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United States Geological Survey
YUCCA MOUNTAIN PROJECT
Monthly Highlights and Status Report
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ACRONYM LIST

A&E	architectural and engineering
ABC	American Borate Corporation
ACD	advanced conceptual design
ACM	alternative conceptual model
ACNW	Advisory Committee on Nuclear Waste
ACP	Area Characterization Plan
ACSR	Activity Control Specification Report
ACS	American Chemical Society
ACWP	actual cost of work performed
ADN	Affected Document Notice
ADP	automated data processing
ADTS	Automated Data Tracking System
AEC	Atomic Energy Commission
AECB	Atomic Energy Control Board
AECL	Atomic Energy of Canada, Ltd.
AEG	Association of Engineering Geologists
AFOS	Automated Field Operating System
AFR	Audit Finding Report
AGU	American Geophysical Union
AIH	American Institute of Hydrology
ALARA	as low as reasonably possible
ALTS	Apache Leap Tuff Site
AMA	Assistant Manager for Administration
AMFM	alternative means of financing and managing
AML	Arc Macro Language
AMP	Administrative Management Procedure
AMD	Administrative Management Section
ANS	American Nuclear Society
ANSI	American National Standards Institute
ANSTO	Australian Nuclear Science and Technical Organization
AO	Administrative Officer
AP	Administrative Procedure
APQ	Administrative Procedure Quality
ARR	Area Recommendation Report
ARS	Automated Records System
ASA	American Statistical Association
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASR	Annual Status Report
ASTM	American Society for Testing and Materials
AT	acoustic televiewer
ATC	Asynchronous Terminal Concentrator
ATLAS	Alternatives to License Application Strategies
ATS	Activity Tracking System
AVL	Approved Vendors List
AVS	Application Visual System
BA	Biological Assessment

BAC	budgets at completion
BAMG	Branch of Atlantic Marine Geology
BBC	British Broadcasting Company
BBS	Bulletin Board System
BCWP	budgeted cost for work performed
BCWS	budgeted cost for work scheduled
BDR	Basic Data Recorder
BFD	Basis for Design
BG&H	Bond Gold and Hydrosearch
BGRA	Branch of Geologic Risk Assessment
BIG	Branch of Isotope Geology
BLM	Bureau of Land Management
BP	before present
BPA	blanket purchase agreement
BPO	blanket purchase order
BQA	Branch of Quality Assurance
BRC	below regulatory concern
BRG	Branch of Central Regional Geology
BSP	balanced cross section modeling program
BSR	Bi-annual Status Report
BWIP	Basalt Waste Isolation Project
C/SCR	Cost and Schedule Change Report
C&C	consultation and cooperation
CA	Construction Authorization
CADD	Computer-Aided Drafting and Design
CAE	Computer-Aided Engineering
CAM	Cost Account Manager
CAP	cost account plan
CAR	Corrective Action Report
CASY	Committee for the Advancement of Science in the YMP
CATS	Corrective Action Tracking System
CBI	Controlled Blasting Investigation
CCB	Change Control Board
CCC	Configuration Control Committee
CD	Consultative Draft
CDP	Career Document Profile
CDR	Conceptual Design for the Repository
CFR	Code of Federal Regulations
CFS	cubic feet per second
CGC	Center for Geoscience Computing
ChemTrec	Chemical Transportation Emergency Center
CHLW	commercial high-level waste
CIRF	Configuration Identification Request Form
CMR	Branch of Central Mineral Resources
COB	close of business
COCORP	Consortium for Continental Reflection Profiling
CODMU	Computer Operations and Data Management Unit
COGS	Computer-Oriented Geological Society
COSIM	conditional simulation
CPR	Cost Performance Report
CR	Central Region
CRF	Central Records Facility

CRF	Comment Response Form
CRG	Central Regional Geology
CRGB	Central Regional Geology Branch
CRW	comment resolution workshop
CSCS	Cost Schedule Control System
CSI	Campbell Scientific, Inc.
CSM	Colorado School of Mines
CVO	Cascade Volcanoes Observatory
CWP	Center for Wave Phenomena
CY	calendar year
D&E	development and evaluation
DAA	Design Acceptability Analysis
DAS	data acquisition system
DCP	data collection platform
DDP	Director's Decision Plan
DEC	Digital Equipment Corporation
DECUS	Digital Equipment Corp Users Group
DEIS	Draft Environmental Impact Statement
DFC	Denver Federal Center
DHLW	defense high-level waste
DISA	Downhole Instrument Station Apparatus
DMS	Desktop Mapping System
DOE	Department of Energy
DOE/HQ	Department of Energy Headquarters
DOE/NV	Department of Energy/Nevada Operations Office
DOE/NVO	Department of Energy/Nevada Operations Office
DOP	Department Operating Procedures
DOT	Department of Transportation
DR3M	Distributed Routing Rainfall-Runoff Model
DRC	Document and Records Center
DRI	Desert Research Institute
DRMS	Data Records Management System
DRS	document review sheet
DTN	document transmittal notice
DTP	Detailed Test Plan
DWMD	Defense Waste Management Department (REECo)
DWPF	Defense Waste Processing Facility
DVNM	Death Valley National Monument
EA	Environmental Assessment
EAC	estimate at completion
EAEG	European Association of Exploration Geophysicists
EBS	engineered barrier system
ECD	electron capture detector
ECR	Engineering Change Report
EDBH	engineered design borehole
EDF	Environmental Defense Fund
EDM	Equivalent Discontinuum Model
EDXRF	energy-dispersive x-ray fluorescence
EEl	Edison Electric Institute
EEP	Emergency Evaluation Plan
EFAP	Environmental Field Assessment Plan
EIA	Emergency Information Administration

EIS	Environmental Impact Statement
EKES	Electronic Keyed-Entry System
EM	electromagnetic
EMP	electron-microprobe
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ERC	Engineering Request Change
ERDA	Energy Research and Development Administration
EROS	Earth Resource Observatory System
ERTP	Environment Requirements Training Program
ES	exploratory shaft
ESF	Exploratory Studies Facility
ESF/DRD	Exploratory Shaft Facility Design Requirements Document
ESQAT	Earth Science Quality Assurance Team
ESR	electron spin resonance
ESSE	Early Site Suitability Evaluation
ESTC	Exploratory Shaft Test Coordination
ESTP	Exploratory Shaft Test Plan
ESTP-C	Exploratory Shaft Test Plan Committee
ET	evapotranspiration
EV	earned value
FEHMS	Finite Element Heat Mass and Stress
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FFS	Federal Financial System
FFS	Federal financial system
FFT	Fast-Fourier Transform
FID	Flame Ionization Detector
FIS	Federal interim storage
FITS	Facilities Important to Safety
FMMG	Fracture Matrix Mesh Generator
FMN	Fortymile neutron
FOLD	Federally Owned Landsat Data
FP	final procedures
FPC	final procurement and construction
FQI	Federal Quality Institute
FR	Federal Register
FRD	Functional Requirement Document
FRHP	Fractured Rock Hydrology Program
FSN	Fenix and Scisson, Nevada
FSU	Florida State University
FTE	full-time equivalent
FWP	field work proposal
FY	fiscal year
G&A	Goodson and Associates
GAO	Government Accounting Office
GAP	Geostatistical Analysis Package
GC	gas chromatograph
GCM	Global Climate Model
GCP	Geochronological Procedure
GD	Geologic Division
GEMLink	General Electric Microwave (communications) Link

GEOEAS	Geostatistical Environmental Software
GET	General Employee Training
GETT	grants equal to taxes
GID	Ground Water Site Investigation
GIS	Geologic Information System
GIS	Graphic Information System
GIT	Geochemistry Integration Team
GMP	Geologic Modeling Program
GMT	Greenwich Mean Time
GOCO	government-owned contractor-operated
GOES	Geostatistical Environmental Operational Satellite
GP	Geologic Procedure
GPO	Government Printing Office
GPP	Geophysical Procedure
GPR	ground-penetrating radar
GPS	global positioning satellite
GQA	Graded Quality Assurance
GRESS	Gradient Enhanced Software System
GSA	Geological Society of America
GSA	General Services Administration
GSIS	Geoscientific Information System
GSP	Geologic Studies Program
GTUF	G-Tunnel Underground Facility
GW	ground water
GWE	Gigawatts Electrical
GWTT	ground water travel time
GXP	Geochemical Procedure
H&N	Holmes and Narver
HIP	Hydrologic Investigations Program (formerly NHP)
HITF	Hydrology Integration Task Force
HLRW	high-level radioactive waste
HLW	high-level waste
HP	Hewlett Packard
HP	Hydrologic Procedure
HQ	Headquarters
HRF	Hydrologic Research Facility
HRMP	Hydrology and Radionuclide Migration Program
HRU	hydrologic-response unit
HSPF	Hydrological Simulation Program
IBM	International Business Machines
IC	ion chromatograph
ICE	Independent Cost Estimate
ICG	International Geologic Congress
ICIAM	International Conference on Industrial and Applied Mathematics
ICN	Interim Change Notice
ICWG	Interface Control Working Group
IDAS	Integrated Data Acquisition System
IDS	Information Data System
IFS	Iterated Function System
IG	Integration Group
IGIS	Interactive Graphics Information System

IGT	Institute of Gas Technology
IHLWM	International High Level Radioactive Waste Management
IMS	Information Management System
INEL	Idaho National Engineering Laboratory
INSTAAR	Institute of Arctic and Alpine Research
INTRAVAL	International Transport Code Validation
IPA	Intergovernmental Personnel Act
IR	infrared
IRG	Interagency Review Group
ISA	Instrument Society of America
ISD	Information Systems Division
ISM	Interactive Surface Modeling
ISO	International Standards Organization
ITR	Information Technology Resources
IVV	Independent Verification and Validation
JGR	<i>Journal of Geologic Research</i>
LA	license application
LACT	laser alignment and centering target
LAN	local area network
LANL	Los Alamos National Laboratory
LBL	Lawrence Berkeley Laboratories
LCS	Liquid Scintillation Counter
LDRP	litigation discovery request procedure
LDS	lightning detection system
LLNL	Lawrence Livermore National Laboratory
LLP	Lightning Location & Protection, Inc.
LLW	low-level waste
LOE	level of effort
LPRS	large plot rainfall simulator
LRC	Local Records Center
LRE	latest revised estimate
LRGS	Local Read-Out Ground Station
LRP	long-range planning
LRP/IPS	Long Range Plan/Integrated Project Schedule
LRS	Litton Resource System
LSC	liquid scintillation counter
LSP	laser safety plan
LSS	Licensing Support System
LWS	Lathrop Wells aeromagnetic survey
LV	Las Vegas
MAs	Management Agreements
MADS	Meteorological Alert Distribution System
MCL	Maximum Contaminant Level
MEDA	Meteorological Data Acquisition Network
MFC	mass flow controller
MGDS	Mined Geologic Disposal System
MIC	Management Information Center
MISIS	Micro Integrated Storm Information System
MLT	materials testing laboratory
MMDS	Martin Marietta Data Systems
MOA	Memorandum of Agreement

MODFE	Modular Finite Element
MOT	Management Overview Team
MOU	Memorandum of Understanding
MPBA	multipurpose borehole activity
MPBH	multipurpose borehole
MPM	Management Procedure Manual
MPU	Manuscript Prep Unit
MRIR	Material Receiving and Inspection Report
MRS	monitored retrievable storage
MSA	major system acquisition
MSHA	Mine Safety and Health Administration
MSIS	Management System Information Strategy
MSL	mean sea level
MSS	Multispectral Scanner
MT	magneto-telluric
M&TE	measuring and test equipment
MTL	main testing level
MTU	metric tons of uranium
MW	mixed waste
NARUC	National Association of Regulatory Utility Commissioners
NBMG	Nevada Bureau of Mines and Geology
NBS	National Bureau of Standards (now NIST)
NCAR	National Center for Atmospheric Research
NCDC	National Climatic Data Center
NCR	Nonconformance Report
NCTM	National Computer Technology Meeting
NEA	Nuclear Energy Agency
NEPA	National Environmental Policy Act
NFS	Nuclear Fuel Services
NGS	National Geodetic Survey
NHP	Nuclear Hydrology Program (now HIP)
NIST	National Institute of Standards and Technology
NLT	no later than
NMD	National Mapping Division
NMIMT	New Mexico Institute of Mining and Technology
NNWSI	Nevada Nuclear Waste Storage Investigation
NOAA	National Oceanic and Atmospheric Administration
NOO	Nevada Operations Office
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRP	National Research Program
NSTF	near-surface test facility
NTC	National Training Center
NTS	Nevada Test Site
NTSO	Nevada Test Site Office
NVO	Nevada Operations Office
NWF	Nuclear Waste Fund
NWIS	Nevada Water Information System
NWIS	National Water Information System
NWM	Nuclear Waste Management
NWN	<i>Nuclear Waste News</i>

NWPA	Nuclear Waste Policy Act
NWPO	Nuclear Waste Projects Office
NWQL	National Water Quality Laboratory
NWTRB	Nuclear Waste Technical Review Board
OBS	organization breakdown structure
OCRWM	Office of Civilian Radioactive Waste Management
OF	Open file
OFR	open-file report
OGR	Office of Geologic Repositories
OMB	Office of Management and Budget
OMR	Office of Mineral Resources
OPCNM	Organ Pipe Cactus National Monument
OPFM	Office of Project and Facilities Management
OPIO	Office of Policy, Integration, and Outreach
ORM	Office of Resource Management
ORNL	Oak Ridge National Laboratory
OSTS	Office of Storage and Transportation Systems
OWQSU	Ocala Water Quality Services Unit
P&S	planning and scheduling
PA	performance assessment
PAC	planning and control
PACE	Performance Assessment Calculation Exercise
PACS	Planning and Control System
PAGEOPH	<i>Pure and Applied Geophysics</i>
PAGIS	Performance Assessment of Geological Isolation Systems
PAL	Project Acronym List
PAMP	Performance Assessment Management Plan
PAP	Performance Assessment Plan
PASP	Performance Assessment Strategy Plan
PBEI	prototype blast effects on instrumentation
PBQ&D	Parson, Brinkerhoff, Quade, and Douglas
PBS	pyramid beam splitter
PC	personal computer
PCBI	Prototype Controlled Blasting Investigation
PCCB	Program Change Control Board
PCM	pivoting camera mount
PCSB	Program Cost and Schedule Baseline
PC&TS	Program Coordination and Technical Support
PD	Position Description
PDA	Participant Data Archives
PDQR	prototype dry coring of rubble
PDHI	prototype drill hole instrumentation
PDM	Problem Definition Memorandum
PDS	Project Decisions Schedule
PEET	prototype excavation effects test
PI	Principal Investigator
PIP	Prototype Investigation Plan
PIR	Precision Infrared Radiometer
PL	Public Law
PMB	Performance Measurement Baseline
PMF	probable maximum flood

PMI	Phase Measuring Interferometry
PMIS	Program Management Information System
PMP	Program Management Plan
PMR	performance measurement review
PMS	Program Management System
PNL	Pacific Northwest Laboratories
PPWE	prototype pore-water extraction
PQM	Project Quality Management
PRBP	project review briefing package
PRC	Project Records Center
PRDA	Program Research and Development Announcement
PRESS	Project-related Engineering and Scientific Studies
PRMS	Precipitation Runoff Modeling System
PSAR	Preliminary Safety Analysis Report
PSI	pounds per square inch
PSS	project summary schedule
PTP	Prototype Test Plan
PTS	Petroleum Testing Services
QA/QC	quality assurance/quality control
QA	Quality Assurance
QAG	Quality Assurance Grading
QAGR	Quality Assurance Grading Report
QALA	Quality Assurance Level Assignment
QALAS	Quality Assurance Level Assignment Sheet
QAM	Quality Assurance Manager
QAP	Quality Assurance Program
QAPD	Quality Assurance Program Description
QAPO	Quality Assurance Project Officer
QAPP	Quality Assurance Program Plan
QAR	Quality Assignment Records
QARD	Quality Assurance Requirements Document
QASC	Quality Assurance Support Contractor
QMP	Quality Management Procedure
QMPR	Quality Management Policies and Requirements
QRA	Quality Related Activities
QRB	Quality Review Board
QVC	Quality Verification Check
QWL	quality of work life
R&D	research and development
R&H	receiving and handling
R&LSD	Research and Laboratory Services Division
RALD	right angle laser deflectometer
RAM	responsibility assignment matrix
RASA	Regional Aquifer Study Assessment
RASRA	radial arm strike rail assembly
RCR	Regional Characterization Report
RCRA	Resource Conservation and Recovery Act
REBS	Radiation Energy Balance Systems
REECo	Reynolds Engineering and Electrical Company
RFP	Request for Proposal
RGEG	Research Grade Evaluation Guide
RIB	Reference Information Base

RIDS	Record and Information Disposition Schedule
RIS	Records Information System
RMF	Records Management Facility
RMNMD	Rocky Mountain National Mapping Division
RMP	Records Management Plan
RMS	Records Management System
ROD	Record of Decision
RPC	Report Package Collection
RQPG	right angle prism goniometer
RRL	reference repository location
RSED	Regulatory and Site Evaluation Division
RSN	Raytheon Services Nevada
RTISA	request to initiate site activity
RW	radioactive waste
RWMNFC	Radioactive Waste Management and the Nuclear Fuel Cycle
RWMS	Radioactive Waste Management Site
s-p	surface-propagated
SA	study activities
SAG	Software Advisory Group
SAGEEP	Symposium on the Application of Geophysics to Engineering and Environmental Problems
SAIC	Science Applications International Corporation
SAR	Safety Analysis Report
SAS	Statistical Analysis System
SBTFRD	Surface-Based Test Facility Requirements Document
SBTP	Surface-Based Test Prioritization
SCA	Site Characterization Analysis
SCC	substantially complete containment
SCI	Software Configuration Items
SCIF	software checklist and indexing form
SCM	Software Configuration Management System
SCP	Site Characterization Plan
SCPB	Site Characterization Program Baseline
SDR	Standard Deficiency Report
SDRD	Subsystems Design Requirement Document
SE	Senior Engineer
SE&D	Systems Engineering and Development
SEG	Society of Exploration Geophysicists
SEM	scanning electron microscopy
SEMP	System Engineering Management Plan
SEPDB	Site and Engineering Properties Data Base
SES	Scientific and Engineering Software
SF	spent fuel
SG	Senior Geologist
SGB	Southern Great Basin
SGBSN	Southern Great Basin Seismic Network
SGR	Seismic Group Recorders
SIP	Scientific Investigation Plan
SIR	Scientific Investigations and Research
SIR	Special Investigative Review
SIT	Site Integration Team
SKB	Swedish Nuclear Fuel and Waste Management Company

SMF	Sample Management Facility
SMS	Sample Management System
SNF	spent nuclear fuel
SNL	Sandia National Laboratories
SNP	Scientific Notebook Plan
SNSN	Southern Nevada Seismic Network
SOBART	Southern Basin and Range Transects
SOC	Sample Overview Committee
SOIR	status of open items report
SOP	Standard Operating Procedure
SP	Seismic Procedure
SP	Study Plan
SPA	Study Plan Assessment
SPE	Society of Petroleum Engineers
SPOC	submersible pressurized outflow cell
SPR	Semi-annual Progress Report
SPR	Software Problem Report
SPRS	small plot rainfall simulator
SQA	Software Quality Assurance
SQAP	Software Quality Assurance Plan
SRD	system requirements and description
SRG	strike rail goniometer
SRM	standard reference material
SRP	Site Recommendation Report
SSF	software summary forms
SSF	specified software forms
SSR	Site Selection Report
SSSA	Soil Science Society of America
STC	Southern Tracer Complex
SWO	stop-work order
SZ	saturated zone
T&MSS	Technical and Management Support Services
T&MSS SP	T&MSS Standard Practice Procedure
TAR	Technical Assessment Review
TBD	to be determined
TBM	Tunnel Boring Method
TC	Technical Contact
TC	Training Coordinator
TCD	thermal conductivity detector
TCP	telescoping camera pedestal
TCPAL	Thermocouple Psychrometer Calibration
TDAG	Technical Data Advisory Group
TDB	Technical Data Base
TDD	Test Descriptions Document
TDF	task definition form
TDIF	Technical Data Information Form
TDR	time domain reflectometry
TDS	total dissolved solids
TEF	Test and Evaluation Facility
TESS	TRW Environmental Safety Systems
TFA	Temporary Field Assistant
TIC	Technical Information Center

TM	thematic mapper
TP	Technical Procedure
TPEC	Technical Proposal Evaluation Committee
TPO	Technical Project Officer
TPT	Testing Prioritization Task
TQM	Total Quality Management
TRIG	Technical Review and Integration Group
TRIMS	Technical and Regulatory Information Management System
TRU	Transuranic
TSR	Technical Status Report
TVA	Tennessee Valley Authority
UARW	Upper Amargosa River Watershed
UNE	Underground Nuclear Explosion
UNLV	University of Nevada at Las Vegas
UNR	University of Nevada, Reno
UNRSL	University of Nevada Reno Seismic Laboratory
UPS	Uninterrupted Power Supply
URL	underground research laboratory
USBLM	U.S. Bureau of Land Management
USBR	U.S. Department of the Interior Bureau of Reclamation
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USNSN	U.S. National Seismic Network
UTM	Universal Trans Mercator
UZ	unsaturated zone
UZFRHP	Unsaturated Zone Fractured Rock Hydrology Project
UZIG	Unsaturated Zone Interest Group
UZSBP	Unsaturated Zone Surface-Based Borehole Project
VAR	Variance Analysis Report
VARS	Video Archival Retrieval System
VLF	very low frequency
VOC	Validation Oversight Committee
VOG	Validation Oversight Group
VSP	vertical seismic profiling
WA	Western Atlas
WAC	Waste Acceptance Criteria
WAS	Work Authorization Submission
WAS/FWP	Work Authorization System/Field Work Proposal
WBS	work breakdown structure
WIPP	Waste Isolation Pilot Plant
WIT	Working Integration Team
WMNFC	Waste Management and Nuclear Fuel Cycle
WMSD	Waste Management Systems Description
WNRE	Whiteshell Nuclear Research Establishment
WORM	Write Once Read Many
WP	waste package
WP	Weapons Program
WPDRD	Waste Package Design Requirements Document
WRCC	Western Region Climate Center

WRD	Water Resources Division
WRG	Western Region Geology
WRI	Water Resources Investigations
WRIR	Water Resources Investigations Report
WRR	Water Resources Research
WSA	Wilderness Study Area
WSNSO	Weather Service Nuclear Support Office
WSP	Water Supply Paper
WT	water table
WVDP	West Valley Demonstration Project
WY	water year
XRD	x-ray defraction
XRF	x-ray fluorescence
YM	Yucca Mountain
YMP	Yucca Mountain Project
YMPB	Yucca Mountain Project Branch
YMPO	Yucca Mountain Project Office

1.2.1 SYSTEMS

OBJECTIVE

To integrate systems with the Geologic Repository Program and to describe the YMP Mined Geologic Disposal System (MGDS); and to evaluate the performance of the natural, engineered barrier, and total systems for meeting regulatory standards.

WBS 1.2.1.3 Technical Data Base Management

OBJECTIVE

To manage, maintain, and accumulate technical data and information produced by site characterization, design development, and performance assessment activities for the Project.

WBS 1.2.1.3.5 Technical Data Base Input

Principal Investigator - L. Hayes

OBJECTIVE

To provide the hardware, software, personnel, and procedures needed to provide data to the technical base.

ACTIVITIES AND ACCOMPLISHMENTS

During a move of the Parfet Participant Data Archives (PDA) files, the contents of the files were identified and location tracking was initiated. Sixteen data submittals were received in the PDA and eight Technical Data Information Forms (TDIFs) for earlier submittals were corrected.

Regarding earthquake center data: 1) a receipt system was established and utilized to track data checked out from Parfet or Security Archives locations, 2) future disposition of data was explored, 3) sample tapes were examined to determine viability of contents, 4) an inventory was conducted to determine whether all tapes are accounted for, 5) data will continue to be submitted through the end of the fiscal year.

A concern about failure to submit data to the Central Records Facility (CRF) according to the timetable or schedules called for by AP-5.1Q resulted in a Corrective Action Request being issued by the Quality Assurance (QA) office.

A problem in the schedules for submittal of data to the PDA was identified and determined to be part of a previously identified deficiency. A considerable effort to correct the problem was made by data management staff, with the cooperation of project control staff, but it was determined that involvement of Principal Investigators (PIs) will be necessary. Plans are being made to enlist such involvement as FY93 Planning and Control Systems (PACS) input is submitted.

WBS 1.2.1.4 Performance Assessment

OBJECTIVE

To conduct investigations and develop mathematical models examining the performance of the MGDS in the preclosure and postclosure phases; to verify, validate, benchmark, and document codes for assessing the performance of the overall waste isolation system; and to analyze the performance of the total system and subsystems.

WBS 1.2.1.4.4 Site Performance Assessment

OBJECTIVE

To integrate physical process submodels and data into computational models for prediction of performance of the site (including uncertainties); and assess whether the site will meet requirements for ground-water travel time in 10 CFR 60.113(a) (2). (SCP Sections 8.2.2 and 8.3.5)

WBS 1.2.1.4.4.2 Favorable and Adverse Conditions

Principal Investigator - A. Flint

OBJECTIVE

To assess site performance characteristics under the favorable and adverse conditions listed in 10 CFR 60.122; and assess engineered barrier system (EBS) performance characteristics under the potentially adverse conditions in 10 CFR 60.122, which refers to impacts on EBS performance. (SCP Section 8.3.5.17)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPA007 Sensitivity analysis model mesh size to 1-d infiltration

In order to expand the vertical grid to the water table, and comply with the maximum limitation of 27 vertical input units in TOUGH, several units in the welded tuff were combined. Preliminary results indicate that convergence and results are not affected significantly by this. Initial efforts to use N-54, N-53 and N-27 are underway to test the model.

3GPA003 Imbibition experiment for input to analytical solution

The sorptivity calculated from imbibition measured on core samples at several initial water contents is required for application to the analytical solution to predict functional relations. Additionally, these samples need moisture retention curves. Several core samples are being processed by RSN-MTL through their centrifuge. These samples will then be tested at the HRF for sorptivity.

Quality Assurance

Planning and Operations

Variances

WBS 1.2.1.4.6 Development and Validation of Flow and Transport Models

Principal Investigator - A. Flint

OBJECTIVE

To develop and validate the calculational models that (1) are used primarily in assessments of performance for the resolution of Issues 1.1, 1.2, 1.3, 1.6, 1.8, and 1.9; (2) describe fluid flow or the transport of energy/or radionuclides; and (3) are not used exclusively in the resolution of a single issue; and to follow applicable quality-assurance procedures.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GVF002 Heating experiment lab analyses

The air and water permeability measurements are continuing. This study is being accelerated to provide SNL with laboratory results to test their modeling efforts for postclosure repository performance. This is reflected in the Mission 2001 updates of the PACS.

3GVF006 Develop software preliminary analyses of thermal conduct heat capacity

A draft of the technical procedure for determining thermal conductivity and heat capacity, which includes the software to conduct the calculations, is complete and will be in colleague review shortly. Additional samples currently are being run to test the procedure.

3GVF014 Prepare a technical report, on the horizontal variability of Shardy base transect

Additional laboratory measurements were made and results added to the report. The draft is currently in colleague review prior to sending it out for technical review.

3GVF015 Finalize geostatistical software and text

The user's manual for the software still is being written and undergoing internal review. It is expected that this activity will be completed on time and will not impact other activities.

Quality Assurance

Planning and Operations

Variations

WBS 1.2.1.4.7 Supporting Calculations for Postclosure Performance Analyses

Principal Investigator - A. Flint

OBJECTIVE

To provide documentation and results of calculations used in analyses of postclosure performance that support design efforts, contribute to the resolution of Issue 1.3, and indirectly support activities carried out under other performance assessment WBS elements.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPC002 Develop method to determine moisture retention-CX-2

Slices of 1 inch plugs are being used to ascertain if sorption and desorption moisture retention curves are feasible using this instrument. Preliminary results suggest that sorption measurements are unrealistic. Changes in water potential, with small changes in water content in the very wet portion of the curve where hysteresis occurs, create errors that overshadow the degree of hysteresis expected due to the small size of the sample. This also was found to be true when very small core samples were used in the SC10-A. It does appear that the desorption phase of the characteristic curve is repeatable and additional measurements are being made to accurately define the air entry potential of several different lithologic units. Investigation of the effects of fragment size on the measurement of potential, using this method, is still underway and an outline for the presentation is being prepared.

Technical Activities (CONTINUED)

3GPC005 Collect additional transect samples

Scattered samples will be collected to look at properties of faults and fractures, but there are no plans to collect more transect samples. This activity will remain open because the final lab measurements are not yet complete, and data to adequately characterize particular units may be necessary at a later date.

Quality Assurance

Planning and Operations

Variances

1.2.3 SITE

OBJECTIVE

To characterize Yucca Mountain and vicinity to identify and technically qualify a possible site for the construction and operation of a mined geologic repository for high-level radioactive waste.

WBS 1.2.3.1 Management and Integration

Principal Investigator - L. Hayes

OBJECTIVE

To manage and integrate the work performed within the site WBS elements.

M&I - Geologic Studies Program 0G3192G1

Summary Account Manager - J. Stuckless

ACTIVITIES AND ACCOMPLISHMENTS

Work continued on Trench 14 issue resolution with H. Moomey (SAIC) and D. Vaniman (LANL). All figures and data tables needed for the report have been completed. Sampling of wells needed to verify older isotopic data has been completed.

Much effort was dedicated to project review at the activity level.

J. Stuckless and J. Whitney spent 2 days meeting with seismic risk specialists in Menlo Park in preparation for writing new MOAs with the Geologic Division.

J. Stuckless and section chiefs met with D. Russ of the Chief Geologist's office to brief him on progress in the transition and to discuss work for the Geologic Division next year.

J. Stuckless and J. Brune (UNR) participated in a press conference concerning the Little Skull Mountain earthquake of June 29.

Work plans for 1993 and performance appraisals for 1992 were completed for GM staff.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 16 hours were spent responding to the Little Skull Mountain earthquake.

ACTIVITIES AND ACCOMPLISHMENTS

Final drafts of the following technical procedures were prepared and returned to Geologic Studies Program/Hydrologic Investigations Program (GSP/HIP) for signatures and then on to Document Control for distribution:

GPP-11, R0 Magnetic Methods
HP-236T, R0 Installation and Operation of PVC Straddle Packer String in UZ Boreholes
for Gas and Water Vapor Sampling

The following preliminary draft technical procedures and scientific notebook plans were prepared as requested:

HP-54, R1 Water-Flow Measurements Using Weirs, Flumes, and Barrels
HP-96, R1 Measurement of Wind Speed Using a Met-One Inc. Model 014A Wind Speed
Sensor
HP-166, R1 Stream Discharge Measurements Using a Pygmy Meter
HP-219, R0 Method to Install, Operate, and Examine a Recording Streamflow Gage
Using the Fluid Data G-II Manometer System (final format)
HP-236T, R0 Installation and Operation of PVC Straddle Packer String in UZ Boreholes
for Gas and Water Vapor Sampling
HP-239T, R0 Method for Removing Traced Drilling Air From Unsaturated-Zone Boreholes
HP-240, R0 Method for Analysis of Co2 Gas Samples by Gas Chromatography Using
Summit Interests SIP 1000 (final format)
HP-241, R0 Air Permeability Testing
HP-243, R0 Method for Determining the Volume and Particle Density of Rock and Soil
Samples Using the Micromeritics Accupyc 1330 Pycnometer
HP-246, R0 Mapping Fractures on Traverses and Outcrops for Hydrologic Studies
HP-248T, R0 Extraction of Pore-Water From Welded and Non-Welded Tuff Chips Using
One-Dimensional Compression Methods
HP-249, R0 Method for Pore-Water Extraction Using High-Pressure One-Dimensional
Compression

The following documents were formatted for HIP, and then deleted from the system per their request.

HP-248T, R0 Collection of Well Discharge and Water Level Data for Input Into Aquifer
Test Analysis
HP-199, R1 Collection of Aquatic Micro-organisms

A Quality Assurance grading report for the United States Bureau of Reclamation (USBR) was submitted to the QA review board (QRB) for review. This grading report is to be re-reviewed by the QRB by the end of July.

Coordination continued for orientation, training, document control, and personnel qualifications for new Geologic Studies Program (GSP) personnel. Monitoring continued for the test planning package and request for proposal (RFP) for the seismic reflection line. Follow-up and tracking continued for overdue document transmittal notices (DTNs) and instruction assignments for the GSP.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

Input was monitored and/or provided to the following open items: CAR-91-01, CAR-91-03, CAR-91-05, CAR-91-07, CAR-92-05, NCR-90-37, NCR-91-26, NCR-91-31, NCR-92-02, NCR-92-06, NCR-92-19, NCR-92-26, and NCR-92-33.

Several meetings and planning sessions were attended at the Nevada Test Site to evaluate the emergency response efforts relating to the June 29, 1992 earthquake at Little Skull Mountain. The evaluation included quality assurance reviews and integration of data from investigations conducted by Lawrence Livermore National Laboratory (LLNL), USGS Branch of Geologic Risk Assessment (BGRA), and the University of Nevada Reno Seismological Laboratory (UNRSL). The data will be used in support of Study 8.3.1.17.4.1.

Meetings and planning sessions were attended concerning the transition of the operation and maintenance of the Southern Great Basin Seismic Network (SGBSN) from the USGS-BGRA to the UNRSL.

Draft Open-File report, "Photogeologic and kinematic analysis of lineaments at Yucca Mountain, Nevada: implications for strike-slip faulting and oroclinal bending," by J. O'Neill, J. Whitney, and M. Hudson was processed.

A draft of QMP-5.01, R5, Preparation of Technical Procedures, was reviewed for the GSP.

A memorandum of agreement (MOA) between the USGS Water Resources Division (WRD) and the USGS Geologic Division (GD) Branch of Paleontology and Stratigraphy for field trip to Yucca Mountain (Activity 8.3.1.5.2.1.3) was distributed.

Technical Procedure GPP-11, R2, "Magnetic methods", was processed and submitted to the QA Office and document control for further processing. Draft technical procedure GPP-15, R1, "Magnetic susceptibility borehole logging operations" has been prepared per instructions and returned to the author.

A TDIF is in process for P. Nelson's Open-File Report (OFR) publication "Assessment of geophysical logs from borehole USW G-2, with recommendations for future logging at Yucca Mountain, NV." Developed and acquired data TDIFs were prepared for S. Harmsen, Branch of Geologic Risk Assessment, in support of his OFR "Seismicity and focal mechanisms for the southern Great Basin of Nevada and California in 1991".

The disposition response for USGS-NCR-92-26 was prepared and submitted to the QA Office for approval.

Modification 2 to QMP-3.07, R4 has been revised and resubmitted to the QA Office for approval.

Assisted L. Kwak, USGS/GSP, in preparing a memo to the record concerning usage of an analytical balance calibrated by CBS, Inc.

Assisted with a technical evaluation to qualify erosion data that will be an integral part of the technical basis for the DOE erosion topical report.

M&I - Hydrology Program Management and Administration 0G3192H1

Summary Account Manager - D. Gillies

ACTIVITIES AND ACCOMPLISHMENTS

Hydrology program management staff and summary account managers participated in a series of programmatic reviews conducted by the YMP-USGS Technical Project Officer, Larry Hayes, July 10-17. Primary emphasis of the reviews was on current schedule status, schedule variances, and unscheduled work. Each summary-account manager discussed their activities with the assembled management personnel.

At the request of the YMP-USGS TPO, D. Gillies performed an analysis of projected spending overrun and underrun at the summary-account level for the hydrology program.

R. Luckey made a presentation at the July TPO meeting on water-level and fluid- pressure responses in wells to the June 29 Little Skull Mountain earthquake.

M&I QA Implementation, Hydrology 0G3192H2

Summary Account Manager - W. Causseaux

ACTIVITIES AND ACCOMPLISHMENTS

S. Frans, (HIP) is currently processing 41 Hydrologic Procedures and Scientific Notebook Plans.

Eight approved Technical Procedure packages were submitted to SAIC by S. Frans.

S. Boucher received HP-196, R1 back from technical review, edited the text, and sent it back to the QA office.

J. Watson wrote a draft of HP-199, R1, which was later rescinded.

GP-12, R1 received a technical review and it is back with the authors (M. Chornack and E. Ervin) for comment resolution.

M. Ciesnik prepared Scientific Notebook - 0014 for use in the field.

M. Pabst assisted in coordinating both technical and QA review comment responses for the following Hydrologic Procedures and Scientific Notebook Plans: HP-54, R1, HP-96, R1, HP-100, R1, HP-166, R1, HP-236T, R0, HP-240, R0, and HP-241T, R0.

J. Woolverton provided input to the YMP-USGS QA office for the quantitative/qualitative section of HP-166, R1, entitled "Stream discharge measurements using a pygmy meter".

Quality Management Procedures

M. Pabst coordinated the selection and distribution of the following QMPs within the UZ section for technical review: QMP-4.01, R4, QMP-5.01, R5, QMP-7.01, R5, and QMP-7.04, R0.

Open Items Status

Per AFR-9204-02, a scientific notebook tracking system, to track the location and status of all saturated zone SNs, was developed by S. Boucher.

M. Ciesnik is awaiting QAO evaluation of responses to AFR-9203-01-03 submitted June 15, 1992.

Open Items Status (CONTINUED)

M. Ciesnik is awaiting QAO evaluation of responses to AFR-9204-01-02 submitted July 8, 1992. While he is waiting for the evaluations, he is rewriting the responses based on information gained from the July 17, 1992 meeting with M. Mustard, J. Ziemba and other section QAs.

M. Ciesnik is awaiting QAO evaluation of response to NCR-92-18 submitted June 30, 1992.

M. Ciesnik prepared a request to the YMP/USGS training coordinator for a workshop on QMP-4.01 for selected HIP personnel. This was part of the disposition to AFR-9203-01.

M. Pabst prepared a supplemental response for USGS-NCR-91-31 to clarify the users of analytical balances calibrated by QA Balance Services Inc.

M. Pabst worked with the UZ hydrochemistry staff to prepare a response for USGS-NCR-92-25. The nonconformance report documents a YMP-USGS QA violation related to a BPA issued without an approved requisition request.

M. Pabst conducted a preliminary investigation into the cause of USGS-NCR-91-31. The NCR documents a YMP-USGS QA violation related to release of a publication without QMP-3.04 processing.

M. Pabst conducted a preliminary investigation into the cause of USGS-NCR-92-33. The NCR documents a YMP-USGS QA violation related to the certification of analytical balances that did not meet manufacturer's specifications.

J. Woolverton prepared an "impact on quality" statement regarding the lack of two MAs described in USGS-CAR-92-03 (D. Thorstenson and J. Healy).

J. Woolverton assisted M. Chornack and D. Appel in preparing a data review plan for USGS-CAR-92-04 ("Gaseous phase circulation"). In addition, Woolverton assisted in preparing final actions to prevent recurrence for USGS-CAR-92-04.

D. Appel, M. Chornack, and J. Woolverton attended the CAR board meeting on July 20, 1992 to discuss required actions regarding USGS-CAR-92-04.

J. Woolverton, M. Pabst, and S. Boucher represented HIP at the YMPB-USGS Open Items meeting on July 22, 1992.

Audit Status

S. Boucher and J. Watson participated in DOE Audit YM-92-20.

W. Causseaux served as HIP/YMPB liaison with YMPO Auditors during YMPO Audit-92-20 during July 28-30, 1992 in Denver; M. Pabst also participated.

26 published report packages identified as a result of CAR-92-029 (Audit YMP 92-13) were reviewed by J. LaMonaca and S. Frans as part of the HIP completion process for the CAR.

Management Agreement Status

S. Boucher prepared 2 MAs to document the work that W. Osterkamp and R. Webb, both of the USGS National Research Program, will be providing to Activity 8.3.1.5.2.1.3 (E. Gutentag). By July 31, 1992, they were at the QAO awaiting signatures.

Management Agreement Status (CONTINUED)

The YMP-USGS MA between the HIP/YMPB and the Nevada District, WRD for the YMP Surface water studies was submitted by W. Causseaux.

M. Pabst continued to coordinate the approval of the following MAs: (1) Between the HIP-YMPB and R. Getzen, Western Regional Research, and (2) Between the HIP-YMPB and the Branch of Isotope Geology Machine Shop.

General

Saturated Zone QAs conducted interviews with their PI's to determine if compliance with QMP-3.15, R0 was necessary by the August 3, 1992 deadline. The results of the interviews were compiled in a memorandum and submitted to the Section Chief. Through discussions with D. Luckey it was determined that there were no activities which required an activity control specification report (ACSR) prior to the August 3 deadline.

Initial training assignments were issued for R. Webb and J. Earl.

M. Pabst assisted G. LeCain in preparing a TDIF and data package for "Pneumatic testing of rock permeability from Apache Leap".

M. Pabst prepared a draft ACSR in accordance with QMP-3.15 for a prototype alert system. The ACSR was prepared in support of SCP Activity 8.3.1.2.1.2.1.

M. Pabst assisted the UZ hydrochemistry staff in preparing a request for the YMP-USGS QA office to evaluate Crystal Laboratory for performing X-Ray Defraction Analyses.

J. Woolverton assisted C. Peters in preparing a guidance memo to HIP Project Chiefs for processing ACSRs in accordance with QMP-3.15.

J. Woolverton assisted the HIP QA Staff in preparing a memorandum to HIP PIs, addressing the use of rescinded QALA Nos. on procurement documents.

J. Woolverton prepared a request for the YMP-USGS QA Office to evaluate the Southern Methodist University Laboratory for performing C¹⁴ analysis of gas samples. He provided input to UZ technical section investigators in the preparation of the following ACSRs: 1. Prototype intact fracture tests in the E.S.F. 2. Prototype percolation tests in the E.S.F., and 3. Hydrochemical modeling in the UZ.

Meetings and Travel

S. Boucher met with P. McKinley and W. Rodman several times to discuss the possibility of NCRs being written on McKinley's data. It was decided that problems with missing and intermittent data did not constitute a "nonconforming item", and therefore NCRs were not necessary. A memo to the QA Manager is being compiled to document this decision.

S. Boucher and J. Watson met several times with E. Gutentag, W. Rodman and/or D. Luckey to decide the best way to document Gutentag's collection of in line flow-meter data. It was decided that a field change to HP-200, R0 was the most efficient way to document the collection of the data.

J. Earl attended YMP orientation training.

Meetings and Travel (CONTINUED)

S. Boucher, M. Ciesnik and J. Watson met with M. Mustard and J. Ziemba on July 17, 1992 to discuss the responses to AFRs 9203 and 9204.

J. Watson discussed the conversion of HP-199T, R0 to a technical procedure with R. Forester.

J. Watson, M. Ciesnik attended the July 20, 1992 software modeling meeting.

S. Boucher and J. Watson met with D. Luckey for the first SZ QA meeting. These meetings will be held bi-weekly.

S. Boucher met with M. Umari to discuss the formulation of a SN to document the cross-hole tests with prototype packer strings. S. Boucher will do some preliminary work on the notebook.

M. Chornack, M. Pabst, and J. Woolverton met on July 13, 1992 to discuss the status of QA action items within the UZ technical section.

The Denver based UZ QA Section Staff met with YMP-USGS QA office representatives, and other YMPB Investigators on July 20, 1992 to discuss software QA applications for modeling.

D. Appel, M. Chornack, and J. Woolverton attended the CAR Board meeting on July 20, 1992 to discuss required actions regarding USGS-CAR-92-04 ("Gaseous phase circulation").

J. Woolverton, M. Pabst, and S. Boucher represented HIP at the YMPB-USGS Open-Items meeting on July 22, 1992.

M. Pabst met with P. McKinley, M. Mustard, S. Boucher and A. Whiteside on July 30, 1992 to discuss TDIFs, and records package submittals/processing.

Records Management

S. Boucher submitted a TDIF for the 2nd quarter Periodic Logbook data (Activity 8.3.1.2.3.1.2).

J. Watson submitted copies of SN -0008 and -0010 to the QAO per QMP-5.05.

J. Watson submitted a TDIF for water chemistry data (8.3.1.5.2.1.3).

M. Ciesnik submitted a TDIF for multi-level sampler data collected in 1990 (Activity 8.3.1.2.3.1.4).

One published GSP publication package was submitted to the LRC by J. LaMonaca in July.

Computer Operation & Data Management, Hydrology 0G3192H3

Summary Account Manager - C. Washington

ACTIVITIES AND ACCOMPLISHMENTS

The Computer Operations Unit's (COU) primary duty for the month of July was that of meeting the FY-92 procurement deadlines. The COU established or renewed software and hardware maintenance contracts for all of HIP's systems. In addition, all orders for hardware and software that fell between \$1K and \$10K were researched and processed.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

Novell System

M. Vaught and C. Washington met with D. Goekel and LRC representatives to resolve LRC's Novell problems. Most of the problems stemmed from having others install software and/or modify the configuration files on LRC's PCs. We resolved LRC's problems and all concerned agreed that all modifications to LRC's PCs will be performed by the Computer Operations Unit.

Unix System

The processing and storage requirements of the ARC/INFO users were met by installing a SPARC station ELC with a 900MB worm drive. The ELC will run ARC/INFO as well as store and/or retrieve the data via the worm drive. This configuration will release extensive amounts of storage on the SUN Server which was allocated as ARC/INFO's.

Meetings and/or Conferences

W. Sockriter attended the IRM Council Meeting in Las Vegas as a COU representative to discuss HIP LAN operations.

Scientific Reports and Project Documents, Hydrology 0G3192H4

Summary Account Manager - T. Brady

ACTIVITIES AND ACCOMPLISHMENTS

HIP is currently processing 88 YMP-HIP scientific publications, 56 YMP-GSP scientific publications, 8 YMP-LBL scientific publications, and 20 abstracts.

T. Brady completed the HIP review of the following abstracts and reports:

"Tectonic framework of Crater Flat basin, adjacent to Yucca Mountain, Nevada: A preliminary report", an abstract, by C. Fridrich, and J. Price; "Photogrammetric analysis of modern hillslope erosion at Yucca Mountain, Nevada", an abstract, by J. Coe, J. Whitney and P. Glancy; an abstract of "The effects of high temperature on hydrologic properties of volcanic tuffs", by M. Nash, and A. Flint; "Effects of rock fragment size on laboratory determination of water potential", an abstract, by M. Nash, A. Flint, L. Flint and J. Rousseau; "A water potential approach to standardize oven dryness", an abstract, by A. Flint and L. Flint; the report, "USGS Committee for the advancement of science in the YM project on "Fractures, hydrology, and YM", abstracts and summary", by J. Gomberg, editor; "Fracture-flow modeling in the saturated zone at Yucca Mountain", a report, by K. Karasaki and E. Ervin; and the report, "Precision and accuracy of water-level measurements taken in the Yucca Mountain area, Nevada, 1988-1990", by M. Boucher.

Study plan status

Author/reviewer concurrences were reached on all DOE review comments for SP 8.3.1.2.3.3 - Site saturated-zone hydrologic system synthesis and modeling, and responses to NRC Phase I review comments were completed for SP 8.3.1.16.1.1 - Flood potential and debris hazards and transmitted to the Project Office.

Technical Data Base Management, Hydrology 0G3192H5

Summary Account Manager - N. Stuthmann

ACTIVITIES AND ACCOMPLISHMENTS

Routine jobs were performed throughout the month, including the retrieval of the QW data from the WRD National Water Laboratory, entering these data into the HIP NWIS database and the cleanup of the Satellite Transmission of data (SATIN) maintenance logs and directories. Backup of the NWIS database was performed and the backup tape sent to the LRC for storage in the fire proof vault.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

B. Oatfield has obtained leads on more analytical data which he passed to the Quaternary/Future Regional Hydrology Section. He also received requests for ground water site information from the GSP users.

Several meetings occurred during the month of July concerning the storage of data in the NWIS-II database. The most significant was meeting with J. Schornick from the Reston office on storage of data values in NWIS-II along with the various constituents and the attributes required to identify the values. The Data Management Unit will be setting up another meeting with Schornick to receive more formal training on the NWIS-II entity relationship diagrams and on checking the various constituents identified as required items within the HIP and GSP.

B. Kerans and D. Burkhardt reviewed the process of receiving data via the satellite transmission network in the transition from processing data on the Prime computer to the Data General computer. The meeting was attended by E. Dryer, Reston, and G. Rogers from Montana. This effort is progressing well and should produce the revised ADAPS code to allow the transition to processing all continuous record on the Data General computer system in the next 3 months.

WBS 1.2.3.2 Geology Principal Investigator - J. Stuckless

OBJECTIVE

To conduct geologic investigations to evaluate the suitability of the surface and subsurface environment for siting a nuclear waste repository.

WBS 1.2.3.2.2 Rock Characteristics

OBJECTIVE

To describe present and expected rock characteristics of the Yucca Mountain site and to develop a three-dimensional model of rock characteristics. (SCP Section 8.3.1.4)

WBS 1.2.3.2.2.1 Geologic Framework of the Yucca Mountain Site

OBJECTIVE

To conduct field studies, including surface and subsurface geophysical surveys and geologic mapping on the surface and in the exploratory shaft facility to characterize the geologic framework of the Yucca Mountain site. (SCP Investigation 8.3.1.4.2)

WBS 1.2.3.2.2.1.1 Vertical and Lateral Distribution of Stratigraphic Units within the Site Area

Principal Investigator - R. Spengler

OBJECTIVE

To determine the vertical and lateral variability and emplacement history of stratigraphic units and lithostratigraphic subunits within the Yucca Mountain site area. (SCP Study 8.3.1.4.2.1)

SCP 8.3.1.4.2.1.1 Surface and subsurface stratigraphic studies of the host rock and surrounding units
0G3221A2

Summary Account Manager - C. Hunter

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU002A Geochemical isotopic sampling and analysis, phase 1

The staff of the Isotope Geochemistry Support Group of GSP continued work in support of stratigraphic studies.

K. Futa and D. Craft continued to analyze samples for G-4 drill core for precise Sr initial isotopic ratio determinations of Topopah Springs member of the Paintbrush Tuff. Data will be used to test application of high-precision isotope stratigraphy within an otherwise monotonous thickness of tuff representing the potential repository horizon. Rb concentrations were determined for six samples by isotope dilution mass spectrometry, and were used to accurately calculate $^{87}\text{Rb}/^{86}\text{Sr}$ and initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratios. These values show an apparent reduction of analytical noise in the isotope stratigraphy of the Topopah Springs member relative to previous data. However, additional analyses are required to statistically validate observed trends

B. Widmann and D. Craft prepared 17 samples from JF-3 and 18 samples from J-13 drill holes for whole-rock analysis of tuffs from below the water table. Ultimately, the chemical and isotopic compositions of these samples will be compared to the same units sampled in the geochemistry reference sections which have not experienced saturated conditions since emplacement.

3GGU003A Review samples from prototype (YM) hole, UZ holes
No start to this activity.

3GG0U10A Comp of existing boreholes, lithologic logs (WT)
The start on this activity again has been deferred.

Quality Assurance

Planning and Operations

Variances

3GGU002A Geochemical isotopic sampling and analysis, phase 1

This activity is being continued pending resolution of reporting protocols. Similar work activity was planned under 3GGU021A (Geochemical isotopic sampling/analysis G-5, UZ, WT), but G-5 has been delayed until FY94. As continuing analytical work on on-going projects, there is no long- or short-term impact related to continuation of 3GGU002A.

3GGU003A Review samples from prototype (Yucca Mountain) hole, UZ holes
No start to this activity due to the slow progress of drilling. No impact is anticipated, long- or short-term. Our staffing is in place and adequate to respond to HIP needs for logging and sampling.

3GG0U10A Comp of existing boreholes, lithologic logs (WT)
This activity was scheduled with adequate flex to allow for conflicts with other duties with no impact. There is no milestone impact at this time.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU220 QA documentation of software

QA of software for calibrating gravity meters could not be completed in time to reduce Mt. Hamilton runs on July 17, 1992, so D. Ponce was forced to reduce the data by hand to comply with QA regulations and meet the field departure deadline of July 22, 1992. D. Plouff is working on converting BRG (for reducing OGS), HP total-station resection solutions, BOUGUER, and AIRYROOT to UNIX. HANDTC (for making inner terrain corrections to gravity data), and DIGIT (for converting X-Y coordinates to geographic coordinates) have been submitted to the YMPB. He is also designing validation tests for these programs as required.

3GGU222 Submit status of regional geophysical for review

Progress continues on the proposed USGS bulletin "Status of regional geophysical studies at Yucca Mountain and Vicinity, Nevada and California." K. Fox signed off as the primary reviewer on the gravity chapter and his minimal comments are being incorporated by co-author D. Ponce. M. Carr has withdrawn his chapter on "Geologic setting of Yucca Mountain" for political reasons. This action forced H. Oliver to write his own geologic summary for incorporation into Chapter 1, "Introduction", and to move up chapters 3 through 10. The remaining chapters by J. Sass and T. Brocher are being revised. J. Healy will provide a revision of his stress chapter by August 21, 1992. All chapters have been through two reviews, and revised manuscripts will be submitted for the expected Branch approval scheduled by the end of FY92.

3GGF223 Study plan approval

No activity reported during this period. The study plan has been approved by DOE Headquarters and is in the review period at NRC. The 90-day comment period concludes in mid-September.

3GGU250 Collect and reduce magnetic/gravity data in Yucca Wash

D. Ponce, R. Sikora, V. Langenheim, and S. Kuehn traveled from Menlo Park to Mercury, NV, for approximately two weeks of field measurements. They are obtaining new gravity and ground magnetic data along several profiles across Yucca Wash and northern Midway Valley, to help locate the trace of the Paintbrush fault. Activity to collect magnetic and gravity data, in investigations to support interpretation of the seismic lines to be run in Yucca Wash as part of the extensive seismic reflection transect of Yucca Mountain, is awaiting approval of the 8.3.1.4.2.1 (Characterization of the vertical and lateral distribution of stratigraphic units within the site area) study plan by the NRC. That study plan is now in the review period at the NRC. Planning for fieldwork supporting the seismic transect is underway, with expected fieldwork late in 1992. Data from this activity will be used to target the location for proposed corehole USW G-5 (currently set for FY94), and will also provide constraints on the interpretation of regional variation in the stratigraphic relationships at Yucca Mountain.

3GTQ006J Oversee field operations

No activity reported during this period. There has been no start to this activity due to delay in approval of the study plan. Additional delays may result from problems in funding for required pre-activity surveys for environmental, archeological and soil radioactivity concerns, among others.

Quality Assurance

Planning and Operations

Variations

T. Brocher et al. helped draft a response to DOE concerns about explosives handling and safety for the upcoming seismic reflection profiling.

T. Brocher debriefed P. Hart on site visit held in June to familiarize potential seismic reflection bidders with site conditions. Brocher responded to questions from a contractor on the RFP.

T. Brocher, P. Hart, W. Mooney, and T. Moses attended GET classes in Menlo Park.

T. Brocher and M. Carr reviewed the editorial comments on their manuscript "Seismic reflection profiling across Tertiary extensional structures in the eastern Amargosa Desert, southern Nevada, Basin and Range Province, United States", by GSA Bulletin. Brocher sent glossy photos of the figures for this manuscript to the GSA Bulletin for publication. Brocher and Carr finished drafting the plate for this manuscript and had the plate professionally photographed.

C. Hunter discussed concerns of the test interference group as to size and location of explosive shots with W. Chambers, SNL. Hunter also worked with T. Brocher, M. Tynan (DOE) and M. Corbett (USGS contract administration) to update and refine seismic line locations and map representations.

SCP 8.3.1.4.2.1.3 Borehole geophysical surveys 0G3221C2

Summary Account Manager - P. Nelson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU332 Evaluate logs from G-2

The review process will continue for an indeterminate period. Branch reviews have been returned to the authors and revisions made to the report tentatively entitled "Assessment of geophysical logs from borehole USW G-2, with recommendations for future logging at Yucca Mountain, Nevada", P. Nelson, co-authored with R. Schimschal. There is no anticipated milestone impact associated with the review process, and the results have been fed to activity 3GGU362 (Specify logging tools for future YMP work).

3GGU362 Specify logging tools for future YMP work

P. Nelson has undertaken efforts with Schlumberger staff to reduce data from geochemical (neutron activation) logging run in borehole G-2 from last year. No progress was made in this effort in July, but Schlumberger has received funding to commence conversion of the yields to chemical weight percent and to estimate mineral abundance. Nelson presented the results and recommendations on logging tools (see summary in May/June monthly report) to a "Geophysical Logging Workshop and Forum" held at the Denver Federal Center on July 16, 1992. In attendance were representatives of Schlumberger and various YMP participants. The workshop demonstrated need for further interaction between participants. Future workshops may be scheduled as needed.

Technical Activities (CONTINUED)

3GGU392 Compute algorithms to density and resistivity logs

Temperature logs were incorporated into the database. These will be very useful in assessing hydrological flow units. Replotting of the borehole data on large format plots has commenced; six of the forty boreholes are complete.

3GGU364 Write procedure for magnetometer logging

In preparation for writing the technical procedure for magnetometer logging, the gyroscope was repaired and replaced in the tool. It powered up correctly, but the readout suffers from dropouts.

Quality Assurance

3GGU364 Write procedure for magnetometer logging

Revisions to the technical procedure for operating the magnetic susceptibility tool were completed and sent to P. Reilly of the QA implementation group.

Planning and Operations

Variances

WBS 1.2.3.2.2.1.2 Structural Features within the Site Area

Principal Investigator - R. Spengler

OBJECTIVE

To determine the frequency, distribution, characteristics, and relative chronology of structural features within the Yucca Mountain site area. (SCP Study 8.3.1.4.2.2)

SCP 8.3.1.4.2.2.1 Geologic mapping of zonal features in the Paintbrush Tuff 0G3221G2

Summary Account Manager - C. Hunter

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF182A Analysis of samples

The staff of the Isotope Geochemistry Support Group of GSP continued support of rock characteristics but no activity was reported for zonal mapping. Work during July focused on subsurface investigations.

3GGF184A Structural analysis of exposed fault zones

F. Singer and J. Nelson have prepared numerous 3-D illustrations using Dynamic Graphics software to depict the spatial distribution and total thickness of major ash-flow sheets. Illustrations include members within the Paintbrush Tuff, tuffaceous beds of the Calico Hills, and members within the Crater Flat Tuff. The data consist of drill hole and measured-section locations with respect to all of these members. These data were then converted to a grid-mesh that was interpolated by the Dynamic Graphics software system (Interactive Surface model, ISM) to create and graphically edit 2-D surface models into a 3-D display model (Geologic Modeling Program, GMP). These data sets are the first step in the development of the 3-D geologic framework of Yucca Mountain.

F. Singer and J. Nelson began digitization of major faults within the site area. This data set will be integrated into the computer-based 3-D geologic model of the site area.

3GGF184A Structural analysis of exposed fault zones (CONTINUED)

Installation of the LYNX Geoscience Modeling System (GMS) was completed. F. Singer, J. Nelson, R. Blackburn, R. Dickerson, A. Braun (SAIC-Golden) and R. Spengler, C. Hunter, and D. Buesch (of the USGS) received training on the system. LYNX GMS will be used to generate a 3-D display of the geologic framework of Yucca Mountain.

A. Braun and colleagues R. Linden, L. Martin and R. Blackburn completed detailed (1:240 scale) mapping of all 61 gridded areas along the Ghost Dance fault. The map grid has been extended to include 60 additional grid units (200 feet by 200 feet each) to cover splays of the Ghost Dance Fault, as mapping to date has identified greater extent of fracturing than previously recognized.

3GGF125 Geologic mapping of northeast corner of site area

R. Dickerson's examination of map and measured section data collected in May/June has led to the tentative conclusion that the individual rhyolite flows mapped in upper Paintbrush Canyon are the distal fingers of rhyolite flows that followed local topographic depressions. It is believed that these small flows coalesce beneath Comb Peak into one or two larger rhyolite flows in the Fortymile Wash/Calico Hills area. The map and the report of this area prepared by D. Gibson of SNL also were received and reviewed this month, but Gibson's map yielded little useful additional data. Previously published data were gathered in view of further defining the source and relationships of the Calico Hills Rhyolite to other volcanic rocks in the greater Yucca Mountain area.

3GGF131A Field check southern and western Yucca Mountain mapping

C. Fridrich and J. Price completed a preliminary map of the "East of Beatty Mountain 7.5' Quadrangle" (covering northern Crater Flat) in June. They prepared an abstract in July entitled "Tectonic framework of Crater Flat Basin, adjacent to Yucca Mountain, Nevada: a preliminary report", describing increased faulting and tilting with age, reflecting intermittent tectonism in Crater Flat throughout the period of volcanism, roughly 9 to 14 Ma. The abstract is in review by DOE/YMPO and has been submitted for the GSA national meeting in October 1992. Results suggest that Crater Flat Basin formed by combined E-W extension and NW-directed right-lateral shear. Future mapping is planned to test the differing predictions of strike-slip and detachment-fault models.

3GGF101 Review, revise outcrop sections of Tpt

This activity is now underway with the addition of D. Buesch to the Rock Characteristics staff. Compilation of outcrop sections of the Paintbrush Tuff has begun. Field checking of sections will begin in August. R. Spengler, C. Hunter, and D. Buesch examined a thick section of Topopah Springs, Pah Canyon, and Yucca Mountain rocks in the upper part of Yucca Wash in preparation for this effort.

3GGF185A Write report on exposed fault zones

A. Braun has completed a draft report detailing efforts by Braun and colleagues in mapping, in detail, the Ghost Dance fault. This two-volume report, containing 61 pages of maps, was delivered to R. Spengler. Tentative intent is to publish this work as a USGS open-file report.

Technical Activities (CONTINUED)

3GGF160 Revise technical procedure on the analysis of volcanic rocks

This activity is now underway with the addition of D. Buesch to the Rock Characteristics staff. Revision of technical procedure began with review of previous versions of the procedure. Discussions are on-going with the USGS-QA group with respect to perceived deficiencies of earlier versions. Lavas and the tuffaceous rocks of Calico Hills occur beneath the host rock for the proposed repository, but vertical and lateral variations in these rocks are not well understood. Work has begun to characterize variations in composition and method of deposition of the tuffaceous rocks. These two features enable correlation of individual units in the formation and can result in changes in rock characteristics. Work during July includes review of literature, acquiring published and nonpublished petrographic and geochemical data from previous workers, and acquiring color aerial photographs for mapping purposes from EG&G, Las Vegas. Aerial photographs for the Paintbrush Canyon area consist of three contact prints of 1:12000 Color Infrared Photographs and one enlargement at the approximate scale of 1:4000. A stratigraphic correlation chart of rock units exposed near Yucca Mountain is under development. This chart attempts to clarify stratigraphic nomenclature between previous workers. Development of bibliographic reference files for D. Buesch and the USGS Las Vegas Office is underway. At present, files emphasize petrographic, geochemical, and electron microprobe data to be used in tephrostratigraphic correlation.

Quality Assurance

Planning and Operations

3GGF184A Structural analysis of exposed fault zones

Recent interest by DOE in having the USGS submit a 3-D geologic model has prompted acquisition of two 3-D geoscientific software packages. These are Dynamic Graphics and LYNX geosystems software packages. The specific software packages offered by Dynamic Graphics include Interactive Surface Modeling (ISM) and Geologic Modeling Program (GMP). These packages will be used to generate a 3-D display of the geologic framework of Yucca Mountain. In addition, structural data will be compiled and integrated into a model that describes the structural history of the site. C. Hunter directed acquisition efforts for balanced-section software to allow paleoreconstruction along structural cross-sections. TECTONICS software was ordered from Midland Valley Associates in New Orleans.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

The following tasks were performed in support of quality assurance:

C. Hunter participated as the GSP member in the Quality Assurance Grading Acceptance Committee (GAC) meeting on July 31, 1992. The committee began review of several submittals (from HIP participants) during the meeting, which consumed six hours. Future meetings are set for August 17, 1992 and September 25, 1992, when numerous submittals are expected.

R. Spengler, C. Hunter and D. Buesch met with DOE and M&O representatives in Las Vegas on July 21, 1992 to clarify development of a standard stratigraphic column for use by YMP participants. J. Gauthier, chairing the meeting, confirmed M&O intent to have this standard column developed by USGS and specifically by R. Spengler. A significant problem was discovered at this meeting with a USBR preliminary set of cross-sections which had been submitted to design groups with no review by the USGS. Work is underway (by Spengler and others) to revise these sections and to clarify that rock characteristics data must be routed through the Section office.

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

The following activities were performed in support of planning and operations:

R. Spengler, C. Hunter and D. Buesch met with DOE and M&O representatives in Las Vegas on July 21, 1992 to discuss sampling of G-5, G-6 and G-7 (future drill holes) with respect to natural resource evaluation.

SCP 8.3.1.4.2.2.2 Surface-fracture network studies 0G3221H2

Summary Account Manager - M. Fahy

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF100 Map & analyze fractures in the Tiva Canyon Member

Fracture data analysis for the bedded tuffs stations is complete and will be included in the Tiva Report. Pavement 500 traceline surveys are 50% complete and also will be included in Tiva Report. Map construction is 60% complete for the Tiva fracture sets. Cluster analysis to identify fracture sets is complete.

3GGF150A Develop Tiva fracture model phase 1

Modeling efforts are statistical in nature and will be the substance of the report. Anticipated completion of the Phase I model and report is September 5, 1992.

3GGF151A Collect vertical continuity data Prow Pass Solitario

This task started on July 27, 1992 with data collection in the Solitario Canyon. Data will be transmitted at the close of this task.

3GGF10AA Preliminary fracture map and report (TIVA)

Outline for report is complete and writing has started. Anticipated date for delivery is September 5, 1992 barring any further non-scheduled work.

Quality Assurance

3GGF100M Map Tiva Canyon for review

Discussion is ongoing as to review and procedures for the qualification of the map as official data. Map is tied to the deadline for 3GGF10AA (Preliminary fracture map & report (Tiva)).

M. Fahy participated in USGS QA audit # 9205, June 29 through July 7, 1992.

Planning and Operations

Variances

3GGF10AA Preliminary fracture map and report (TIVA)

The expected delivery date is September 5, 1992 and is attainable barring unscheduled work.

3GGF080 Clear pavement at Fran Ridge

Criteria Letter was signed by L. Hayes. Anticipated date is August 10, 1992 to start deepening of the pit and clearing the pavement. Logically, all Fran Ridge activities follow from this task.

SCP 8.3.1.4.2.2.3 Borehole evaluation of faults and fractures 0G3221I2

Summary Account Manager - J. Wright

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU004F Review vendor's techniques; acquisition

Contacted the following vendors: K. Waak, Western Atlas International, and requested information on Circumferential Borehole Imaging Log (CBIL); K. Guidry, Restech Inc., and requested information on image processing capabilities; M. Mullen, Halliburton Logging Services, with the request for information on Circumferential Acoustic Scanning Tool (CAST); M. Seal, BPB, and requested information on borehole imaging services; D. Thorn, Schlumberger, and requested information on Formation Microscanner (FMS).

3GGU006F Edit, and review existing data; data login

Began processing Lotus files for transcription into database format. Brought in personnel from Water Conveyance Branch to aid in processing data. Currently reviewing geologic data on G-4.

3GGU09AF Design fracture Db compatible with surface fracture network

This task will coordinate database design to accommodate integration of data from borehole and surface fracture distribution studies. Basic design of database format is completed. Ready to begin input of existing fracture data.

Quality Assurance

J. Wright participated in USGS QA audit # 9205, June 29 through July 7, 1992.

Planning and Operations

Variances

3GGU004F Review vendors techniques; acquisition

Waiting on response of several vendors before activity is complete.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 32 hours were spent hosting the Geophysical Logging Workshop and Forum. Purpose of meeting was to update personnel involved in borehole logging at Yucca Mountain on new logging techniques available, and to discuss better coordination between contractors, contracting officers, contract monitoring and end users of the logging data.

SCP 8.3.1.4.2.2.4 Geologic mapping of the exploratory shaft and drifts 0G3221J2

Summary Account Manager - S. Beason

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF006B Excavate test pit

The Criteria Letter for the deepening the Fran Ridge Pit and cleaning around the pits was signed by the USGS TPO and QA Manager on July 16, 1992. Personnel at Raytheon Services Nevada, REECo, and DOE are proceeding with the job package development. Work continues on the test planning package for the pit deepening and pavement clearing around the pit. The project office has set a date of August 10, 1992 for completion of plans.

Technical Activities (CONTINUED)

3GGFO22B Upgrade computer equipment

After meetings with the USGS TPO, plans for upgrading the existing computer equipment and the purchase of a new analytical plotter have been postponed. Projected funding levels for FY93 will not provide adequate funding to proceed with upgrading the analytical plotter work station.

Quality Assurance

3GGF006B Excavate Test Pit

Beason met with Al Handy (USGS QA) regarding invoking USGS QMP-3.15 for the upcoming Fran Ridge work. After discussion and review of the QMP, it was concluded that an SN would be the most expedient method to cover the pit deepening.

S. Beason participated in USGS QA audit # 9205, June 29 through July 7, 1992.

Planning and Operations

Variances

3GGF009B Reduce test pit data

Delays in completion of job package and test planning documents resulted in delays in the excavation and acquisition of data. The Criteria Letter for deepening the Fran Ridge Pit was signed by the USGS TPO in July, and the Project office has set an August deadline for planning document completion. This delay in test pit preparations will have an indeterminate impact on the ability to map ramp and bore openings. Efforts are underway to resolve TPP/JPP concerns and to finalize those documents.

3GGF044B Modify study plan

This activity has been slipped into FY93 until an ESF design and configuration is established. Geologic mapping is tied to the size, layout, and schedule of the ESF excavation, and rewriting of the study plan is not expedient until plans for the ESF are firmed up.

SCP 8.3.1.4.2.2.5 Seismic tomography/vertical seismic profiling 0B3221A2

Summary Account Manager - E. Majer

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF030B Validate interpretational codes ANI90 and BEAM87

Work continued on ANI90 and VELIN3D with actual borehole data from Yucca Mountain to ensure compatibility of methods with the proposed repository setting. Work in July continued with the evaluation of P-wave attenuation and elastic scattering. Theoretical formulations for S-wave scattering off a sphere were developed, and are being considered for inclusion into ANI90. This data modeling will be used in preparation for code testing and for determining initial design parameters for the VSP field work anticipated for late summer 1992.

Technical Activities (CONTINUED)

3GGF035M Report: Progress VSP

Preparation for VSP field work in support of the seismic reflection surveys continued. The target hole for VSP is P-1 or if necessary C-1. Quotes were obtained for performing the VSP work. Initial modelling of the VSP offset distance was performed, including calculation of synthetic seismograms at near and far offsets. Plans to integrate VSP and seismic reflection are underway but remain incomplete at this time. The DOE YMPO has notified us of transfer of funds to cover additional length of seismic line to link VSP with the seismic line planned for mid-1992. Plans for linked VSP have not been finalized, but VSP will be conducted in drillhole UZ-16 (now being drilled with slow progress) with seismic line coverage of that bore location.

Quality Assurance

Planning and Operations

Variances

3GGF031B Update ESF planning documents

No activity during the reporting period. Start of this activity is tied to DOE finalizing the ESF structural design. No impact is expected given the timeframe and scale of the ESF construction project.

WBS 1.2.3.2.3 Erosion

OBJECTIVE

To identify the site-specific geomorphic parameters and data that are needed to satisfy the design and performance issues and to ensure that the 200-meter disqualifying condition is not exceeded. (SCP Section 8.3.1.6)

WBS 1.2.3.2.3.1 Present Location and Rates of Surface Erosion

Principal Investigator - J. Whitney

OBJECTIVE

To identify the erosional processes in the Yucca Mountain area during the Quaternary; quantify the rates of the different processes and assess their relative importance; and identify the specific locations of past erosion. (SCP Investigation 8.3.1.6.1)

SCP 8.3.1.6.1.1.1 Development of geomorphic map of Yucca Mountain 0G3231A2

Summary Account Manager - J. Coe

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GER001A Scoping study - photogrammetric analysis

J. Coe and R. Cress surveyed ground control points on the west-facing hillslope of Yucca Crest. Control points were used to orient aerial photographs in an analytical stereo plotter. Once oriented, the photographs were used to measure a Digital Elevation Model (DEM) of the hillslope. J. Coe measured a 2 m spaced DEM on bedrock, channel, and dated colluvial boulder flow exposures on the west facing hillslope of Yucca Crest. The elevation difference between each DEM node, and a planar surface calculated on the upper surface of the boulder fields, will be used to estimate the volume of material eroded since the boulder fields were stabilized. The calculated volume, along with the estimated ages of the flows, will be used to

estimate a long-term erosion rate for the area.

3GER01AM Report: Short term erosion rate on YM

J. Coe continued work on a report describing the results of a volumetric analysis of debris eroded off a hillslope near Yucca Mountain during a single rainstorm. The volumetric results will be used to help characterize the short-term erosion rate for activity 3GER01AM.

Quality Assurance

Planning and Operations

Variances

3GER02AM Report: Yucca Mountain Erosion Rate

Finish date pushed back because personnel were needed for field work related to the Little Skull Mountain earthquake. No impact to the schedule is anticipated.

3GER002A Write report on erosion rate for existing data

Planned finish date pushed back because personnel were needed for field work related to the Little Skull Mountain earthquake. No impact to the schedule is anticipated.

WBS 1.2.3.2.5 Postclosure Tectonics

OBJECTIVE

To supply data on the probability and effects of tectonic initiating events that may alter existing conditions at Yucca Mountain and adversely affect repository performance. (SCP Section 8.3.1.8)

WBS 1.2.3.2.5.3 Changes in Hydrology Due to Tectonic Events

OBJECTIVE

To assess or analyze the possibility that tectonic events could cause changes in existing hydrologic conditions at the Yucca Mountain site. (SCP Investigation 8.3.1.8.3)

WBS 1.2.3.2.5.3.2 Effect of Tectonic Processes and Events on Changes in Water-Table Elevation

Principal Investigator - J. Whitney

OBJECTIVE

To analyze and assess the probability that tectonic initiating events could result in significant changes in the elevation of the water table or potentiometric surface, changes in the hydraulic gradient, the creation of discharge points in the controlled area, or the creation of perched aquifers in the controlled area. (SCP Study 8.3.1.8.3.2)

SCP 8.3.1.8.3.2.5 Effects of faulting on water-table elevation 0G3253L2

Summary Account Manager - C. Fridrich

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTW020 Compile existing water-table elevation data

This activity is a collection of tasks being undertaken by the USGS-GSP to prepare to write a study plan for investigation 8.3.1.8.3, Changes in SZ and UZ hydrology due to tectonic events. Technical elements of this effort include: (1) an ongoing literature review to determine what is known, from direct observations of tectonic impacts on hydrologic systems and from numerical modeling of these impacts, (2) continuing discussions with scientists in other groups to determine what already is being done in the Project to address the goals of this investigation.

Quality Assurance

Planning and Operations

3GTW020 Compile existing water-table elevation data

Planning elements of this effort include: continuing discussions with scientists in other groups to determine what already is being done in the project to address the goals of this investigation. This month, C. Fridrich had discussions with representatives of SNL, LANL, USGS/HIP, and DOE/YMPO to determine which aspects of this investigation are covered by on-going or planned activities by other groups, and the role that USGS-GSP needs to take to make this investigation come together. This resulted in a good idea of how the work scope of this investigation needs to be redefined and streamlined to efficiently achieve the goals of the investigation, and an outline for the study plan is being prepared.

Variances

WBS 1.2.3.2.5.5 Information Required by the Analysis and Assessment Investigations of the Tectonics Program

OBJECTIVE

To collect field data called for by analysis and assessment activities in other tectonics investigations to support analyses of volcanic, igneous intrusion, and folding processes. (SCP Investigation 8.3.1.8.5)

WBS 1.2.3.2.5.5.2 Characterization of Igneous Intrusive Features

Principal Investigator - J. Sass

OBJECTIVE

To gather data concerning the presence of thermal anomalies in the area and data on the geochemical and physical effects of intrusions on the surrounding rock. (SCP Study 8.3.1.8.5.2)

SCP 8.3.1.8.5.2.3 Heat flow at Yucca Mountain and evaluation of regional ambient heat flow and local heat flow anomalies 0G3255B2

Summary Account Manager - J. Sass

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GAT006 Revise study plan

Two study plans were prepared (8.3.1.8.5.2.3 and 8.3.1.15.2.2.1) and are being revised by D. Keefer prior to submittal for review.

Technical Activities (CONTINUED)

3GAT011 Collect field measurements

No field work can be conducted until the study plan is approved. Work continued in preparation for data collection activities including: routine maintenance of lab and field equipment; lab balances and secondary weight standards were calibrated; a NIST calibration for newly acquired standard thermometer (bought with USGS funds) was ordered; and modifications were made to the temperature calibration bath to improve its performance.

Quality Assurance

Continued with QA related activities, including reading assignments and maintenance of controlled documents.

Planning and Operations

J. Sass met with J. Stuckless, J. Whitney and other OEVE personnel on July 20, 1992 to discuss options for earthquake and stress studies. W. Wendt joined those three and S. Hickman on July 21, 1992 to discuss issues related to heat-flow, stress and other borehole studies

Variances

WBS 1.2.3.2.6 Surface Characteristics

OBJECTIVE

To collect information on surface characteristics to determine location and design of repository surface facilities. (SCP Section 8.3.1.14)

WBS 1.2.3.2.6.2 Soil and Rock Properties of Potential Locations of Surface Facilities

OBJECTIVE

To characterize the soil and rock at and near the surface to provide design issues with the necessary geotechnical information to help locate the surface facilities, conduct foundation design analyses, evaluate soil-structure interactions, and evaluate potentially unstable slopes; and provide design issues with hydraulic-related soil information for evaluating erosion potential and infiltration-runoff characteristics. (SCP Investigation 8.3.1.14.2)

WBS 1.2.3.2.6.2.2 Surface Facilities Laboratory Tests and Material Property Measurements

Principal Investigator - M. McKeown

OBJECTIVE

To conduct laboratory tests and material property measurements on representative samples of soil and rock. (SCP Study 8.3.1.14.2.2)

SCP 8.3.1.14.2.2 Laboratory test and material property measurements 0G3262A2

Summary Account Manager - M. McKeown

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GSROO5 Field exploration-mapping, drilling, excavation

Drill hole NRG-1 was completed in June. The core was received July 20, 1992 by the laboratory in Denver. Geophysical logging of the hole is tentatively set for August. Data from density and caliper logs and check shot data will be used to determine dynamic moduli for the rock and alluvium.

Please note that previous PI submittals indicated planning activity and actual completion of drillhole SRG-1, which in fact has not been started. This July report corrects those previous errors.

3GSR006 Materials testing

Testing continued with logs, gradations, relative and/or Proctor densities; properties were determined for seven representative locations in June. Work continues on the remaining test pit data.

3GSR007 Design data submittal of north ramp

Informal submittal of geotechnical design data to Raytheon Services Nevada (RSN) continued through July. Submittal of the draft report anticipated for July was not reported by the PI.

3GSR008 Draft report of physical properties of north ramp

3GSR010 Draft report of mechanical properties of north ramp

These draft documents were submitted in June.

3GSR012 Draft report field testing physical/properties of north ramp

3GSR014 Draft report of mechanical properties field of north ramp

These efforts were complete June 5, 1992 with submittal of analytical results.

3GSR016 Draft report on engineering geophysics

Planning continued on the borehole engineering geophysics specifically required for the Soil/Rock investigations. Technical procedures for density and caliper logs, and check shots were prepared.

Quality Assurance

M. McKeown participated in USGS QA audit # 9205, June 29 through July 7, 1992.

Planning and Operations

3GSR005 Field exploration-mapping, drilling excavation

The job package for the second phase of geotechnical investigations is being prepared by the Project. The package contains test pits along road alignments, aggregate source sampling, and percolation testing for leach field design.

Drill hole NRG-6 has been relocated downhill from the old location to facilitate pad construction. The hole was originally located on the axis of a proposed shaft, but the location of the shaft was exceedingly tenuous. Pad construction at the shaft location was not worth the time and expense. This hole will provide qualified data on geotechnical parameters of a major part of the lithologic sequence overlying the repository, and data describing the elevation of the TSW1/TSW2 contact. The hole location was staked in the field on July 22, 1992.

Variances

The failure to complete the Test Planning Package in a reasonable length of time required revising the start date of field exploration from November 1991 to March 1992. The resultant slippage of dependent activities resulted in a reduction in time available to perform the work by at least 50 percent. This has resulted in a reduction of submitted data by at least 50 percent and a continuing frantic effort to get minimal data to the designers for their use in Title II design.

The failure to complete drill hole NRG-1 (3GSR005 Field exploration-mapping, drilling excavation) on schedule has resulted in no submittal of rock testing data for Title II design. At least a month will be required to perform required testing after receipt of core. NRG-1 core was received in Denver on July 20, 1992.

3GSR013 Final report of physical properties field north ramp

3GSR015 Final report of mechanical properties field north ramp

Because of the delays in starting data collection, the final reports for field mechanical and physical properties will be delayed. Draft reports have been submitted (June 5, 1992) and completion is anticipated in August. Continuing programmatic delays in design of the ESF should accommodate these report delays with no long-term impact.

3GSR017 Final report geophysical north ramp

No start reported. Draft geophysical report was submitted on June 24, 1992. No significant milestone impact anticipated.

Work Performed but not in Direct Support of the Scheduled Tasks

Two days were spent modifying PACS.

Cross-sections along the ramps and drifts were prepared for RSN in June and submitted in July. The drawings are "yet-to-be-qualified data" intended for Design Package 1A. These sections are strictly preliminary and have not obtained USGS review. They require probable revision and complete USGS approval prior to qualification and submittal to RSN as official documents.

WBS 1.2.3.2.8 Preclosure Tectonics

OBJECTIVE

To develop an understanding of and to characterize the tectonic events and processes that could impact proposed repository structures, systems, or components considered to be important to safety through the operational phase and that could affect the design and operation of certain structures, systems, and components required for exercising the retrieval option. (SCP Section 8.3.1.17)

WBS 1.2.3.2.8.4 Preclosure Tectonics Data Collection and Analysis

OBJECTIVE

To provide data and analyses required by other investigations including the assessments of fault displacement and vibratory ground motion that could affect repository design or performance. (SCP Investigation 8.3.1.17.4)

WBS 1.2.3.2.8.4.1 Historical and Current Seismicity

Principal Investigator - K. Shedlock

OBJECTIVE

To compile information on reported and instrumentally recorded earthquakes that characterize the earthquake potential near Yucca Mountain and to attempt to purge explosion and triggered earthquakes related to weapons testing from existing catalogs of instrumentally determined earthquakes. (SCP Study 8.3.1.17.4.1)

SCP 8.3.1.17.4.1.2 Monitor current seismicity 0G3284HB

Summary Account Manager - K. Shedlock

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GSM153A Install SGBSN stations (6)

3GSM150A Install SGBSN nodes (1)

Field installation of the new telemetry node and construction of the six stations was completed.

3GSM160A Monitor 1992 seismicity

Field experiments were conducted by USGS-BGRA personnel and 3 BGRA-SGBSN field technicians to record aftershocks of the Little Skull Mountain earthquake. USGS-BGRA portable seismographs were deployed during the period of June 29 - July 14, 1992.

The existing SGBSN continued to record aftershocks of the Little Skull Mountain earthquake. In the first several days of July, due to the extremely high data rate, SGBSN personnel were on duty 24 hours a day, to change data tapes and to keep the computer system operational. By the middle of July, nearly regular work schedules could be maintained. During this period, a back-log of more than 160 data tapes were accumulated. At the end of July, the number of events per day was still significantly higher (5 to 8 times) than normal, as are the magnitudes. The "excess" seismicity is in the vicinity of Little Skull Mountain, although rates were elevated throughout the network. A number of the larger events (ML>3) have occurred along and to the west of the Death Valley/Furnace Creek fault systems. The SGBSN staff was able to keep up with the routine processing of incoming data, however, the staff was unable to process any back-logged data tapes. The computer system was also down 10-15% of the time this month.

USGS-BGRA personnel began to process aftershock data from the Little Skull Mountain earthquake. Data and preliminary results were exchanged with UNR on a regular basis via telephone and electronic mail.

0G3284HB Prepare FY91 earthquake catalog

The report, "Seismicity and focal mechanisms for the southern Great Basin of Nevada and California, in 1991" by S. C. Harmsen, was submitted to DOE for concurrence on July 21, 1992.

Quality Assurance

A DOE audit of the SGBSN laboratory facilities in Golden, CO, was conducted on July 29, 1992.

Planning and Operations

Variations

WBS 1.2.3.2.8.4.2 Location and Recency of Faulting Near Prospective Surface Facilities

Principal Investigator - J. Whitney

OBJECTIVE

To identify appropriate trench locations to investigate the possible occurrence of late Quaternary surface faulting in the vicinity of planned critical surface facilities; and using surface and trench mapping, locate sites without evidence of significant late Quaternary faulting. (SCP Study 8.3.1.17.4.2)

SCP 8.3.1.17.4.2.1 Identify appropriate trench locations in Midway Valley 0G3284IB

Summary Account Manager - F. Swan

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFP002 Surficial mapping in Midway Valley

Field checking of mapped contacts and map units was performed in Midway Valley.

3GFP001 Excavate and log soil pits

Additional personnel were trained on logging procedures, and logging of soil pits continued.

Quality Assurance

Planning and Operations

Variances

SCP 8.3.1.17.4.2.2 Conduct exploratory trenching in Midway Valley 0G3284JB

Summary Account Manager - F. Swan

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFP005 Write criteria & assemble job packages for trenches

Criteria letters and job packages for trench studied have been completed.

3GFP007 Excavate and log trench through proposed ESF

Logging activities are suspended until safety inspection and approval is granted. Commenced logging of the short trench adjacent to the long trench.

3GFP009 Clean and log trench 17

Trench 17 was cleaned and is ready for logging.

3GFP010 Excavate and log trench A-3 on Paintbrush fault

Work on trench A-3 is deferred until after NRC review of the long trench through the ESF site.

Quality Assurance

Planning and Operations

Coordinated safety inspections and trench modifications.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Considerable time was spent in meetings with safety inspectors to gain approval to access and log the long trench through the ESF site.

WBS 1.2.3.2.8.4.3 Quaternary Faulting within 100 km of Yucca Mountain

Principal Investigator - J. Whitney

OBJECTIVE

To identify Quaternary faults within 100 km of Yucca Mountain and to characterize those faults capable of future earthquakes with magnitude such that associated ground shaking could impact design or affect performance of the waste facility. (SCP Study 8.3.1.17.4.3)

SCP 8.3.1.17.4.3.2 Evaluate Quaternary faults within 100 km of Yucca Mountain 0G3284K2

Summary Account Manager - L. Anderson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTQ008B Review and synthesize existing work

Project staff continued reviewing and synthesizing existing work in the Yucca Mountain region.

3GTQ001B Draft technical procedure - aerial photo

Project staff continued the revision of the draft of the technical procedure.

3GTQ009B Conduct field reconnaissance - Quaternary faults within 100 km

Recent geologic field mapping by C. Fridrich along the Bare Mountain Fault was reviewed by project staff.

3GTQ002B Compile map - Quaternary faults within 100km

Project staff continued to compile fault data.

Quality Assurance

Planning and Operations

Variances

As reported in the May report, the lateness in submittal of the study plan will not impact the completion of milestone activity 3GTQ006M, "Report: Preliminary Assessment of Quaternary Faulting" by the scheduled completion date of September 30, 1992.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 24 hours were spent in the following:

A 5.6 ML earthquake occurred on June 29, 1992 near Yucca Mountain on the Nevada Test Site. At the request of J. Whitney (USGS-YMPO), L. Anderson flew to the site on June 29. Reconnaissance was conducted of several fault zones in the epicentral area looking for evidence of possible ground rupture. This work was conducted with J. Whitney and C. Menges (USGS) over about a two day period.

WBS 1.2.3.2.8.4.4 Quaternary Faulting within Northeast-Trending Fault Zones

Principal Investigator - J. Whitney

OBJECTIVE

To evaluate the potential for ground motion resulting from future movement on Quaternary left-lateral strike-slip faults located east and south of the site area. (SCP Study 8.3.1.17.4.4)

SCP 8.3.1.17.4.4.1 Evaluate the Rock Valley fault system 0G3284O2
Summary Account Manager - D. O'Leary

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTN012 Study plan comment resolution

USGS review comments were resolved and the study plan was revised.

Quality Assurance

Planning and Operations

3GTN007 Compile/analyze map of Satellite imagery

Obtained information required to order SPOT Pan stereo images of the Yucca Mountain - Rock Valley region. Identified images for required aerial coverage: tabulated BLM stereo photos that provide coverage of the Rock Valley - Amargosa Valley area. Prepared order for these photos.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 32 hours were spent on the following:

D. O'Leary completed three QA reading assignments, compiled information for the monthly report, and worked with J. Whitney on a paper entitled "Tectonic characterization of a potential high-level nuclear waste repository and applications of tectonic models at Yucca Mountain, Nevada."

WBS 1.2.3.2.8.4.5 Detachment Faults

Principal Investigator - J. Whitney

OBJECTIVE

To provide information pertaining to the distribution, displacement rate, and age of detachment faults proximal to Yucca Mountain; and determine whether they represent a significant earthquake source or conceal a significant earthquake source at depth. (SCP Study 8.3.1.17.4.5)

SCP 8.3.1.17.4.5.1 Evaluate the significance of the Miocene-Paleozoic contact in the Calico Hills area to detachment faulting within the site area 0G3284S2

Summary Account Manager - W. Hamilton

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTD002B Conduct field work FY92 detachments

Two weeks in July were spent doing field work along the California - Nevada border area and Bare Mountain, Nevada area. Several days were spent appraising effects of the June 28, 1992 Landers earthquake and its relevance to tectonics at Yucca Mountain.

The Landers earthquake produced right-lateral fault breaks with variable subordinate extensional components. The style of faulting is not known to be present at Yucca Mountain; therefore, tectonism represented by the Landers earthquake is not a factor in the Yucca Mountain tectonic setting.

Technical Activities (CONTINUED)

3GTD007B Complete geologic map of the Calico Hills

Field mapping conducted June 19-21, 1992 was partially compiled on a 1:12,000 scale base map.

Quality Assurance

Preparations were made to submit TDIF's for existing data (maps, and notebooks).

Planning and Operations

Plans for continued mapping in the area north and west of the Calico Hills were discussed with R. Dickerson.

Variances

SCP 8.3.1.17.4.5.2 Evaluate postulated detachment faults in the Beatty-Bare Mountain area 0G3284T2

Summary Account Manager - W. Hamilton

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTD010B Evaluate, published/unpublished mapping

Continued evaluation of bedrock mapping of the Bare Mountain area.

3GTD020B Begin scoping study - altered conodonts

This activity has been suspended.

3GTD011B Thermobarometry study of lower plate rock

Data on mineral equilibria assemblages were gathered from lower plate rocks of Bare Mountain.

Quality Assurance

Planning and Operations

Variances

WBS 1.2.3.2.8.4.6 Quaternary Faulting within the Site Area

Principal Investigator - J. Whitney

OBJECTIVE

To evaluate the age and recurrence interval of Quaternary faulting and to analyze the probability of future faulting; to determine which faults moved during the Quaternary; and to assess fault probability on the basis of rates of faulting during the Quaternary. (SCP Study 8.3.1.17.4.6)

SCP 8.3.1.17.4.6.1 Evaluate Quaternary geology and potential Quaternary faults at Yucca Mountain

0G3284C2

Summary Account Manager - J. Whitney

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPF07A Complete field mapping strip map YM fault zone

Field mapping by J. Yount and M. Carr was compiled at 1:12,000 scale. Fault locations and observed fault attributes were plotted on overlays for the 1:12,000 scale orthophotosgraphs. A. Ramelli conducted field work, to the north and south of Yount's mapping along the Solitario Canyon fault, and examined trenches 10a and 10b.

Quality Assurance

Planning and Operations

Plans were discussed with K. Fox for compilation of his mapping and a map symbol scheme was developed.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 32 hours were spent on the following:

W. Simonds was called away to study the effects of the June 29 earthquake. In support of the earthquake studies, 25 boxes (765 pounds) of seismic monitoring equipment were assembled and shipped to the site. Simonds escorted UNR seismologists on the site and helped set up portable seismograph stations.

SCP 8.3.1.17.4.6.2 Evaluate age and recurrence of movement on suspected and known Quaternary faults

0G3284D2

Summary Account Manager - C. Menges

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GPF09A Study Paintbrush Canyon fault at Busted Butte

The job package was completed and all clearances were obtained in July. Construction work to expose faults on the west side of Busted Butte will begin the first week of August. J. Paces and S. Lundstrom discussed sampling strategies and examined sites for U-series dating of soil layers and vein fillings at Busted Butte and at Trench 14.

Variances

3GPF17A Relog TR-8 Solitario Canyon fault

Relogging of TR-8 is on hold until trench can be cleaned out with a bulldozer. Relogging anticipated to begin in August. No impact to the schedule is anticipated.

3GPF11A Complete report - Trench logs Windy Wash

No progress is anticipated until FY93. No significant impact to the schedule is anticipated.

3GPF17M Report: Trench 8 Solitario Canyon fault

Report delayed because contract for scientist to do this work was not completed until June 92. No impact to the schedule is anticipated.

WBS 1.2.3.2.8.4.12 Tectonic Models and Synthesis
Principal Investigator - J. Whitney

OBJECTIVE

To synthesize data relevant to tectonics; and to develop a model or range of models that establishes the causal relationship between application of tectonic forces and formation of structures observed at Yucca Mountain and vicinity; link observed rates of formation of those structures with regional rates of crustal strain; forecast changes in tectonic setting and the manner in which those changes will affect both the regional crustal strain rate and tectonic stability in the Yucca Mountain region; and estimate the effect of those changes on rate and nature of crustal strain at Yucca Mountain and vicinity and the future rate of tectonic processes at Yucca Mountain. (SCP Study 8.3.1.17.4.12)

SCP 8.3.1.17.4.12.1 Evaluate tectonic processes and tectonic stability at the site 0G3284A1
Summary Account Manager - W. Hamilton

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTE001K Draft study plan and USGS review

Preliminary version of the study plan was edited and revision is in progress.

3GTE06JA Order thematic map 1:100,000

The thematic map is in preparation at JPL.

3GTE07JA Integration of tectonic data

W. Hamilton examined surface deformation caused by the June 28, 1992, Landers, California, earthquake ($M \approx 7.5$) to determine whether similar features, indicative of paleoearthquakes, might be recognizable near Yucca Mountain. The Landers earthquake was the largest strike-slip event in the Basin Range province in 135 years; it produced right-lateral strike-slip offsets as great as 5 m along north- to northwest-striking faults, with variable subordinate extensional components. Despite the size and extent of the structural breaks, surface deformation of alluvial and colluvial deposits was surprisingly difficult to see, and Hamilton concluded that the surficial effects will soon be obliterated. Some investigators (Slemmons, Schweickert, others) argue that difficult-to-recognize strike-slip faults close to Yucca Mountain represent a seismic hazard for the facility. Hamilton noted that there is no direct analogy between the faults displaced by the Landers earthquake and faults in the Yucca Mountain region because, unlike Landers, conspicuous, major bedrock strike-slip faults are not present near Yucca Mountain, nor is the regional geology or fault-related topography analogous. Hamilton concluded that the Landers geology provides no support for conjectures that major young strike-slip faults are present but unrecognized near Yucca Mountain.

Quality Assurance

Planning and Operations

Variations

3GTE06JM Enhanced thematic mapper of YM

Contract approval for the thematic map imagery was delayed and therefore the order did not go to JPL in time for JPL to produce the map by the scheduled date. No impact to the schedule is anticipated.

Variances (CONTINUED)

3GTE01KM Study plan submitted for review

Revision of the study plan was postponed so that the principal investigator could observe the effects of the California earthquakes. No impact to the schedule is anticipated.

WBS 1.2.3.3 Hydrology

Principal Investigator - D. Appel

OBJECTIVE

To conduct hydrologic investigations to evaluate the suitability of the surface and subsurface environment for siting a nuclear waste repository.

WBS 1.2.3.3.1 Geohydrology

OBJECTIVE

To provide information about geohydrologic characteristics, processes, and conditions, both favorable and potentially adverse, to support resolution of the performance and design issues through the development of a credible geohydrologic model of Yucca Mountain and vicinity. (SCP Section 8.3.1.2)

WBS 1.2.3.3.1.1 Description of the Regional Hydrologic System

OBJECTIVE

To develop a conceptual model of the regional hydrologic system to assist in assessing the site's suitability to contain and isolate waste. (SCP Investigation 8.3.1.2.1)

WBS 1.2.3.3.1.1.1 Precipitation and Meteorological Monitoring for Regional Hydrology

Principal Investigator - A. Flint

OBJECTIVE

To characterize the area surrounding Yucca Mountain in terms of precipitation and other meteorological data and their relationship to surface runoff and infiltration; and to provide input into rainfall-runoff model development for the Fortymile Wash drainage basin. (SCP Study 8.3.1.2.1.1)

SCP 8.3.1.2.1.1.1 Precipitation and meteorological monitoring 0G3311E2

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GMM02A Monitor stations and tipping-bucket gauges FY92

Periodic visits were made to each weather station and tipping bucket rain gauge site. Maintenance was performed as required and data were retrieved.

3GMM03A Calibrate tipping-bucket rain gauges

One tipping bucket rain gauge was calibrated. This was done for the USGS Las Vegas office who plans to deploy the gauge at a stream gauging site.

Technical Activities (CONTINUED)

3GMM05A Acquire regional meteorological data-FY92

Daily precipitation, temperature, and evaporation data were collected for Nevada and California locations for February 1992. These data are published in monthly periodicals called Climatological Data by the National Climatic Data Center. There is generally a 5-month delay while the data, originally obtained mostly from cooperative observers, are run through a 9-step quality control process.

3GMM07A Monitor collection gauge network-FY92

The collection gauge network was visited and prepared for expected rainfall in July. However, significant showers occurred only from the 12th through 15th. And, this activity affected only the northern end of Yucca Mountain. The maximum amount noted was at N-11 (.25 inches). All other locations received less or none at all during the month.

3GMM10A Analysis of station data-FY91

These data are being reformatted into a spreadsheet format for further study.

3GMM16A Conduct readiness review

This item is being closed out as it is not needed. See 3GMM15A.

3GMM23A Collect NTS lightning data-FY92

Lightning activity increased greatly in July because of the onset of the monsoon season. Most activity was concentrated in northwest Arizona. Few strikes occurred in the vicinity of Yucca Mountain, and those that did occurred near the north end of the mountain.

3GMM034 Analysis of regional data-FY91

Last month, an effort began to compare regional lightning strike data with precipitation measurements near observed lightning patterns. Early results indicate that the correlation of rainfall amounts with lightning strikes within a few miles of a rain gauge was poor. The study will continue, but will consider only lightning patterns occurring directly over a given rain gauge. This means that several years' data will have to be collected since most storms do not occur directly over an established rain gauge site. Only one lightning storm occurred over the rain gauge network at Yucca Mountain in 1991. Data from the 13 Nevada Test Site rain gauges and the Nevada cooperative climatological stations will be helpful in increasing the probability of encountering a thunderstorm overhead.

3GMM070 Collect GOES data-FY92

Collection and archival of weather satellite imagery continued. Two sources of data were exploited. One source is via the Weather Facsimile (WeFax) system and the other is via a GOES Drop from the National Weather Service in Mercury, Nevada. The GOES Drop data are of higher resolution and are received more frequently (hourly versus three-hourly) than the WeFax data. Higher resolution images are important in tracking the development and movement of summer thunderstorms.

3GMM080 Analysis of Yucca Mountain precipitation data-FY91

Work continues to place the precipitation data into a useable format. No progress was made in data analysis other than the correlation with lightning data.

Technical Activities (CONTINUED)

3GMM100 Monitor daily weather patterns-FY92

Efforts continued to track and document daily changes in the synoptic weather patterns affecting the western U.S. Early in the month the southwest was affected by an influx of moisture from Pacific hurricane "Darby". However, the expected southeast monsoon did not materialize. Most of the month was hot and dry with above normal temperatures and below normal precipitation. Most Pacific storm systems stayed well to the north of the Yucca Mountain region.

Quality Assurance

3GMM067 Implementation of all QA requirements

All QA requirements were completed.

Planning and Operations

Variances

3GMM15A Prepare criteria letter

No progress was made; we are having difficulty locating potential tipping bucket gauge sites. Gaps in our present precipitation gauge network are evident, but access to potential sites is a large consideration. We are trying to find sites that best fill in gaps and yet are easily accessible using existing roads.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 8 hours were spent in support of the following activities:

- Supported tours at the HRF.
- Logged neutron boreholes.

WBS 1.2.3.3.1.1.2 Runoff and Streamflow

Principal Investigator - D. Beck

OBJECTIVE

To collect basic data on surface-water runoff at, and peripheral to, Yucca Mountain and its hydrologic flow system; to use the streamflow data to describe the runoff characteristics of the area and assess the response of runoff to precipitation; to assess the potential for flood hazards and related fluvial-debris hazards to the Yucca Mountain Project; and to provide basic data and interpretations of surface-water runoff to investigations that evaluate the amounts and processes of infiltration and ground-water recharge at Yucca Mountain and surrounding areas. (SCP Study 8.3.1.2.1.2)

SCP 8.3.1.2.1.2.1 Surface-water runoff monitoring 0G3311F2

Summary Account Manager - T. Kane

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRS002A Collect FY92 runoff and streamflow data

July precipitation measurements were confined to the period of July 11 - 13, 1992. The average monthly precipitation for the immediate area surrounding Yucca Mountain was .003 inches. Exceptions were: a) Skull Mountain Pass, and Rock Valley at Jackass Flats which averaged .32 inches and, b) Fortymile Wash from the Narrows to Lathrop Wells averaged .04 inches. Areas of moderate rainfall were Rock Valley at U.S. Highway 95 near Amargosa Valley with .97 inches and Stockade Pass above Area 12, with 1.06 inches.

3GRS002A Collect FY92 runoff and streamflow data (CONTINUED)

A summer storm off the southern California coast moved through southern Nevada producing isolated thunderstorms. Runoff was noted in the Cane Springs Wash tributary near Cane Springs station, 10251265 located on the test site. 29 CFS was estimated with .46 inches of rainfall recorded. At the Amargosa River, at Eagle Mountain, an initial estimate of 700 to 1000 CFS was established for the main channel. A side channel running parallel to this site, produced an additional 50 to 100 CFS. Northwest of the Eagle Mountain site, a tributary from the Greenwater Mountain was estimated to have produced 200 CFS which contributed to the Amargosa River.

A field trip on July 29, 1992, established that the origin of flow to the Amargosa River, for the July 11-13, 1992 period, was Ash Meadows. A number of small tributaries seem to flow out of this area onto the Alkali Flat, just above Eagle Mountain. No large body of water other than Greenwater tributary could be associated with the flow which passed the Eagle Mountain site. The Amargosa River at Stateline, which lies 15.3 miles north of the Eagle Mountain site, contributed 15 to 25 CFS and was the furthest site (north of Eagle Mountain) measured. No other flows of substance were noted between Stateline and Eagle Mountain.

The field trip started in Pahrump, working its way west, across Ash Meadows then south on State Route 127, culminating in Tecopa, where an estimated discharge of 360 CFS was determined from a peak gage height of 3.88 feet at the Amargosa River at Tecopa, station 10251300. The time associated with the peak was 05:30 AM, July 13, 1992.

T. Kane, P. Cooley, and P. Glancy surveyed the runoff which occurred on the Amargosa River during the July 11-13, 1992 period.

D. Bauer, and C. Martinez, P. Cooley, T. Kane completed the installation of additional partial record stations at Drill Hole Wash, Cane Springs, Yucca Wash, Amargosa River near Beatty, and Fortymile Wash near Amargosa Valley.

T. Kane, P. Glancy, D. Grasso, D. Beck, and C. Martinez went on a field trip on July 27, 1992, to Death Valley. The field trip was to determine the magnitude of past flood events on the Amargosa River. The connection between Fortymile Wash and the Amargosa River was also of major interest. Recent storm events of February and March produced a shallow lake in Death Valley. This was a direct result of runoff on the Amargosa River. During March and again in July, an estimate of 340 to 400 CFS was determined to have occurred on the Amargosa River, at Highway 127 near Ripple Dunes. The major source of flow was suspected to have originated above Eagle Mountain and continued to a terminus in the Badwater Basin at Death Valley with little loss between Tecopa and Ripple Dunes.

An estimate of 40 CFS was made north of Shoreline Butte in Death Valley and was the furthest downstream estimate made on the Amargosa River this day. It was difficult to determine whether or not additional flow had reached this point during the recent events, and if this indicated a substantial loss between here and Ripple Dunes.

T. Kane worked on third quarter budget statements as well as prepared for a scan of PACS activities at HIP. He worked on performance appraisals and worked on the telemetry equipment.

P. Cooley, and C. Martinez received QA training (GET).

Technical Activities (CONTINUED)

3GRS022A Complete FY 83-85 data and prepare report

T. Kane completed revisions to 83-85 data. The report was compiled and sent to Carson City for typing. A TDIF was completed and a LRC package was prepared. Records are to be held in Las Vegas until final district approval of data report is received.

3GRS00GA Reduce FY 86-89 data and prepare report

T. Kane continued to review data.

Quality Assurance

3GRS027A Complete technical procedures for streamflow data collection

HPs 100, R1, and 166, R1 were received for response to reviewers comments and resubmitted to YMP QA.

HP 219, R0 received from HIP for concurrence, returned to YMP QA for final signature.

Planning and Operations

3GRS016A Complete installation of two Armargosa gages

T. Kane received approval for the work permits for Pagany Wash.

3GRS029A Continue reconnaissance for new sites

Site selection for Pagany Wash, site SY15 near well UE-25 UZ#4 was approved on July 31, 1992.

Variances

3GRS002A Collect FY92 runoff and streamflow data

Impact: all activities impacted by loss of principal technician D. Bauer to illness.

Corrective action: PI is presently assuming additional responsibilities. Estimated impact is unknown.

3GRS027A Complete technical procedures for streamflow data collection

All procedures reside at HIP QA.

Impact: schedule delayed. Estimate an additional month to complete, August 30, 1992.

3GRS022A Complete FY83-85 data and prepare report

Report now resides at Carson City for final typing. District advises that final approval will not be complete until September 30, 1992.

Impact: schedule delayed. Estimated completion September 30, 1992.

3GRS016A Complete installation of two Armargosa gages

Pagany Wash substitute gage has received permit approval as of July 31, 1992.

Impact: schedule delayed. Estimate September 30, 1992, as completion date.

3GRS006A Reduce FY86-89 data and prepare report

Impact: activity moved into FY93 based on Mission 2001 update.

3GRS022M Reduce FY83-85 data to PDA

Impact: schedule delayed. Main portion of report resides in Carson City for final typing and district approval. Estimated final approval date is September 30, 1992.

3GRS007A Reduce FY90-91 data and prepare report

Impact: activity moved into FY93 based on Mission 2001 update.

Variances (CONTINUED)

P934 Streamflow and precipitation FY83-85

Impact: schedule delayed. Activity tied to 3GRS022A. Report in Carson City for final typing and district approval. District advises two months to completion. Estimated completion date is September 30, 1992.

3GRS002M Submit FY92 runoff data to PDA

Impact: activity moved into FY93 based on Mission 2001 update.

3GRS008A Compile/reduce FY92 data

Impact: activity moved into FY93 based on Mission 2001 update.

SCP 8.3.1.2.1.2.2 Transport of debris by severe runoff 0G3311G2

Summary Account Manager - D. Grasso

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

0G3311G2 Aerial reconnaissance of severe runoff features

D. Grasso obtained a 1954 (pre-flow) aerial photograph of the Potosi Mountain area. The photograph was scanned (digitized) and geometrically corrected for computer mapping of landforms that were present prior to the debris flows of July 1990. Although the photograph gives useful information, higher resolution aerial photographs of the NAPP program (1:40,000) were ordered. These photographs (a stereo pair) will furnish better resolution of smaller land features and provide stereo data needed for development of a digital elevation model (DEM) of the area immediately prior to the flows (photo date is 4-26-90). The DEM will be particularly useful for establishing needed landscape parameters related to debris flow processes and products in the area.

During an aerial reconnaissance of the Amargosa River, D. Grasso located what appears to be a large debris flow that occurred prior to June 23, 1984, the date of the satellite imagery. Preliminary analysis of the landform shows that it extends for a distance of one to two miles along a pre-existing, alluvial fan drainage that ultimately flows into the Amargosa River. It is conceivable that the debris flow occurred as a result of intense precipitation in the area on August 18-19, 1983. This storm caused severe runoff (10,600 cfs) on the Amargosa River, and destroyed the bridge and gauging station at Tecopa, California. More work is needed to substantiate this hypothesis.

D. Grasso began preparation of a 1968-1992 climatic database for southern Nevada. The database will allow analysis of recent climatic trends for the area, and enable region-wide winter and summer storm events to be more clearly defined. It already has been determined, for example, that in January and February of 1969, two major storms caused extensive flooding in southern Nevada with the heaviest storm occurring February 24-26. These data will additionally provide correlations of precipitation and severe runoff events.

0G3311G2 Aerial reconnaissance of severe runoff features (CONTINUED)

P. Glancy conducted investigations of debris movements due to severe runoff in July throughout central and northern Nevada. The following are summary accounts of this work: a) debris movement, due to severe flooding, occurred on July 11, 1992, near Hawthorne, Nevada. The debris, which consisted of fine-grained sand and gravel, was transported and deposited on most of the streets in Hawthorne. South of Hawthorne, debris was deposited in several road cuts of Nevada State Highway 359. This debris was mostly fine-grained sand and gravel, and the volumes were fairly large. One road cut filled to depths of about 10 feet over a length of several hundred feet. These debris movements could have been hazardous to vehicles or people, but none were caught in their paths; b) moderately heavy debris (boulders up to 2 feet in diameter in a sand and gravel matrix) was deposited over Interstate 80 east of Reno, Nevada on July 14, 1992. The debris covered parts of the highway and obstructed traffic for several hours. Although the characteristics and quantity of the debris were hazardous, there were no casualties; c) fine-grained sandy debris was deposited on residential streets and yards in Carson Valley on July 14, 1992. The debris was more of an expensive nuisance than a hazard; and d) heavy debris transport occurred in Gray Creek, a tributary of the Truckee River, north of Reno, Nevada. Fine-grained sand, silt, and clay caused municipal water-treatment plants in Reno and Sparks to cease operations for several days. The effect was almost disastrous because the metropolitan area gets about 80 percent of its water supply from the Truckee River. The source of this debris movement has not been investigated because of time constraints. It is hoped the source area can be examined soon.

Quality Assurance

Planning and Operations

Variations

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 32 hours were spent in support of the following tasks:

D. Grasso conducted a field reconnaissance of the Potosi Mountain debris flow area to field check photogrammetric measurements of landforms underlying the flow.

D. Grasso prepared field equipment, maps, satellite images, and other research materials, and was accompanied by P. Glancy as active participants on a regional paleoflood field trip of the Lower Amargosa River system. The trip included an evaluation of the late-Quaternary geomorphology, sedimentary stratigraphy, and drainage patterns of the Amargosa River and its tributaries. Procedures for modeling the magnitude and frequency of mid-Holocene streamflow were evaluated during a group discussion with Y. Enzel, author and paleoflood investigator of 'Holocene streamflow events of the adjacent Mojave River and Silver Lake system'. These modeling procedures are very relevant to work in the Lower Amargosa River, and would allow correlations to be made between large-magnitude, historic streamflow and precipitation events.

WBS 1.2.3.3.1.1.3 Regional Ground-Water Flow System

Principal Investigator - J. Czarnecki

OBJECTIVE

To define the potentiometric distribution hydraulic properties, and recharge and discharge for the regional ground-water flow system to determine the magnitude and direction of ground-water flow. (SCP Study 8.3.1.2.1.3)

SCP 8.3.1.2.1.3.2 Regional potentiometric level distribution and hydrogeologic framework studies 0G3311B2

Summary Account Manager - J. Czarnecki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG052: Process existing log data Amargosa Desert

S. Keller finalized a data package pertaining to borehole data from mining company drillholes in the Amargosa Desert. The data is being prepared for technical review as a USGS Open-File Report. At the suggestion of the mining company providing the data, a new format for producing combined geophysical and lithologic logs was written, and the 60 existing logs were recompiled into 44 logs and replotted. These logs incorporated standardized lithologic patterns. Items still needed for the report are the text, log header information, and several missing geophysical logs to be provided by the mining company.

3GRG053: Locate additional piezometers in the Amargosa

J. Czarnecki and C. Savard met with staff from the Franklin Mining Company (Death Valley Junction, CA) and discussed opportunities to obtain access to exploration drillholes in the vicinity of Franklin Lake playa that would be constructed by the mining company. A water sample was obtained for strontium analysis from one of the mining company's newly constructed wells on the north end of Franklin Lake playa. A mining company official took project staff to a well he discovered that had a padlock cover and likely is well FL-1 that was reported by Pantea (1980).

3GRG054: Prepare report on existing regional water level data

M. Ciesnik responded to technical-review comments on a draft Open-File Report entitled "Ground-water data from wells in Nye and Inyo Counties, Nevada-California."

3GRG003: Measure water levels in Amargosa Desert

Water levels were measured in well NA-9 and in wells throughout Franklin Lake playa.

3GRG009: Analyze hydrostratigraphy and structure

Compilation of computer files for geologic cross sections in the Amargosa Desert is in progress, using the graphics files of the combined geophysical/lithologic logs and borehole locations provided by the mining company. These will serve as a basis for attempting correlations of the basin-filling units.

Quality Assurance

Planning and Operations

3GRG053: Locate additional piezometers in the Amargosa

M. Ciesnik completed entry of basic data on wells designated for a monitoring network in the Amargosa Desert area.

J. Czarnecki discussed possible participation in renewed drilling of oil-test holes in the Amargosa Desert with an operator who has requested permits to access sites relinquished by another oil company. Preliminary arrangements were made to participate in collection of cuttings and borehole geophysical data.

3GRG003A: Access permits to measure water-levels in Amargosa Wells

J. Czarnecki spoke with personnel from the Barstow, CA BLM office and from DOE/LV regarding status of requested permits to wells in the Amargosa Desert. Permits for access to wells in Nevada should be given soon, whereas California well access will require a sketch map for each site to be visited and a detailed description of tests to be performed.

3GRG007: Prototype equipment testing for small diameter wells

C. Savard and J. Czarnecki pumped deep well NA-9 in the Amargosa Desert using a jack pump and approximately 410 ft of sucker rod and pipe. The pumping apparatus was removed from the well using a modular tripod and electric winch.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 106 hours were spent in support of the following tasks:

M. Ciesnik prepared responses to USGS Audit Finding Reports nos. 9204-01 and 9204-02 for the USGS-QA office, and participated in a meeting with QA office personnel related to these AFR's.

J. Czarnecki met with L. Hayes, D. Appel, and D. Gillies to review causes for variances related to scheduled project activities.

M. Ciesnik reviewed QA issues pertinent to field activities within SCP 8.3.1.5.2.1.4 in preparation for a field trip to southern Arizona. He participated in the field trip during which precipitation samples from two stations were collected and QA procedures implemented. Also prepared was a scientific notebook #0014 for SCP activity 8.3.1.5.2.1.4 for use during the field trip.

J. Czarnecki and C. Savard interviewed candidates for a Foothills hydrologic technician position in Las Vegas, NV. Czarnecki also conducted phone interviews with applicants for a temporary USGS hydrotech position based in Mercury, NV.

M. Ciesnik discussed issues pertaining to a grading report for SCP 8.3.1.5.2.1.4 with D. Porter (SAIC Golden). He also completed a request from YMP/USGS training coordinator pertaining to a workshop on QMP-4.01 for selected HIP personnel.

J. Czarnecki discussed the current state of surface-based geophysical surveys with R. Spengler (USGS GSP) in connection with identifying the cause of the large hydraulic gradient beneath Yucca Mountain.

SCP 8.3.1.2.1.3.3 Fortymile Wash recharge study 0G3311C2

Summary Account Manager - C. Savard

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG003B Complete report on channel loss
Continued to draft report.

3GRG005B Complete procurement of infiltration test equipment
Major equipment needed to run infiltration testing has been procured. This activity is complete.

3GRG028 Collect FY-92 moisture data
Read rain wedges at UE-25 UZN#92 and UE-29 UZN#91. Neutron logged UE-25 UZN #92 and UE-29 UZN #91. Made depth to water measurements in UE-29 UZN #91, UE-29 a#1, and UE-29 a#2. The data collection frequency was increased to document effects from the Rock Valley earthquake.

3GRG025 Construct ponding/infiltration sites
Field reconnaissance was made for several sites.

Quality Assurance

Planning and Operations

3GRG001B Complete criteria letter ponding sites
Continued to draft criteria letter.

3GRG006B Complete criteria letter FM & FMN holes
Continued to draft criteria letters.

3GRG010B Continue to site FMN & FM holes
Continued to site possible locations for the FMN & FM holes.

Variances

3GRG001B Complete criteria letter ponding sites
Ponding sites locations are not finalized. The infiltration test procedure has not been finalized and the extent of other DOE contractors' involvement is not decided. Infiltration tests at the ponding sites will not be run until neutron logging holes are completed. Additional time is required to complete the draft criteria letters. No impact on major deliverables is expected.

3GRG003B Complete report on channel loss
Additional time is required to complete the report which is being targeted for a journal.

3GRG006B Complete criteria letter FM & FMN holes
Additional time is needed to complete the draft criteria letters. Hole locations need to be sited and the sampling schedule during drilling defined. No impact on major deliverables is expected.

3GRG010B Continue to site FMN & FM holes
FMN locations need to be finalized. A balance between holes used to monitor natural conditions and infiltration experiments needs to be defined. No impact on major deliverables is expected.

3GRG106A Analyze imagery of Fortymile Wash

Difficulty in scheduling time when Nevada based personnel and Denver based personnel can meet and do combined work. No impact on major deliverables is expected.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 40 hours were spent in support of the following tasks:

Represented the Saturated Zone during a Public Open House tour of the Yucca Mountain Project.

Sent a memorandum to the Chief, International Water Resources Program, USGS detailing the foreign travel trip to the AGU Meeting in Montreal, Canada.

Assisted other Regional Saturated Zone and Paleohydrology personnel in collecting ground-water samples from the Amargosa Desert.

Assisted in interviewing personnel for a Foothills Hydrotech position to support the Regional Saturated Zone study.

Evaluated 35mm slide maker software for use in presenting technical data.

SCP 8.3.1.2.1.3.4 Evapotranspiration studies 0G3311D2

Summary Account Manager - J. Czarnecki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

Variances

3GRG209A: Obtain permits for piezometer construction

No activity. Work is delayed until an evaluation of the potential for chloride profiling can be made. This will change the scope of the permit.

3GRG206A: Analyze Franklin Lake hydrochemical data

J. Czarnecki discussed plans to incorporate strontium isotopic ratio results from Franklin Lake playa samples with Z. Peterman (USGS GSP). Czarnecki led a group of USGS personnel, including Peterman, to several sites on Franklin Lake playa to collect water samples from various wells for determining $^{87}\text{Sr}/^{86}\text{Sr}$ ratios which may be useful for identifying sources of water into the playa.

3GRG030: Select water table/evapotranspiration sites

A determination of which sites are to be used for piezometer nests cannot be made until an evaluation of the number of sites is made. This will be delayed until the chloride profiling method can be evaluated and tested, which may minimize greatly the need for piezometer nests. J. Czarnecki discussed chloride profiling with S. Tyler (DRI, Reno) who provided several papers on the subject. See 3GRG208A variance.

Variances (CONTINUED)

3GRG201A: Perform prototype tests on evapotranspiration measuring technique

J. Czarnecki attempted to program a Campbell Scientific CR10 datalogger using a IBM-PC direct link. It was determined that an optical interface was needed to achieve this step.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 60 hours were spent in support of the following tasks:

M. Ciesnik prepared and submitted a TDIF pertinent to data generated using a multi-level, in-situ sampler deployed at Franklin Lake playa in the fall of 1989.

J. Czarnecki attended the 7th International Conference on Water-Rock Interaction held in Park City, UT. A poster entitled "A Hint of Recharge at Franklin Lake Playa" was presented. Czarnecki attended a field trip to the Great Salt Lake and made several contacts with attendees working in arid/saline water ground-water environments. Also discussed with meeting participants, were models related to chemical precipitation/dissolution in the SZ related to elevated temperatures as a possible result of nuclear-waste emplacement in the UZ.

WBS 1.2.3.3.1.1.4 Regional Hydrologic System Synthesis and Modeling

Principal Investigator - J. Czarnecki

OBJECTIVE

To synthesize hydrologic, geologic, hydrochemical, and geophysical data into a model and make a qualitative analysis of how the system is functioning; and to represent quantitative observations of hydrologic data pertaining to the ground-water flow system in a comprehensive flow model. (SCP Study 8.3.1.2.1.4)

SCP 8.3.1.2.1.4.2 Subregional two-dimensional areal hydrologic modeling 0G3311I2

Summary Account Manager - J. Czarnecki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRM017A: Hydrology integration task force participation

A meeting of the Hydrology Integration Task Force was held July 28, 1992, at Sandia National Laboratories, at which J. Czarnecki and C. Fridrich presented a proposal to perform hydraulic and hydrochemical tests in drill hole USW G-2. The proposal was accepted by the committee. The meeting included a tour of B. Glass' UZ fracture laboratory. Czarnecki also met with a committee assigned to review written summaries and recommendations from working groups during the joint HITF/GIT workshop on preferential pathways.

3GRM015A: Prepare software QA for MODFE code

No activity this reporting period. See 3GRGM014A below (precursor to software QA activity).

3GRM015A: Test finite-element mesh generator

J. Czarnecki finished installation of the software package GRID BUILDER and was successful in generating some simple finite-element meshes. A digitized outline of new model domain and digitized well location coordinates within that domain were downloaded to an IBM PC for use in construction of a new model grid.

3GRM016A: Digitize boundary of subregional flow domain

A digitized outline of the area of a new subregional model was produced and transferred to an IBM-PC for use in constructing a new finite element mesh. Coordinates for the outline were digitized in UTM coordinates.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 10 hours were spent in support of the following tasks:

J. Czarnecki sent letters and USGS reports to attendees of public update meetings held in Pahrump, Las Vegas, and Reno, NV in May, 1992.

J. Czarnecki attended a meeting to review software quality assurance requirements now in place under QMP-3.03, R3.

J. Czarnecki, D. Luckey, and C. Fridrich met to discuss a strategy to test drillhole USW G-2. Per that meeting, Czarnecki and Fridrich drafted a test plan that was endorsed by Luckey and presented at the Hydrology Integration Task Force meeting. Czarnecki met with S. Williamson and D. Miller (Baker Oil Tools) to discuss new water-well technology and a method for removing a stuck bridge plug in USW G-2.

SCP 8.3.1.2.1.4.4 Regional three-dimensional hydrologic modeling 0G3311K2
Summary Account Manager - J. Downey

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRM040 Interface GIS with ground-water models

J. Downey completed necessary modifications of PREMOD source code (on loan from International Ground Water Modelling Center) in order to port same to run on the IBM model RS6000 RISC system under UNIX OS.

A. Turner was invited to spend two days at a joint US Air Force-EPA Data Management Workshop in Denver. The Workshop reviewed site characterization, data management, and information uses to permit forecasting of hazardous waste site cleanup activities. Use of GIS technologies to support ground water modelling was a major topic discussed. Currently the Air Force is testing the same series of GIS modelling packages for their site remediation studies as are being used by the YMPB.

3GRM13A Develop visualization software

F. D'Agnese met with B. Meier to review Intergraph plans to release GeoVoxel in the fourth quarter of calendar year 1992. GeoVoxel is a three dimensional voxel-based volume modeling and visualization software that will be integrated with ERMA (Intergraph's GIS/Ground-water modelling code).

Quality Assurance

Planning and Operations

3GRM040 Interface GIS with Ground-water Models

F. D'Agnese spoke with Intergraph concerning upgrades to ERMA that will allow efficient interfacing with MODFLOW.

Planning and Operations (CONTINUED)

3GRM08A Begin Calibration of Numerical Model

Prototype model test runs with large model grid (250 X 250 X 10 layers) were conducted on IBM model RS6000 RISC system at CSM.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 180 hours were spent in support of the following tasks:

F. D'Agnese participated in the Yucca Mountain tour in Mercury for the Saturated Zone Section. (16 hrs.)

J. Downey was involved with preparation of several administrative memoranda and letters required by project activities due to the loss of key personnel (160 hrs).

The paper by H. Claassen and J. Downey using program SNODIF has been submitted to the manuscript section and is in final typing for submission to the Director's office for approval. (8 hrs.)

WBS 1.2.3.3.1.2 Unsaturated Zone Hydrology

OBJECTIVE

To develop a model of the unsaturated zone hydrologic system at Yucca Mountain that will assist in assessing the suitability of the site to contain and isolate waste. (SCP Investigation 8.3.1.2.2)

WBS 1.2.3.3.1.2.1 Unsaturated Zone Infiltration

Principal Investigator - A. Flint

OBJECTIVE

To determine the effective hydraulic conductivity, storage properties, and transport properties pertinent to unsaturated zone infiltration as functions of moisture content or potential; and to determine the present and to estimate the future spatial distribution of infiltration rate over the repository block at Yucca Mountain. (SCP Study 8.3.1.2.2.1)

SCP 8.3.1.2.2.1.1 Characterization of hydrologic properties of surficial materials 0G3312Z2

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI005A Install and check geophysical instruments

Installation of geophysical instruments has been tested for the geophysical logging van. All is in working condition. An additional person was familiarized with the operation of the van. Special radiation safety training is needed and has been scheduled. Geophysical logging will be tested in N54 and N55. Calibration will be checked against the known conditions in these boreholes.

Technical Activities (CONTINUED)

3GUI007A Analyze spatial variability of soil physical properties

Two watersheds, Split Wash and Pagany Wash, were studied by reconnaissance method. From the field observations, samples in ridge to ridge transects will be obtained in order to develop a grid network sampling strategy that encompasses all of the spatial variability of the soil's physical properties in these watersheds. This activity will support the development of small watershed models until the Mission 2001 activities begin in October. These activities will be directed towards the development of a map of infiltration-runoff for the surficial materials.

3GUI020A Prepare Open File Report outcrop samples

Laboratory data from seven surface outcrop transects have been compiled and analyzed. The outline for the open file report is in progress.

Quality Assurance

3GUI023A Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

Variances

3GUI025A Procure SPARC station for GIS program

This activity is delayed due to snags in the procurement process. The GIS program has not been impacted because that position was not filled. The GIS operator has been selected but is currently filling another position (in the Meteorology program) that cannot be vacated until a replacement is found. Advances were made in our capability to interface our current GIS computer (a PC compatible) with the peripherals necessary for GIS.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 8 hours were spent in support of the unscheduled tasks.

SCP 8.3.1.2.2.1.2 Evaluation of natural infiltration 0G331212

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI303 Continue small scale deterministic model FY92

Development of two watershed models for the sub-drainages Pagany Wash and Split Wash was continued. Surface drainage boundaries and 10 foot elevation contours were digitized using orthophotographs provided by EG&G in an effort to create high-resolution DEMs necessary for slope & aspect calculations. At present, the most accurate elevation data are provided by the 160 foot spacing DEMs that were used to help generate the elevation contours on the orthophotos. A Fortran program was developed to perform interpolation on original DEMs to create elevation grids of various spacings and to perform slope and aspect calculations. This program can also create a regular elevation grid from the digitized elevation contours. Although there is significant loss of accuracy in elevations using the digitized elevation contours, these files will have to be used for detailed slope and aspect calculations until the original 160 foot spacing DEM files are obtained from EG&G. The accuracy of the existing digitized elevation contours is approximately +/- 10 feet.

Technical Activities (CONTINUED)

3GUI311A Continue analysis of moisture profiles

Efforts were continued to update and validate the neutron logging database in order to create a more usable database of volumetric water content for an efficient and complete analysis of moisture profiles obtained from all boreholes and all logging dates since 1984. The creation of an intermediate database is necessary because the original data files which are down-loaded from the neutron moisture meters can not be used efficiently for analysis, and do not include the calibration to convert from counts to volumetric water content. In addition, all original data files must be checked for possible sources of error using the meter standardization data, shielded readings obtained for each neutron log, and consistency of profiles for each individual borehole. A preliminary analysis of relative changes in moisture profiles using neutron meter counts is continuing for a qualitative analysis of wetting fronts that resulted from the above-average precipitation that occurred during the winter and early spring of 1992. This analysis is providing important information concerning differences in infiltration mechanisms between bedrock and alluvium surficial materials, and between channel, terrace, sideslope, and ridgetop locations. A preliminary calibration for meter 3 has been used to quantitatively analyze changes in volumetric water content for moisture profiles in boreholes located in Pagany Wash. On an average, approximately 50 to 75 percent of the measured precipitation accounted for an increase in moisture content within the upper 2 meters depth of alluvium material, and within approximately the upper 5 meters depth for bedrock. Continued analysis of the moisture profiles in Pagany Wash is being used to estimate evapotranspiration for a mass balance analysis, and for comparison with energy budget measurements being made on the surface and also with a class A evaporation pan.

3GUI315 Prepare technical paper small scale model

Preparation of the manuscript was continued as new information concerning the representation of evapotranspiration and precipitation as a dynamic upper boundary condition was obtained from the analysis of moisture profiles in Pagany Wash. Small scale 1-dimensional modeling was conducted using measured precipitation and calculated evapotranspiration rates for an inverse-solution analysis of saturated hydraulic conductivity and the parameters for Brooks & Corey moisture characteristic functions. The results compared favorably with the original results obtained using a 2-dimensional model for inverse-solution analysis using moisture profiles obtained in 1984 immediately following a runoff event in Pagany Wash. This information helps validate the original work performed for small-scale modeling. The modeling results also compare favorably (within 1 order of magnitude for hydraulic conductivity) with estimates obtained empirically using grain size analysis.

3GUI340 Procure tritium analysis

Analysis of the N-55 LEXAN samples by personnel in Denver is continuing.

3GUI358 Collection and analysis of evaporation pan data

Data collection is continuing using the newly developed automated system. Corrosion problems with the sensitive float valve were corrected and a validation check of the system is continuing using a manual class A evaporation pan. The modified float valve system is being used in an effort to obtain hourly pan evaporation data.

3GUI369 Initiate collection and analysis of evapotranspiration data

Analysis of evapotranspiration using the energy-budget technique with measured radiation and micrometeorological parameters was initiated using a comparison of energy-budget data with calculated evapotranspiration obtained from the mass-balance analysis of moisture profiles.

Technical Activities (CONTINUED)

3GUI381 Log neutron access boreholes FY92

Monthly logging was initiated in July for all neutron access boreholes, and was approximately 50 percent complete by the end of the month. Logging of the remaining holes will be completed as scheduled during the first week of August.

3GUI386 Continue drilling new neutron access holes

Drilling of neutron access borehole N-63 in Pagany Wash using the CME 850 is scheduled to begin the first week of August. This site is located on the alluvium terrace adjacent to N-9, and will extend the existing transect of boreholes, which has provided very important input for 2-dimensional modeling of infiltration, across the wash towards the north slope of the wash. Environmental compliance for N-33 was approved, and drilling will begin as scheduled immediately following the completion of N-63.

3GUI388 Procure and calibrate sensors for borehole monitoring

Calibration of sensors for borehole monitoring has been delayed pending procurement of these sensors.

3GUI390 Remove borehole casing and install sensors

Due to Mission 2001 PACS endeavors this activity will be redirected.

3GUI391 Siting boreholes for cross-hole gamma

Due to Mission 2001 PACS endeavors this activity will be redirected.

3GUI397 Criteria letter for cross-hole gamma boreholes

Due to Mission 2001 PACS endeavors this activity will be redirected.

3GUI398 Conduct readiness review

Due to Mission 2001 PACS endeavors this activity will be redirected.

3GUI404 Installation of TDR network

Field calibration of the TDR system is continuing as time permits with personnel in the artificial infiltration program.

Quality Assurance

3GUI409 Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

Variances

SCP 8.3.1.2.2.1.3 Evaluation of artificial infiltration 0G331222

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI606 Prototype infiltrometer field testing

Continued field testing of single and double ring infiltrometers on various geohydrological surfaces. A system is being developed that allows the researchers to accurately control water levels and to measure total quantity of water introduced into the rings. As soon as all needed parts arrive, field testing of this system will begin.

3GUI608 Develop sampling scheme/field infiltrometer study

A number of different sample bags have been ordered, and we are currently waiting on their arrival. The new Time-domain reflectometry unit (TDR) has been assembled and tested in the lab. Preliminary plans for the field calibration are being studied.

3GUI616A Develop prototype ponding study

A second ponding prototype field location is being evaluated. Layout of field instrumentation, radio telemetry equipment, and various sampling schemes are being reviewed.

Quality Assurance

3GUI695 Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

Variances

WBS 1.2.3.3.1.2.3 Percolation in the Unsaturated Zone - Surface Based Study

Principal Investigator - J. Rousseau

OBJECTIVE

To determine the present *in situ* hydrologic properties of the unsaturated zone hydrogeologic units and structural features; to determine the present vertical and lateral variation of percolation flux through the hydrogeologic units and structural features; to investigate the relationships between present flux and past climatic conditions; and to determine the effective hydraulic conductivity, storage properties, and transport properties as functions of moisture content or potential. (SCP Study 8.3.1.2.2.3)

SCP 8.3.1.2.2.3.1 Matrix hydrologic-properties testing 0G3312U2

Summary Account Manager - D. Soeder

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP003A Continue QA procedures, training & calibration FY92

QA training and equipment calibrations were carried out as required. The Campbell 207 sensors in the relative humidity ovens were replaced with newly-calibrated sensors on July 28, 1992. The old sensors were returned to the HIF for closing calibrations. The technical procedure for the helium pycnometer has been reviewed and returned to Denver for final processing before release. The technical procedure for the high-flow permeameter has been written and will be submitted for review within the next month.

Technical Activities (CONTINUED)

3GUP009A Construct and test low-flow permeameter

This activity has been delayed because critical components, such as valves and tubing, have not yet been delivered. Progress also has been slowed due to personnel taking annual leave during this period. The finish date for this activity has been delayed to September 30, 1992.

3GUP013A Model imbibition to verify lab measurements

This activity was completed on July 28, 1992, as scheduled, with the development of a new formalism in cooperation with LBL which better matches the water characteristic function and the permeability function to our laboratory imbibition data. A follow-on task (3GUP014A) was initiated the next day on July 29, 1992.

3GUP014A Continue modeling imbibition

This activity was started to validate the numerical model of the relationships between the water characteristic function and the permeability function developed in cooperation with LBL. Application of the imbibition data to unsaturated flow models is expected to begin soon.

3GUP17AA Water retention from SPOC analyses

No progress was made on this activity in July because the apparatus has not been received from Oregon State University. The completion date for this work has been delayed until September 30, 1992.

3GUP018A Matric potential from heat-dissipation probe

The start date for this activity has been pushed back to September 1, 1992, because the equipment still has not been received.

3GUP019A Water retention pressure plate tests

No specific progress has been made on performing this activity, although a TDIF and the outline for an OFR which incorporate data collected earlier have been prepared.

3GUP023A Develop pore geometry technique

Nearly a dozen thin sections of fluorescent-dye impregnated Yucca Mountain rocks have been successfully produced in our laboratory using a simple lap polishing wheel. Components to mount a camera to the microscope and an image-analysis system have been procured but not delivered.

3GUP25AA Chilled-mirror psychrometer verification

This activity was completed as scheduled on July 2, 1992. Experiments have revealed that samples with a minimum size of about 1 cm are required to provide water potential measurements that are representative of whole rock in the ground. Finely-pulverized samples are generally drier than larger chips because of the increased porosity caused by crushing. The exception to this rule is zeolitic samples, where fine crushing actually makes the sample wetter, presumably by releasing water from zeolite structures. A technical procedure for using the chilled-mirror psychrometer on Quality-Affecting core is in review.

3GUP028A Imbibition measurements on transect samples

This activity was completed as scheduled on July 30, 1992. Analysis of the data will be continuing under 3GUP014A.

Technical Activities (Continued)

3GUP028AA Psychrometry on selected transect samples

No progress. This activity has been delayed because of the need to complete the verification of the chilled-mirror psychrometer in 3GUP025AA. This delay should not impact the schedule.

3GUP029A Transect moisture characteristic curves

No specific progress has been made on performing this activity, although a TDIF and the outline for an OFR which incorporate data collected earlier have been prepared.

3GUP30AA Neutron core physical property measurements-FY92

This activity is ongoing as scheduled. Processing under procedure HP-229 was continued from last month on preserved (canned) core samples from neutron-access boreholes N-11, N-27 and N-37. HP-229 processing was initiated this month on canned core samples from neutron-access boreholes N-15, N-16, N-17, N-36 and N-53.

3GUP31AA Neutron core gas pycnometry measurements-FY92

This activity has been delayed until a QA-approved technical procedure is in place. The procedure has been written and technically reviewed, and is currently awaiting approval by QA. A second gas pycnometer has been delivered from Micromeritics to increase our sample throughput. It is identical to the first apparatus, except that it has a 10 cc volume chamber instead of a 100 cc chamber. Completion of this activity will be delayed until September 30, 1992.

3GUP32AA Neutron sample statistics-FY92

This activity was completed as scheduled on July 27, 1992. Statistical analysis of water content data and physical properties of core from neutron access holes N-55 and N-54 was done to assess the geologic framework of groundwater distribution in the unsaturated zone.

3GUP33AA Imbibition on neutron core samples FY92

This activity has been delayed until a technical procedure approved by QA is in place. The start of this activity will be delayed until September 1, 1992.

3GUP34AA Permeability of selected neutron cores FY92

This activity has been delayed until a technical procedure approved by QA is in place. The start of this activity will be delayed until September 1, 1992.

3GUP37AA UZP-6 core gas pycnometry measurements

This activity has been cancelled as a result of the postponement of the UZP-6 drilling activity.

Quality Assurance

Planning and Operations

Variations

3GUP17AA Water retention from SPOC analyses

Finish date delayed from July 2, 1992 until September 30, 1992. Neither the apparatus nor the walk-in environmental room have been received to run the analyses.

3GUP009A Construct and test low-flow permeameter

Completion date delayed from July 28, 1992 until September 30, 1992 because of technical personnel on leave and slow procurement of critical tubing and valve components.

Variances (CONTINUED)

3GUP31AA Neutron core gas pycnometry measurements-FY92

Finish date delayed from July 28, 1992 until September 30, 1992 waiting for QA-approved procedure to be put into place.

3GUP37AA UZP-6 core gas pycnometry measurements

Activity cancelled.

3GUP018A Matric potential from heat-dissipation probe

Start date delayed from July 3, 1992 until September 1, 1992 due to late delivery of equipment.

3GUP33AA Imbibition on neutron core samples-FY92

Start date is delayed from July 28, 1992 to September 1, 1992 until QA-approved technical procedure is put into place.

3GUP34AA Permeability of selected neutron cores-FY92

Start date is delayed from July 28, 1992 to September 1, 1992 until QA-approved technical procedure is put into place.

SCP 8.3.1.2.2.3.2a Surface-based boreholes studies 0G3312V2

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP059M HP, Thermistor/Pressure/Psychrometer/Technical Procedure Calibration

See 3GUP059E

3GUP003E Instrument and monitor HRF boreholes

Monitoring of HRF boreholes continued throughout the month of July. Alternate (backup) sensors were activated and scanned during July to assess possible drift of the primary sensors.

3GUP021E Construct/test/evaluate multi-station gas sampling apparatus

Preliminary testing of gas sampling software was conducted during the second week of July. Testing involved sampling from a single, simulated instrument station: start-up, line purging, flow monitoring, and dew point temperature monitoring. More elaborate multi-station tests are planned during the next months.

3GUP035E Prepare for instrumentation of UZ-16

Meetings were held in Las Vegas with RSN representatives to discuss various aspects of instrumenting UZ-16. A final design for the geophone cable mounts was agreed upon. The USGS agreed to fabricate a prototype mount, and deliver to RSN in about 3 weeks. RSN will take the lead in arranging for fabrication of a sufficient number of mounts to accommodate the 96 geophone units that will be installed in UZ-16. RSN delivered a sample section of plastic coated tremie pipe to the USGS for testing grout adhesive characteristics. Tests were conducted by the USGS and indicate that grout buildup in the sample pipe is excessive. Alternatives will need to be examined.

3GUP059E Complete procedure thermocouple/pressure/psychrometer/calibration technical procedure

A final draft of the thermocouple psychrometer calibration procedure was submitted to the Project Chief for review. August will be devoted to completing these three technical procedures and preparing them for submission to the QA office for approval.

Technical Activities (CONTINUED)

7201M 7201: Deep UZ Borehole (VSP-1) Drilling (start)

Total depth of borehole at end of July was 400 ft. Latest completion date estimate by DOE/REECo is March 18, 1993. Drilling has penetrated the Tiva Canyon unit, and is now drilling thru the upper lithophysal section of the Topopah Spring unit.

Quality Assurance

Planning and Operations

3GUP020E Acquire/install mass flow

The bench-top mass flow calibrator from Sierra Instruments was delivered and installed at the HRF Calibration Laboratory. Activity is complete as of July 30, 1992.

3GUP047E Prepare procurement documents, 2nd gas sampling system

No further work on this activity will be conducted for the remainder of FY92. So far, only the mass flow controllers for the 2nd gas sampling system have been ordered. Chilled mirrors, precision mass flow meters, a vacuum pump, miscellaneous tubing, valves, filters and fittings, and DAS electronics are still required for the 2nd system. Funding is insufficient to complete acquisition of the remaining components in FY92.

3GUP042E Prepare procurement documents for UZ-9 borehole instrumentation

Downhole instrument station apparatuses for 82 instrument stations were ordered (sufficient to service 4 to 5 UZ boreholes). DAS electronics for UZ-14 were delivered during July. Activity is on schedule.

3GUP045E Order additional microwave telemetry

No work on this activity during the reporting period. FCC license approval is still pending.

Variances

3GUP023E Develop/test/evaluate in situ pressure transducer recalibration

Activity has not started yet; it has slipped several months. Work will begin when the majority of testing on the gas-sampling apparatus has been completed, which will be about November 15, 1992. System/capability is not needed until September 1993. Cause: lack of staff. Impact: none.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 422 hours were spent in support of the following tasks:

Prepared/submitted criteria letter for drilling, 120 testing, instrumenting UZ-14. (120 hrs.)

Conducted prototype experiment to evaluate use of Peltier cooled psychrometers to measure core water potential. Experiment also run to compare effects of sample size on measured water potential. (40 hrs.)

Set up an inventory control and management system for tracking sensors and devices that will be used in the Deep UZ borehole instrumentation program. (40 hrs.)

Attended a one-day conference hosted by SAIC (LV) on well logging. (16 hrs.)

Completed QAGR activity controls specification reports for the site vertical borehole and Solitario Canyon horizontal borehole studies. (16 hrs.)

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

Conducted a field reconnaissance survey of the Ghost Dance Fault to determine locations for the drilling of UZ-7 and UZ-8. (100 hrs.)

Submitted specifications for construction of an Insulated Instrument Shelter test bed facility at the HRF. (30 hrs.)

Processed electronic equipment to Ball Aerospace for calibration. (60 hrs.)

SCP 8.3.1.2.2.3.2b Vertical seismic profiling 0G331232

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP035B Design/test/evaluate geophone mounts

J. Rousseau and A. Balch met with Raytheon personnel in Las Vegas on July 26, 1992. Drawings and specifications were given to Raytheon for fabrication of prototype mounts.

3GUP045B Identify/evaluate seismic source tool

The orbital vibrator, made by OYO, Inc., under license from Conoco is available. Plans are being made to test it at the Bergen park site. Also, the SNL wall-locking vibrator has become available through license to Bolt Technology.

3GUP025B VSP prototype field test and data analysis

Boreholes number three and four have been drilled at Bergen Park, and a 5' section of surface casing set. A borehole fluid loss problem must be solved prior to the start of production reading. The plastic sleeves being used were punctured, so a heavier (16 mil) sleeve was tried, and it was also was punctured. The holes were logged with caliper, TV and inclinometer surveys. Considerable fracturing and several borehole enlargements were observed. One borehole is substantially smoother and better than the others, and larger diameter liners will be purchased and placed in this borehole.

3GUP019B Continue VSP lab/physical & computer simulation 2-d method

All physical measurements have been made. The 2-D fault model data have been reprocessed which greatly improved all images. Sharp, clear images of the fault and the reflecting boundaries have been obtained. Re-imaging of the Yucca Mountain Physical Model produced much higher quality data. The 2-D modeling report is being prepared.

Quality Assurance

3GUP030B Develop/write VSP technical procedure for data acquisition

A draft of this procedure has been completed.

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 64 hours were spent in support of the following tasks:

A. Balch and J. Rousseau spent July 28-31, 1992, in Las Vegas and at NTS developing plans and procedures with SAIC and RSN personnel for the zero offset VSP and the multi offset VSP. (Balch 32 hrs., Rousseau 32 hrs.)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP025C Integration and test design for software

Test plan is approximately 55% complete. Target date to complete first draft, August 31, 1992, appears feasible. Test plan is designed to qualify and certify all IDAS software systems and subsystems.

3GUP013C Development and module testing software-2

A patch to the Domain Control Subsystem has been designed. The patch is intended to provide a temporary by-pass of IDAS access control for the purpose of meeting the September HRF borehole restart schedule. The patch has not been coded or tested. Extensive modifications have been made to the sensor reader program to correct timing lag problems. Work on modifying sensor reader to meet the HRF restart schedule is approximately 70% complete.

3GUP063C Write/review/revise, IDAS maintenance procedures

No work on this activity during the reporting period. Awaiting delivery of first IIS, which probably will be delivered to the HRF during the first or second week of September.

3GUP051C Evaluate IDAS prototype-2, data from HRF-BH's

No work on this activity during the reporting period. Restart of data acquisition from the HRF boreholes is scheduled for the period of September 8 - 21, 1992. Cannot continue work on this activity until after the restart.

3GUP035C Procure/deliver microwave datacom

REEC Co Communications has arranged with the manufacturer of the microwave data communications equipment to lease 3 transmitter/modem systems and test these on 2 pair of frequencies available at the NTS but not currently in use. REEC Co advises equipment will be available for testing at the end of August and will commence evaluations in September.

Quality Assurance

Planning and Operations

3GUP032C Construct prototype IDAS instrumentation shelter (IIS)

Insulation of shelter is complete. An inspection of the insulation and wall penetrations was conducted in mid July. R/P International has advised that completion of the shelter is scheduled for the end of August. Delivery will probably be made during the first or second week of September.

Variances

3GUB058C Review QA, rewrite IDAS computer procedures

Activity was rescheduled to start on February 15, 1993.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP003 Complete construction of first support trailer

The USBR has completed all design work. The control panel is 80% complete and the tube bundle winding apparatus has been set up. Construction of the tube bundle will begin in early August.

3GUP005D Purchase parts/assembly of 12" packer system #1

The subs have been installed on the 12" packers. This will allow installation of the tubing and electrical wiring in August.

3GUP014D Expand hydrologic research facility calibration lab

Modification of equipment for calibration of Air-K thermistors is complete. Modification for calibration of Air-K pressure transducers has begun. The first half of the mass flow calibration system has been installed.

3GUP016D Technical procedure for thermistors

The TP for calibration of thermistors is complete and ready for QA review. Submittal for QA review is on hold awaiting a decision as to what software QA requirements will be applied to the Macros programs.

3GUP012D Technical procedure for air k testing

The scientific notebook plan for Air-K Testing has been completed and all comments from the technical review answered. The plan is presently in QA review.

3GUP015D Technical procedure/pressure transducer calibration

Adaptation of the HRF calibration lab for the Air-K pressure transducers has begun. All equipment has been purchased and installed. The calibration will require new computer programs. Writing of these new programs is under way. The first draft of the technical procedure will be completed in August.

Quality Assurance

3GUP010 Complete engineering drawings/assembly/test instruments, packer

The USBR has completed all preliminary engineering drawings for the trailer.

3GUP004 Complete QA for 8", 12" packers and trailers

The USBR continues to meet all QA requirements for purchasing, designing, operating and documenting the packers and trailer.

Planning and Operations

3GUP001 Purchase mass-flow control calibration system

The Sierra Instruments Cal-Bench mass flow calibration unit was delivered to the HRF July 6, 1992. Purchase of two bell provers, for expansion of the Cal-Bench range, is presently awaiting the listing of the Sierra Instruments inclusion on the GSA vendors list for bell provers. The new list is due out July 31st. Since we already have the Cal-Bench, it is important to purchase the bell provers to insure that the system is compatible.

3GUP008D Purchase parts & assembly of support trailer #2

The paper work for purchase of the winch, tubing reel, and pneumatic swivels for the second support trailer has been submitted to purchasing. No progress was made during this reporting period.

Variances

3GUP001 Purchase mass-flow control calibration system

Purchase of the bell provers for extending the range of the mass-flow calibration system has been delayed until the suggested supplier is listed as a government supplier of bell provers. The supplier is expected to be listed as of July 31st. When the supplier is listed, a purchase order will be issued. Expected completion date is August 28, 1992.

3GUP018D Field test 8" packer system - Field testing has been delayed because the USBR has not completed the support trailer needed for the field test. Testing will be conducted when this trailer has been completed. Anticipated completion date for the support trailer is September 30, 1992.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 24 hours were spent in support of the following tasks:

G. LeCain attended a Schlumberger geophysical logging presentation (8 hrs.)

G. LeCain met with Science & Engineering Inc. to discuss using the SEAMIST system in Air-K Testing (16 hrs.)

WBS 1.2.3.3.1.2.4 Percolation in the Unsaturated Zone - ESF Study

Principal Investigator - M. Chornack

OBJECTIVE

To conduct hydrologic tests in the ESF to supplement and complement the surface-based hydrologic information needed to characterize the Yucca Mountain site; to provide phenomenological information for analyzing fluid flow and the potential for radionuclide transport through unsaturated fractured tuff; and to provide information about water flow through unsaturated fractured tuffs. (SCP Study 8.3.1.2.2.4)

SCP 8.3.1.2.2.4.1a Prototype testing of intact fractures 0G3312N2

Summary Account Manager - G. Severson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS004A Write Open File Report; Intact fracture sampling

A draft has been written but, there was little progress in July. Files describing the axial cores collected were revised for greater detail.

3GUS001A Select analog site for fracture sampling

This activity did have some progress earlier in the fiscal year that could have been reported but was not. Several discussions have been held throughout the year with HIP management and staff regarding a reasonable (from a logistics and fiscal stand point) analog site. The "north test pit" (test pit #1) at Yucca Mountain is scheduled to be deepened in August 1992 for the mapping platform. When construction is complete in August the pit will be inspected for possible sampling sites.

Quality Assurance

Planning and Operations

Variances

3GUS006A Continued moire projection; method development

Work continues to progress using image digitization and processing to look at moire fringes. Work with the transform analyses for replicating topographical surfaces (fast-Fourier transform (FFT) analysis and cosine transforms) continue to be studied. A preliminary program has been written to do an accuracy check of the system using an object of known dimensions. Documentation of this program and a program that splices and rotates "screens" will start in August 1992.

The high-resolution monitor was received in Denver the last of June. Work on bringing the USGS video camera, imaging board, and monitor into the moire projection system will begin the first week of August 1992.

3GUS007A Write technical procedure; moire calibration

Little progress in July, some editorial changes made to draft. Not enough time available to make significant progress.

3GUS023J Journal paper, moire bench-mark and calibration

The paper titled, "Projection Moire as a Tool for the Automated Determinations of Surface Topography," was published (Nov/Dec 1991) in the Proceedings of the 1991 International Symposium on Optical Applied Science and Engineering. A NCR (92-32) has been issued concerning this publication because DOE concurrence was not obtained by the author before publication. This publication contained no quality-affecting/site characterization data. The NCR disposition is being completed by the PI for the activity.

3GUS012J Complete journal paper-Moire Automation

A final draft incorporating the technical review comments and the format comments from Applied Optics for the paper titled, "Implementation and Use of an Automated Projection Moire Experimental Set-Up" should be submitted to the HIP Reports Section in August.

3GUS013J Complete journal paper; FFT Moire

No progress on the draft written by Dr. Cardenas in July. Work on this activity and 3GUS014J has been delayed due to personal reasons.

3GUS014J Complete journal paper; Stereo viewing moire

No progress on this draft written by Dr. Cardenas in July. Progress on this paper and the FFT Moire paper (activity 3GUS013J) will be reviewed by the PI in August.

3GUS004J Document computer software; Moire QA

Software currently being used to collect topographical data was reviewed with Dr. Cardenas late May 1992. G. Severson is documenting the programs used for this technique in greater detail. The documentation for the program FASTEST will be discussed in detail with Dr. Cardenas the first week of August.

3GUS014A Complete design fabricate low-pressure vessel

This activity should be near completion the first week in August. Estimates from possible vendors/machine shops will be evaluated in August 1992 and the vessel fabricated.

3GUS008J Prepare axial core/vessel; air permeabilities

No progress in July. Further progress dependent on fabrication of low-pressure vessel.

Variances (CONTINUED)

3GUS016J Complete design, radial fracture test vessel

This activity will be started when the low-pressure vessel design is complete and the vessel is being fabricated.

3GUS015J Complete journal paper; Detailed moire

This paper will be written prior to the final report activity 3GUS006J.

3GUS010A Continued development; axial fracture

This activity will not be started in FY92.

3GUS001J Complete design, confining vessel: axial core

Drafts of the sketches for the low-pressure vessel are almost complete. The design of the low-pressure vessel is a prerequisite of the confining cell design.

3GUS003J Evaluate alternative axial fracture coring

Alternative approaches to the current sampling method were discussed with the co-investigator involved with the G-Tunnel prototype work. Changes to the present method used have been discussed with HIP management.

3GUS015A Begin unconfined tests gaseous phase

Work on this activity has been delayed because it is dependent on the completion of activity 3GUS014A.

3GUS006J Prepare final report projection

Final report draft will be started fall 1992.

3GUS002J Prepare budget-work plans-PACS

USGS-HIP Project Review (PACS) for this activity was held with Larry Hayes on 13 July.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 83 hours were spent in support of the following tasks:

Technical reviews of USGS-QMP-4.01,R4; -7.01,R5; and -7.04,R0 and comment resolutions (14.5 hours).

Completed Activity Control Specification Report (ACSR) per USGS-QMP-3.15,R0 for the Intact Fracture Test and submitted to USGS-HIP QA specialist for review. Submitted revised ACSR to USGS-HIP QA specialist and Grading Acceptance Committee (GAC) representative. Addressed review comments per QMP-3.07 and submitted to GAC 31 July (7 hours).

HIP Project Review (PACS) meeting on 13 July with Larry Hayes, USGS TPO (3 hours).

Several meetings and conversations with GSA and USGS Space & Facilities personnel concerning additional fire exit for the Fractured Rock Hydrology Laboratory in Bldg 20. Construction complete 29 July (3 hours).

Prepared and submitted FY93 requisition requests for Buyer Purchase Orders (BPOs) for services, calibrations, leases, and purchases (14 hours).

Data General workstation by M. Brodie: Continued work with software and operating system update installation (40 hours).

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

Meetings with GSA staff, contractors, and lab personnel concerning installation of uninterruptible power supply (UPS) to emergency power generators at Bldg 20. Floor plan and installation details provided to contractor (4.5 hours).

SCP 8.3.1.2.4.2a Prototype infiltration (percolation) testing 0G3312O2

Summary Account Manager - F. Thamir

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS029B Prepare data report of imbibition experiments

Data from the imbibition experiments conducted under 3GUS101B have been processed.

3GUS101B Conduct imbibition experiments on small samples

Preliminary results from several imbibition experiments that were started in May 1992 indicate that there is a difference in permeability in different directions. Direct measurement indicated otherwise. Another experiment was conducted to investigate any variations in permeability that may be introduced to sample outer surfaces after preparation (cutting and finishing). Preliminary results indicate that there is no significant variation.

3GUS026B Prepare data report of large block ponding test

Data is being collected, indexed, backed-up, processed, and archived on computer disks. The data include water potentials, electrical resistance, and Time-Domain Reflectometry (TDR) to estimate water saturation within the block.

3GUS014B Conduct ponding test on large block, final stage

Activity started on May 11, 1992. Initially a positive water pressure of around +5.5 cm of water was applied to the top of the block. The flow rate was around 25 cubic cm of water per day in the rock matrix and fracture. Later the water pressure was increased to +7 cm of water. The initial flow rate at the new pressure increased to around 100 cubic cm of water per day, then decreased to zero. A core was tested under activity 3GUS101B to investigate any variations to rock surfaces after cutting and finishing. Preliminary results indicate that there are no significant changes.

3GUS003B Write fracture air perm technical procedure

Technical procedure, describing detecting and measuring fracture permeability in rock, was written and completed for QA review.

3GUS004B Write psychrometry technical procedure

Work on this procedure, describing a method for measuring water potential in fractured welded tuff rock using thermocouple psychrometers continues.

Quality Assurance

Planning and Operations

Variances

3GUS035B Measure rock sample hydrologic properties

Originally this set of measurements was scheduled to be made at the matrix hydrologic properties laboratory in Nevada. However, the laboratory staff were not able to make the measurements because they are currently building a system that is capable of measuring small permeabilities (in the nanodarcy range which is the range for the samples to be measured). This delay will not affect the overall finish date since the completion of this activity is linked with the large block ponding experiment which is taking longer than expected.

3GUS034B Prepare data report of hydrologic properties

No progress is reported during this month. This activity is linked to the above mentioned activity (3GUS035B). This variance will not cause a delay in the schedule for the same reasons given in the above activity

SCP 8.3.1.2.4.3a Prototpye bulk-permeability testing 0G3312P2

Summary Account Manager - E. Kwicklis

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GU5004C Prepare budget and work plan

The budget and work plan for FY93/94 were prepared as required by the Mission 2001 exercise and consolidated with similar plans under the radial borehole activity.

Quality Assurance

Planning and Operations

Variances

WBS 1.2.3.3.1.2.6 Gaseous-Phase Movement in the Unsaturated Zone

Principal Investigator - M. Chornack

OBJECTIVE

To describe the pre-waste-emplacement gas-flow field; to identify structural controls on fluid flow; to determine conductive and dispersive properties of the unsaturated zone for gas flow; and to model the transport of water and tracers in the gas phase. (SCP Study 8.3.1.2.2.6)

SCP 8.3.1.2.2.6.1 Gaseous-phase circulation study 0G3312W2

Summary Account Manager - M. Chornack

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGP06A Tabulate and analyze data

Deficiencies in the gaseous-phase circulation study were discovered during an internal USGS audit conducted in January 1992. As a result of the audit, YMP-USGS-CAR-92-04 was issued on this study. All data collection and analysis activities are suspended pending resolution of the items listed in the corrective action report.

Technical Activities (CONTINUED)

3GGP17A Continue progress report air flow and gas chemistry

Due to corrective action report, YMP-USGS-CAR-92-04, work on this activity is temporarily suspended.

3GGP07A Develop and complete technical procedures

Existing air-flow measurement and gas-sample collection techniques have been evaluated. The technical procedures for these activities are sufficient to provide technical guidance for the collection of air-flow data and gas-samples from unsaturated-zone boreholes. Revisions will be made to existing technical procedures if necessary.

3GGP19A Conduct and complete technical procedure training

Personnel assigned to this project have been trained to the existing technical procedures. When new personnel are assigned to the gaseous-phase circulation study, technical procedure training will be conducted prior to their performing any work related to this project.

3GGP002A Collect UZ borehole data

The need to collect additional UZ borehole data is being evaluated. The resolution of YMP-USGS-CAR-92-04 and the addition of staff on the Gaseous-phase Circulation study may enable the collection of data from boreholes UZ6 and UZ6s in August 1992. The collection of data from additional UZ boreholes is dependent upon the UZ drilling program.

3GGP04A Chemical analysis of gas samples

All gas samples collected to date have been analyzed. Additional gas samples will be analyzed after they are collected. This activity is dependent upon the collection of additional UZ borehole data as stated in activity 3GGP002A.

3GGP10A Backlogged data

Continuing to address the issues outlined in the USGS-YMP audit, backlogged data is being examined to determine what data can be qualified. A plan of action to qualify the hotwire anemometer data is being formulated in accordance with the resolution to YMP-USGS-CAR-92-04.

Quality Assurance

Planning and Operations

Variances

3GGP002A Collect UZ borehole data

The need to collect additional data from boreholes UZ6, UZ6s, and selected neutron-access boreholes is being evaluated as part of the resolution of YMP-USGS-CAR-92-04. This process could delay the collection of data from these boreholes until August 1992. The collection of gaseous-phase circulation data from additional UZ boreholes at Yucca Mountain is dependent upon the UZ borehole drilling schedule.

Cause: suspension of data collection activities as a result of YMP-USGS-CAR-92-04, and the reassignment of PI as acting section chief.

Impact: level 3 milestones are negatively impacted by this departure from the original schedule.
Corrective Action: issues raised in the CAR are being resolved. Some of the items listed in the corrective action report have been resolved. Management Agreements between YMP-USGS and contributing USGS scientists have been signed. QA qualifications have been established for the contributing USGS scientists.

Variances (CONTINUED)

3GGP10A Backlogged data

Continuing to address the issues outlined in the USGS-YMP audit, backlogged data is being examined to determine what data can be qualified. A plan of action to qualify the hotwire anemometer data is being formulated in accordance with the resolution to YMP-USGS-CAR-92-04.

Cause: problems addressed in YMP-USGS-CAR-92-04, such as the assignment of a PI and under staffing, has delayed the examination of backlogged data.

Impact: level 3 milestones are negatively impacted by this departure from the original schedule.

Corrective Action: a plan of action to qualify the hotwire anemometer data is being formulated in accordance with the resolution of YMP-USGS-CAR-92-04.

WBS 1.2.3.3.1.2.7 Unsaturated Zone Hydrochemistry

Principal Investigator - I. Yang

OBJECTIVE

To understand the gas transport mechanism, direction, flux, and travel time within the unsaturated zone; to design and implement methods for extracting pore fluids from the tuff; to provide independent evidence of flow direction, flux, and travel time of water in the unsaturated zone; to determine the extent of the water-rock interaction; and to model geochemical evolution of ground-water in the unsaturated zone. (SCP Study 8.3.1.2.2.7)

SCP 8.3.1.2.2.7.1 Gaseous-phase chemical investigations 0G3312X2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUH010 Fabricate UZP6 [change to UZ-16] multi packer string (USBR)

Tests of heat tape used to prevent condensation of gasses were completed. Tests indicated that heat tapes if used in conjunction with aluminum insulation would prevent condensation. 3 tapes will be needed near the surface, 2 tapes will be needed to about 1200 feet, and 1 tape below 1200 feet.

3GUH012 Perform leak & pressure tests on UZ 16 packers

8 packer units were built and leak tested. No leaks were observed after inflation.

Machining of the end caps to fit the tubing is completed, additional leak and pressure tests are being performed.

3GUH044B Prepare WRI/OFR, on UZ1 data 1984-1991

USW UZ-1 gas-sample data have been compiled by P. Striffler, who is writing the paper as a USGS Open File Report. Verification and tabulation of data continues.

Draft report on interpretation of UZ-1 data from 1984-1991 was completed by A. Yang. D. Thorstenson is preparing the section on gas-transport mechanism (modeling). The paper will be published in the Water Resources Research Journal instead of the USGS WRI.

3GUH067B Analyze UZ1 gas samples 1992

UZ1 gas samples were sent to USGS Reston Isotope Lab, through Denver Central lab, and Krueger Geochron Lab for analyses of tritium, carbon isotopes (^{13}C and ^{14}C) and stable isotopes of hydrogen (Deuterium) and oxygen (^{18}O).

Technical Activities (CONTINUED)

3GUH068B Tabulate data for UZ1 gas samples

Data on UZ1 gas samples collected in 1992 is being entered into the computer as it arrives.

Quality Assurance

Planning and Operations

3GUH070B Procure laboratory chemicals, labware, and field apparatus

BPO's for Scott Specialty Gas and Air Products Gas were prepared for the 1992 fiscal year. These vendors supply us with calibration gasses for running the gas chromatograph.

BPO for General Air Products & Services was also prepared for the 1993 fiscal year. This vendor supplies us with carrier gas for the gas chromatograph.

3GUH037B Procure GC and DAS

Chrompac Model CP-9000 Gas Chromatograph and data acquisition system, which will include thermal conductivity detector, flame ionization detector, and electron capture detector is with REECo procurement. There seems to be a discrepancy between the requisition and the manufacturer's quote on the data acquisition system hardware. This problem is being addressed.

3GUH036B Procure 10 kw generator for gas sampling support

T & J Manufacturing, Inc., was awarded the contract to construct and deliver the generator by September 11, 1992. The generator will not be needed until November or December of 1992 when UZ-16 drilling is complete.

3GUH010 Fabricate UZP6 [change to UZ-16] multi packer string (USBR)

Heat tape, tubing, tubing connectors, cable requisitions were ordered.

Purchase order for the USBR shops has been prepared to allow machining of packer ends for tube fitting installation.

Requisition for a winch is being prepared.

Plans for boom construction have undergone engineering review.

3GUH025B Outfit mobile lab with GC, IC, degassing rack

When the gas chromatograph and data acquisition system arrive in the Denver UZ Hydrochemistry lab they will be tested prior to being set up in the mobile lab.

Variances

3GUH012 Perform Leak and pressure test on UZ-16 packer

Cause: increased complexity of the packer design (addition of heat tape required additional testing prior to purchasing the materials needed to complete the packers for final leak and pressure testing.

Impact: none, packers will be completed by the end of FY92 and before UZ-16 is completed.

Corrective Action: none needed.

3GUH037B Procure GC and DAS

Cause: REECo is purchasing this equipment. All necessary information has been provided.

Impact: none.

Corrective Action: none needed.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 220 hours were spent in support of the following tasks:

J. Ferarese had several discussions with QA Specialists concerning re-evaluation of Scott Specialty Gasses as an approved USGS-YMP Vendor. (8 hours)

The UZ Hydrochemistry Laboratory and all data books and summary sheets were checked in preparation for the QA Audit. (8 hours)

J. Ferarese was interviewed by DOE Auditors concerning sample tracking and records management. (2 hours)

J. Ferarese responded to Quality Assurance Comments on HP-240,RO, titled "Analysis of CO₂ Gas Samples by Gas Chromatography using Summit Interests SIP 1000." (2 hours)

Various UZ Hydrochemistry personnel took turns monitoring tracer injection, core collection, etc., at the field site where the UZ-16 borehole is being drilled. (200 hours)

SCP 8.3.1.2.2.7.2 Aqueous-phase chemical investigations 0G3312Y2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUH009A Analyze/extract core & water, UZ4, 5, 6s bh's

Analytical results on chemical compositions were received from Huffman Laboratory for about 57 samples of pore water. This completes the analyses/extraction of all cores from these holes.

GUH012A Prepare OFR-sp, dtps, proto and site UZ hydrochemistry

J. Ferarese completed the first draft of the OFR. C. Peters made additional comments and text organizational changes. Ferarese is working on incorporating these suggestions into the draft.

3GUHO15A Procure "Seamist" fracture-water collector

C. Peters met with S.E.A. representatives. A new design incorporating a "strap technique" was devised. A requisition will be prepared and submitted along with a request for gas collection Seamist systems for 1", 4", and 12 5/8" boreholes. The gas phase circulation and radial borehole tests also need these Seamist systems. A rollover of the 20K available this year in capital equipment funds for UZ hydrochemistry projects, into FY93, is being requested.

3GUH001A Test H₂O collection method from fractures

As explained in 3GUH015 above, no Seamist is available for this test. This test will depend on the availability of the capital fund (about 50K).

3GUH13AA Extract/analyze core & water, UZN-27 borehole

No cores are allocated for this hole. However, UZN-55 cores will be extracted and analyzed instead.

Quality Assurance

3GUH17A Train staff on analysis of technical procedure

J. Ferarese completed reading assignment of the scientific notebook plan: "Installation and operation of PVC straddle packer string in UZ boreholes for gas & water vapor sampling" HP-236T,RO.

C. Peters completed reading assignment of: HP236T, HP237T, HP238T, HP240, and HP242.

Planning and Operations

3GUH018A Procure ion chromatograph and DAS

Dionex Model DX-100 Ion Chromatograph which will include anion and select cation capabilities, and data acquisition system is with REECO procurement. There is a discrepancy between the requisition and the manufacturer's quote on the data acquisition system hardware. This problem is being addressed.

3GUH07AA Procure laboratory chemicals, labware and field apparatus

BPO's for Continental Water and Dionex Corporation were processed for the 1992 fiscal year. These vendors supply us with high quality water and instrument services required in use of the ion chromatograph.

3GUH14AA Collect core from UZN-27 borehole

Core has been collected and released to A. Flint. 30 core pieces were requested for release from Flint to UZ Hydrochemistry. A new procedure for these types of releases has recently been approved.

3GUH002A Submit TDIF for UZ4, UZ5, 6s & UZP reduced data

P. Striffler submitted this TDIF on July 1, 1992.

Variances

3GUH001A Test H2O collection method from Fractures

Cause: "Seamist" fracture collection system has not been procured.

Impact: none; UZ-16 is not yet completed, so no new hole to test system in.

Corrective Action: none needed.

3GUH015A Procure "Seamist" Fracture water collector

Cause: capital equipment funding was not sufficient to purchase. Will roll money over to FY93 to combine with additional capital equipment funding.

Impact: none. No new hole available for use yet.

Corrective Action: none needed.

3GUH018A Procure Ion Chromatograph and DAS

Cause: REECO is purchasing this equipment and has all necessary information.

Impact: none.

Corrective Action: none needed.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 120 hours were spent in support of the following tasks:

The ion chromatograph, for use in analysis of select anions in water samples, was yielding erratic baselines. Troubleshooting led to a problem with the suppressor, an internal hardware item. A new suppressor was received free of charge from the manufacturer. (16 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

A formal report discussing the counting performance of our LKB-Willac 1220 Quantulus state-of-the-art liquid scintillation counter has been written by J. Ferrese. This report contains an abstract, introduction, discussion of vials, sample preparation, the counter, results of C-14 counting efficiency, figure of merit, background considerations, vial permeability and conclusion. (40 hours)

Water samples derived from pore-water extraction of UZN55 were analyzed for tritium (^3H) content on the in-house liquid scintillation counter. (24 hours)

Six cores from UZN-55 were distilled. A new distillation method is being tested using these cores. Method involves purging with N_2 gas and freezing using liquid nitrogen. (40 hours)

WBS 1.2.3.3.1.2.8 Fluid Flow in Unsaturated Zone Fractured Rock

Principal Investigator - L. Anna

LBL Principal Investigator - G. Bodvarsson

OBJECTIVE

To develop and validate conceptual and numerical models describing gas flow and liquid water and solute movement in unsaturated, fractured rock at the laboratory and sub-REV scales. (SCP Study 8.3.1.2.2.8)

SCP 8.3.1.2.2.8.1 Development of conceptual and numerical models of fluid flow in unsaturated, fractured rock 0G3312T2

Summary Account Manager - L. Anna/E. Kwicklis

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUF0051 Scoping and bounding calculations for FY92

Data for boreholes UZ #4 and UZ #5, presented by Lascot and D. Hammermeister (in process), was used to develop water potential and water saturation profiles for the stratigraphic units penetrated by these boreholes. The accuracy of these profiles was assessed by plotting the relation between water saturation and water potential for core taken from depth intervals over which the rock could be considered as homogeneous on the basis of lithologic description by the well-site geologist. Data for most depth intervals showed considerable scatter and relations between saturation and potential were poorly defined. Ideally, water saturation increases in a smooth fashion with increasing water potential. Comparison with water saturation-water potential relations developed by A. Flint and L. Flint (1990) for the same stratigraphic intervals but using different methods showed the data of Lascot and Hammermeister, although exhibiting considerable scatter, was generally reasonable. The saturation and water content profiles were used in conjunction with effective hydraulic conductivity - saturation relations presented by Flint and Flint to estimate the downward liquid water flux. Preliminary estimates of the flux suggest it is less than 1mm/yr. The water saturation and water potential profiles subsequently will be used to help calibrate numerical models for the nonwelded tuffs overlying the Topopah Springs hydrogeologic unit.

Quality Assurance

3GUF0001 Develop graded QA package

The procedure for implementing QA grading changed during this report period and is now described in QMP 3.15 "Application of graded QA packages". E. Kwicklis and L. Anna have agreed to meet with the UZ section QA specialist in August to implement the QMP.

Planning and Operations

3GUF001 Resolve study plan comments (DOE and NRC)

It is believed that all DOE reviewer's comments have been resolved and the study plan approved by DOE.

Variances

3GUF0021 Revise scoping calculations of percolation test

This activity is behind schedule because revisions incorporating new work represent a far more sophisticated understanding and modeling approach than was described in the original report. The revisions attempt to reflect advances that have been made in modeling since the report was first submitted for review. There was not any progress made on this activity, as E. Kwicklis was responding to review comments on Study Plan 8.3.1.2.2.9.

3GUF0001 Develop graded QA package

The implementation of QA grading to this activity was delayed in anticipation of the new mechanism for implementation of QMP 3.15 QA grading becoming effective.

SCP 8.3.1.2.2.8.1 Development of conceptual and numerical models of fluid flow in unsaturated, fractured rock 0B3312T2

Summary Account Manager - G. Bodvarsson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUF002L Complete dual-porosity code

Simulations were carried out to benchmark the computational efficiency of the new semi-analytical dual porosity code.

3GUF010L Initiate verification of fracture permeability models

A lubrication model for rough-walled fracture permeability was applied to the data set of Hakami and Barton (1990), with average predicted permeability accurate to within 16 percent.

Quality Assurance

3GUR007L Continue software QA and all other QA requirements

Reading assignments were completed by various staff members.

Updates of the QMP were put in place.

Planning and Operations

3GUF133L Correlate fractal/deterministic approaches to permeability

R. Zimmerman made plans with S. Kumar of Polytechnic University for a visit by Kumar to LBL in August, to work on combining the fractal and deterministic approaches to fracture permeability.

3GUF218L Prepare budge and work plan for FY93

R. Zimmerman and G. Bodvarsson met with L. Anna and E. Kwicklis of USGS at LBL on July 1-2, 1992, to discuss work plans for FY93.

G. Bodvarsson met with L. Hayes, D. Appel, M. Chornack and others in Denver to discuss work variances.

Variances

3GUF002L Complete dual-porosity code

More testing of the code is needed to assure its accuracy and efficiency for all anticipated ranges of parameter values, ie. fracture spacings, fracture/matrix permeability ratios, etc.

WBS 1.2.3.3.1.2.9 Site Unsaturated Zone Modeling and Synthesis

Principal Investigator - E. Kwicklis

LBL Principal Investigator - G. Bodvarsson

OBJECTIVE

To develop conceptual and numerical models for the site unsaturated zone hydrogeologic system; to apply the models to predict the system response to changing external and internal conditions; to evaluate the accuracy of the models using stochastic modeling, conventional statistical analyses, and sensitivity analyses; and to integrate data and analyses to synthesize a comprehensive qualitative and quantitative description of the site unsaturated-zone hydrogeologic system under present as well as probable, or possible, future conditions. (SCP Study 8.3.1.2.2.9)

SCP 8.3.1.2.2.9.1 Conceptualization of the unsaturated-zone hydrogeologic system 0G3312C2

Summary Account Manager - E. Kwicklis

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM05A Construct 2-dimensional cross-sectional model using TOUGH

LBL modelers are continuing to incorporate current USGS geologic and hydrologic data from neutron boreholes in the construction and refinement of 2-cross sectional models. When the model has been completed, it will be used to conduct sensitivity analyses to test hypotheses concerning the hydrologic system and investigate grid effects on moisture flow.

3GUM06A Study plan revision and resolution of comments

Modelers from LBL and the USGS continued revising the study plan in response to DOE review comments. Responses to some comments required extensive review and analysis of existing data, as well as drafting of new figures and tables.

Quality Assurance

Planning and Operations

Variances

3GUM05A Construct 2-dimensional cross-sectional model using TOUGH

This activity is behind schedule because the level of effort required to resolve the study plan review comments was much greater than originally anticipated.

3GUM06A Study plan revision and resolution of comments

This activity is behind schedule because the level of effort required to resolve the study plan review comments was much greater than originally anticipated.

3GUM013A Sensitivity analysis using 2-dimensional cross-sectional model

This activity is behind schedule because the level of effort required to resolve the study plan review comments was much greater than originally anticipated.

SCP 8.3.1.2.2.9.2 Selection, development, and testing of hydrologic-modeling computer codes 0B3312D2
Summary Account Manager - G. Bodvarsson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

3GUM18A Grading of QA and other QA requirements
Reading assignments were completed by various staff members.

Updates of the QMP were put in place.

Planning and Operations

3GUM14A Study plan revision and resolution of comments
Revisions of the study plan and work on responses to comments are continuing.

Variances

3GUM14A Study plan revision and resolution of comments
This task is delayed because of the extent of comments and work involved in resolving them.
The new completion date is September 30, 1992.

SCP 8.3.1.2.2.9.3 Simulation of the hydrogeologic system 0B3312E2
Summary Account Manager - G. Bodvarsson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM03B Perform preliminary simulation with moisture-flow model

Further 2-dimensional simulations were performed with heterogenous and isotropic rock properties for each of the hydrogeological units. Due to the effect of gas flow, steady state conditions could be reached only by changing the air entry value of the various hydrogeological layers to 1. The permeability contrasts at the unit boundaries also created numerical problems. These tests complete the task. Simulations with the 3-D model will be performed under a new task in FY93.

3GUM07B Evaluate model grid effects

An input deck was prepared including rock properties for each of the subunits. Data were taken from A. Flint and L. Flint (1991), and unpublished results were also used to refine the porosity and permeability values. Simulations could not be performed because of the gas-flow problem described in task 3GUM03B. The tests will be run as soon as the gas component in the TOUGH code can be decoupled from moisture flow. This work will be performed under activity 8.3.1.2.2.9.2.

3GUM05B Prepare report on preliminary moisture-flow model

The contents of the report have been defined. The construction of the 3-dimensional mesh and the methods used to include the offset of the major faults will make up the bulk of the report. The simulations performed to test the grid and to check the capabilities of the TOUGH code to simulate the complex geometry and the highly heterogenous rock properties will also be discussed.

Quality Assurance

3GUM14B Graded QA and other QA requirements

Reading assignments were completed by various staff members.

Updates of the QMP were put in place.

Planning and Operations

3GUM13B Study plan comment and revision

Revisions of the study plan and work on responses to comments are continuing.

Variances

3GUM13B Study plan revision and resolution of comments

This task is delayed because of the extent of comments and work involved in resolving them.

The new completion date is September 30, 1992.

WBS 1.2.3.3.1.2.10 Prototype Hydrologic Tests that Support Multiple Site Characterization

Activities

Principal Investigator - M. Chornack

OBJECTIVE

To perform prototype hydrologic tests to minimize costly stand-by times; to develop QA procedures; to determine feasibility of the proposed tests; to train new personnel; to help increase likelihood of success of the tests; and to test new instruments, equipment, and procedures.

Prototype Cross-Hole Testing 0G331212

Summary Account Manager - G. LeCain

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT006C Prepare TP for air-permeability

The Peer Review of the SN plan for air-permeability testing has been completed and all comments answered. This activity is complete, and future QA review of the plan will be addressed under QA documentation 3GUT007C.

3GUT005C Prepare ALTS data report on testing and methods

The PI is working on an open file report covering all ALTS prototype cross-hole testing. The report is approximately 20% complete. The sections covering test analysis and test results are complete.

Quality Assurance

T02M Proto Air-K Data Set to PDA

The ALTS prototype testing data and all required documentation was delivered to the local records center.

Planning and Operations

Variances

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT03DD Prepare WRI report on aqueous tracer tests

The manuscript was sent to the author, A. Lewis-Russ, for response to reviews and later sent to G. Rattray who will complete the review.

3GUT13DD Conduct tracer gas sorption test on stem mtls

Two improvements were made with glass manifold/column and peristaltic pump/norprene tubing system. The length of norprene tubing used to connect the peristaltic pump to the glass manifold and column was reduced to the shortest length possible; and both ends of the norprene tubing were glued to glass ball joint fittings. As a result of these improvements the system remained leaktight and maintained a stable SF₆ concentration for a period of 48 hours.

Batch testing will restart with the addition of a shaker. A cushioned box has been constructed that will hold up to nine sample flasks upright in a shaker. The stopcocks on the sample flasks are being ground to insure a leaktight seal.

Research of additional gas tracers other than CFC's is continuing. Information about chemical properties, availability, cost, and prior use as tracers of HCFC's, HFC's, and PFT's are being gathered. The collected information will aid us in determining gas tracers that may be used in addition to CFC's.

3GUT01DD Conduct tracer gas sorption tests on tuffs

These tests will be conducted following completion of testing on the stemming materials.

3GUT012D Test on-line gas tracer monitoring equipment

A week was spent at NTS monitoring the injection of trace gas into the drilling air at UZ-16. The temporary system that is now on-line is working smoothly. The calculated and measured concentrations of tracer gas in the drilling air are in good agreement. The mass flow controller can be rapidly adjusted to match changes in the volume flow of drilling air. Three sample collection ports have been installed onto the uphole drilling line to check air leakage.

3GUT133D Develop tech procedures for monitoring gas tracer

A meeting was held at UZ-16 with representatives from Caltrol, RSN, REECO, DOE, and USGS to discuss final design modifications for the automated gas tracer injection system. The USGS representative requested that software, which will be used to run the system, record drilling air and trace gas flows at the beginning and end of each drilling cycle and every two minutes during drilling. Early September was the time requested by the USGS for delivery of the system; however, it is believed that additional items requested for the drillers' console will delay the arrival time of this equipment.

Quality Assurance

3GUT133D Dev tech procedures for monitoring gas tracer

A technical procedure has already been written for monitoring the gas tracer injection (HP-07,HP-238T). A new technical procedure will be written for the automated injection system when it is installed in September.

Planning and Operations

3GUT012D Test on-line gas tracer monitoring equipment

Testing of the automated injection system cannot begin until the system has been purchased and installed. The system has been procured by REECO, and is expected to be on-line in September.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 4 hours were spent in support of the following tasks:

Modified figures for UZ-1 data (1984-1991) which will be published by Yang and others.

Prototype Dry Coring of Rubble 0G3312L2

Summary Account Manager - C. Peters

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT01EE Complete testing effects of core sealing method

80 core samples were weighed in their packaging, removed from packaging, reweighed, dried in an oven for 72 hours and reweighed after drying.

Wax, Saran Wrap and Lexan control tests were completed.

3GUT02EE Reduce data for effects of coring methods

Chemical data from water samples extracted from cores removed from rubble was compiled. Chemical results table was combined with the previously compiled physical results table.

3GUT13FF Complete reduction of data effect of core sealing

Reduction of data is progressing.

3GUT004F Develop technical procedures on core sealing

Cores are being collected at UZ-16 according to HP-237T. Information obtained during the construction of UZ-16 will be used to turn HP-237T into a hydrologic procedure.

3GUT14FF Prepare WRI report: G-TUNNEL effects; blasting, coring on chemistry

This report will now include 3GUT03FF "Complete preparation of report on G-Tunnel work".

The outline has been revised to include G-Tunnel work.

3GUT03FF Complete preparation of report on G-tunnel work

No progress made. This report is being combined with 3GUT14FF.

3GUT02FF Prepare report for effects of core sealing.

Outline for report has been written and revised. Outline has been annotated and writing has begun on introductory sections.

3GUT07FF Develop technical procedure on rubble coring

No progress made. See GUT02EE; Reduction of data forms the basis for development of the technical procedure.

Quality Assurance

3GUT016F Conduct technical procedures training on core sealing

First phase of training, utilizing SNP HP237T for sealing UZ-16 core, and working with the Sample Management Facility at UZ-16 is ongoing.

Planning and Operations

Variances

3GUT14FF Complete preparation of report on G-Tunnel work

Cause: report is delayed because it is being added as a part of 3GUT14FF.

Impact: no impact, information will be released.

Corrective Action: none.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 32 hours were spent in support of the following tasks:

Time spent working on grading reports for the UZ hydrochemistry study and as a member of the Grading Acceptance Committee.

Prototype Pore-Water Extraction 0G3312M2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT020G Procure & construct additional high press 1-D cell

Heat treatment and milling of the inner and outer corpus rings were completed by the contract shop. The corpus rings were picked up and brought back to the USBR labs for assembly. The paper work was completed to bring in a consultant to supervise the assembly of the corpus rings (as was done on the first high pressure cell). Assembly of the corpus rings is tentatively scheduled for August 10, 1992. Once the corpus rings are assembled, the sample sleeve and other components will undergo final milling to fit in the cell. All work on the cell is planned to be completed by September 30, 1992.

3GUT002G Complete extraction/analysis chemistry of pore water, UZ4,5,6, and GT

Data analyses were started on quick loading and staged loading effects on water chemistry and loading of chips vs. water chemistry.

3GUT027G Submit WRIR triaxial & 1-D methods review & approval

The WRIR titled "Pore-water extraction from unsaturated tuff by triaxial and one-dimensional compression methods, Nevada Test Site, Nevada" is presently in review. One technical review was completed and returned to the authors. The text has been modified considering the reviewer's comments. The second technical review is expected to be returned this month. Modifications will be made to the manuscript based on the reviewer's comments and the manuscript will be submitted for USGS editorial review.

3GUT032G Review and revise journal paper on 1-D compress

The paper was revised and submitted to the journal in March 1992. The paper has been accepted for publication. Complete July 1, 1992.

Technical Activities (CONTINUED)

3GUT015G Prepare WRIR pore-water chemistry vs pressure

As reported previously, this WRIR will be replaced with a journal paper. A draft of a paper that summarizes the results of a comparison of changes in pore-water chemistry vs. pressure from pore-water extraction by compression was started this month.

3GUT033G Submit 1-D paper for review, revise, publish

A poster was prepared and presented at the 7th International Symposium on Water-Rock Interaction, July 13-18, 1992 and the written manuscript was published in the referenced proceedings volume. Complete July 18, 1992.

Quality Assurance

3GUT002G Complete extraction/analysis chemistry of pore water, UZ4,5,6, and GT

Seventy nine pore-water chemical analyses were received from Huffman Laboratories. Five of the samples were knowns, for QA checks of analysis quality. A preliminary analysis of the results for known QA samples shows a reasonable comparison. These results have improved over the last set of samples sent to this lab.

A request was submitted to QA to review the calibration service of SATEC, Inc. for addition to the USGS approved vendor's list.

A purchase order was prepared to retain SATEC, Inc. to perform the yearly calibration on the SATEC load frame and to calibrate the Houston Scientific load frame in the vibration laboratory in building 56. This load frame will be used for compression testing of core as soon as calibration is completed.

3GUT006G Modify high-press cell technical procedure

The technical procedure HP-249, R0 titled "Method for pore-water extraction using high-pressure one-dimensional compression" was completed July 21, 1992 and submitted for review.

3GUT028G Review & revise tech proc for high-press cell

The technical procedure for high-pressure one-dimensional compression (HP-249, R0) is presently in technical review. When the technical review is complete, the draft will be revised and submitted for QA review. This task is on schedule.

Planning and Operations

Variances

3GUT020G Procure & construct additional high-press 1-D cell

T22M Additional high press 1-D cell

Cause: the contract machine shop has made much slower progress than originally planned, reportedly due to personnel shortages and difficulty with heat treatment of the steel components of the cell.

Impact: as reported in March 1992, the cell material became too hard after heat treating for machine work and required solution annealing. This work took several weeks to complete and was not anticipated. It is expected that the cell will be complete by September 30, 1992.

Corrective Action: solution annealing is complete and initial grinding of the inner and outer corpus rings has been completed. The shop work is progressing as planned. There is no corrective action available since the project must depend on outside contractors to complete this work.

Variances (CONTINUED)

3GUT027G Submit WRIR triaxial & 1-D methods review & approval

T14M Report triaxial and 1-D

Cause: the delay in completing this task is due to a nearly five month lapse in IPA contract with the Colorado School of Mines that caused the report to be completed two months late, and the USGS review process has taken longer than originally planned.

Impact: the final approval of the manuscript will be delayed. Projected completion is September 30, 1992.

Corrective Action: the manuscript is being modified as soon as possible after reviews are received.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 163 hours were spent in support of the following tasks:

Tour of laboratory facility and explanation of pore-water extraction by compression procedure to USBR personnel. (2 hours)

Removed all core cutting tools and supplies from rock laboratory in Building 56 because of current renovation activities. (2 hours)

Setup of rock saw with Nitrogen as a blade coolant for UZN55 core cutting operation. The previous gas cooling system had been disconnected due to renovation of the laboratory building. A Nitrogen tank cooling system was designed and put together to be used with the existing saw. Ordered a high pressure regulator, nitrogen tanks, quick connect fittings. (30 hours)

Core samples (15) from UZN55 were cut and prepared for one-dimensional compression testing. Moisture contents and degrees of saturation were computed for each sample. Samples of similar degree of saturation, composition and depth were selected to experiment with quick loading vs staged loading. These tests will be run in August to determine if quick loading will extract as much pore water as staged loading, and if water chemistry is not altered by the quick loading. (49 hours)

Two project personnel attended the 7th International Water-Rock Interaction Conference in Park City, Utah to present a poster summary on the project results to date. (80 hours)

WBS 1.2.3.3.1.3 Saturated Zone Hydrology

OBJECTIVE

To develop a model of the saturated zone hydrologic system of Yucca Mountain that will assist in assessing the suitability of the site to contain and isolate waste. (SCP Investigation 8.3.1.2.3)

WBS 1.2.3.3.1.3.1 Site Saturated Zone Ground-Water Flow System

Principal Investigator - M. Umari

OBJECTIVE

To determine the hydrogeologic nature of the Solitario Canyon fault in the saturated zone; to determine the time and spatial variation of the potentiometric surface; to determine the character, magnitude, and causes of water-level fluctuations; to estimate elastic and hydraulic properties; to determine transport properties of the saturated zone; to evaluate the relation between hydraulic properties and fracture characteristics; to characterize chemical and physical properties of the saturated zone that affect radionuclide retardation; and to conduct single-and-multiple well tracer tests using conservative and reactive tracers to determine hydrologic, chemical, and physical properties in the saturated zone. (SCP Study 8.3.1.2.3.1)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF005A Begin 1992 water-level data collection

Data collection began January 1, 1992. Began monitoring of 18 zones in 18 wells on a monthly basis and 19 zones in 12 wells on an hourly basis. A continuous analog of data was obtained from 4 zones of 2 wells (included in count of hourly sites above. Real-time data on 19 zones in 12 wells using satellite data-collection platforms was obtained. An evaluation was made of the status of the network at the end of each month and recommendations were made for instruments that should be watched, calibrated, or replaced.

Monitored real-time data on a daily basis looking for water-level excursions.

Calibrated transducers at the following wells: UE-25b #1 (upper & lower zones), USW G-3, USW H-5 (upper & lower zones), USW H-6 (upper & lower zones), USW VH-1, USW WT-2.

Calibrated barometer L821615.

A transducer and a data logger were temporarily installed in well USW VH-1 (part of periodic network) to monitor water-level changes during water sampling and aquifer testing.

Water levels for the second quarter of 1992 for several wells were submitted to the USGS Nevada District Office for inclusion in their quarterly report to DOE as part of the USGS/DOE Environmental Monitoring Program.

Water-levels in 4 zones in 2 wells continued to be monitored for responses to earthquakes and aftershocks. Data loggers were installed at these sites in order to record maximum water-level responses, which were often off-scale on the analog recorders.

A report on water-level responses to the April earthquakes was written by G.M. O'Brien, and received Director's approval on June 8, 1992. The report is being prepared for printing and final distribution.

An investigation of the water-level and fluid pressure responses in wells at Yucca Mountain to earthquakes on June 28-29, 1992, in southern California and Little Skull Mountain is continuing. Preliminary data and analyses were sent to DOE for their use and dissemination. Data compilation of water-level fluctuations caused by the earthquakes was begun, in response to a request from the State of Nevada.

Work continues on investigating barometric, earth-tide, and seismically-induced water-level fluctuations. G. O'Brien continues to consult with D. Galloway (USGS, California District) on the methodology and analysis.

3GWF41AA Continue preparing 1989 water-level data report

Report "Water levels in continuously measured wells in the Yucca Mountain area, Nevada, 1989" by D. Lobmeyer and R. Luckey has been written and reviewed. No progress was made on this task this month due to other project commitments of the author.

Technical Activities (CONTINUED)

3GWF18AA Continue study of accuracy and precision of water-level data

Work continued on draft report "Precision and accuracy of water-level measurements taken in the Yucca Mountain area, Nevada, 1988-90" by M. Boucher. All reviewers comments have been resolved and text has been revised. Report is being prepared for transmittal and approval.

3GWF117A Convert HP-196T (notebook)

Technical review of the draft technical procedure HP-196, "Use of data collection platforms to collect water-level data" was completed on June 15, 1992. The document has been revised and reviewers comments incorporated. The document was sent for QA review on July 21, 1992, and this activity is considered complete as of that date.

3GWF42AA Complete 1990 water-level data report

Regression analyses were done for all transducer calibrations for 1990 and results were compiled into tables suitable for inclusion in the report. Compilation of transducer histories was completed. The data for 1990 will be included in a report on continuous water-level measurements for both 1990 and 1991. A draft outline for the report was written.

3GWF027 Evaluate quality of 1991 transducer data

Data has been continuously evaluated through 1991 and plots are available for a more formal evaluation. No other work has been performed on this task.

3GWF004A Prepare report on water-level fluctuations at YM

Work began to determine whether or not sufficient data on long-term and seasonal trends exists to warrant preparation of a separate report on the subject. If this analysis does not warrant a report of its own, the results will be reported in the revised potentiometric-surface map. See 3GWM06AA under SCP 8.3.1.2.3.3.1.

Quality Assurance

Planning and Operations

3GWF129A Develop software QA for data reduction

Decision to use NWIS software was made, negating the need to develop new software for data reduction. This activity is considered complete as of July 2, 1992.

Variances

3GWF41AA Continue preparing 1989 water-level data report

No progress was made on this task this month due to other project commitments of the author, including completing employee workplans, public briefings on water-level responses to earthquakes, and a press tour of Yucca Mountain. There is no long-term impact, but the public availability of the continuous water-level data for 1989 will be delayed.

3GWF18AA Continue study, accuracy/precision, water levels

Will be ready for transmittal to YMP Branch Office by August 10, although some new information on borehole-deviation surveys has come to light. This information, if significant enough to be included in the report, could cause additional delays. This study, while important, is conducted as time permits and the amount of time available has been seriously underestimated as person working on this study has had to spend much time working with other projects and earthquake-related information requests. No impact as nothing in foreseeable future depends on this study.

Variances (CONTINUED)

3GWF027 Evaluate quality of 1991 transducer data

This work is on-going as time allows, with much time spent responding to information requests following the late June earthquakes. New PI needs to be trained in the criteria for evaluating the transducer data. Delay in this activity will delay preparation of report for 1990-91 water-level data.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 168 hours were spent in support of the following tasks:

M. Boucher lent Quality Assurance (QA) support to various activities evaluating QA and organizing QA support for other groups of activities. Boucher prepared for and participated in QA audits that took place during the week of July 27, 1992. (80 hrs.)

G. O'Brien prepared information and visual aids on the effects of the Landers, CA and Little Skull Mountain earthquakes on water levels, for presentation at TPO meeting on July 24, 1992. A great deal of time was spent by various project personnel on responding to information requests by DOE, State of Nevada, and the press, related to water-level responses to the earthquakes in late June. (24 hrs.)

P. Tucci attended a workshop on new borehole-geophysical logging techniques that might be applicable to studies at Yucca Mountain. (8 hrs.)

P. Tucci reviewed a journal article on electromagnetic methods for locating faults at Yucca Mountain. (16 hrs)

SCP 8.3.1.2.3.1.3 Analysis of single- and multiple-well hydraulic-stress tests 0G3313F2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF001D Finish intraborehole flow & stress test report

Work continued at a very slow rate, as discussions were held on the viability of continuing this activity in its present form, or combining the report (which presents past c-hole test data) with future report(s) presenting results from upcoming cross-hole tests at the c-hole complex.

3GWF006D Analyze strain-related pressure response in cased holes

G. O'Brien, Site Saturated Zone Hydrology Project, has been monitoring, and analyzing strain-related pressure responses (to atmospheric loading, earth tides, earthquakes, and Underground Nuclear Explosions) in the h-holes, on behalf of the Saturated Zone Fractured Rock Hydrology Project. He has been analyzing the results of water pressure responses to the earthquakes on June 28 and June 29, 1992, in California and Nevada.

3GWF007D Case uncased holes, or develop methods for uncased holes

Work continued under this activity to investigate approaches for extending cased-hole analysis techniques to situations where the unsaturated thickness above the water table is uncased, allowing barometric pressure changes to be dissipated by air diffusion through the unsaturated zone

Quality Assurance

3GWF012D Continue development of software QA for activity 8312-3.1.3 Programs

Work continued under this activity. The main code that needs Software QA is the Well Test Analysis Program. This program is needed to analyze previously completed hydraulic tests at the c-holes. Other programs that may require software QA are programs used to perform the strain-related hydraulic response analysis (atmospheric loading, earth tides, and seismic stress).

Planning and Operations

Variations

3GWF001D Finish intraborehole flow & stress test report

The reasons that this report was not finished by the original completion date have been thoroughly documented in past monthly status reports.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 160 hours were spent in support of the following tasks:

In the first week of June, the Barbour Logging Company made oriented borehole television logs of UE-25c#2 and UE-25c#3, and non-oriented log of UE-25c#1 (the latter only for locating and dislodging an obstruction, rather than for obtaining a log for fracture mapping). A. Geldon has been studying these television logs and preparing tables of fracture locations and densities throughout the depth of the holes. Geldon will also calculate fracture strikes and dips from the television logs using borehole diameter information obtained from existing caliper logs.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0G3313G2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF004F Complete (procurements for and) construction of third 3-zone packer string (and packer-string-related items)

The contract for procurement of more packers to complete construction of the third 3-zone packer string has not been let out. Negotiations between the USBR and the two bidders (Baker Tools Co. and Tam Inc.) are in progress over details of tubing sizes and over the minimum number of packers to be purchased under the contract.

J. Gemmell initiated contacts with the Allied Power Co. concerning the design and construction of a power reeling system to handle our multiple hoses and tubes during lowering and raising the packer system. Gemmell provided Allied Power with the information they need to provide a preliminary proposal. The power reeling system will be bought in FY93.

The manufacturing of the "shroud", or housing, for the multi-stage pump to be used in the upcoming hydraulic and tracer tests at the c-hole complex, has been completed by the Centerlift Co., and is being inspected before shipping to us.

3GWF013F Develop techniques to analyze x-hole test results

M. Umari and G. Patterson met with K. Kipp (USGS/WRD NRP) on using the USGS HST (heat and solute transport) 3-D code, written by Kipp, to develop a 3-dimensional porous-medium-equivalent model of the c-hole complex. The model can be used for cross-hole test design, in addition to analysis of the eventual cross-hole test results. A copy of the program was ported from Kipp's workstation to the YMP-USGS LAN SUN file server.

Technical Activities (CONTINUED)

E. Ervin is preparing to use the software package FracMan to develop a 3-dimensional fracture-network model for the c-holes. The model can be used for cross-hole test design, in addition to analysis of the eventual cross-hole test results. Ervin is working in cooperation with the saturated zone fractured rock hydrology project.

3GWF028F Continue preliminary numerical/analytical modeling to assist in cross-hole test design
Both bullets under item 2 above support this activity, as indicated in the text of the bullets.

3GWF022F Continue oversight of field simulation of cross-hole tests
This activity encompasses all work related to the U.S. site (Raymond Quarry, near Oakhurst, CA) of the DOE/AECL international project. It is intended that the hydraulic and tracer tests planned for the c-holes be prototyped at the Raymond site.

In some previous status reports, this work had been reported under section III (work at the site has been going on since December 1991).

A quarterly report, covering the period from April 1, 1992 to June 30, 1992, was prepared by M. Umari for the AECL-project activities, and sent to C. Davison at AECL for inclusion with his report to DOE.

Preparations were made for enlarging two of the 6-inch holes at Raymond to 10 inches, to accommodate the multi-zone packer string being built for the c-holes complex, so it can be tested prior to being used at the c-holes. This enlarging, or reaming, process is scheduled for August 23, 1992 to August 25, 1992.

Arrangements were made with the USGS/WRD/National Research Program's Borehole Geophysics Unit to conduct a suit of logs (caliper, temperature, acoustic televiewer, intraborehole flow) at the 9 Raymond holes starting August 20, 1992.

3GWF025F Continue development of Scientific Notebook for x-hole tests with prototype string
Preparations for development of the SNP continued. S. Boucher, QA Implementation Specialist, has been asked to take a first cut at preparing an outline for the SNP. The technical details will be added by members of the saturated zone fractured rock hydrology project.

3GWF019F Oversee LBL (develop and) analyze seismic profile for c-holes
E. Majer's field crew, from Lawrence Berkeley Laboratories (LBL), has completed the cross-hole seismic tomography along the vertical plane between wells UE-25c#2 and UE-25c#3. The raw tomographic data are being analyzed, and a decision will be made based on the quality of the results whether to seek funding to conduct two more tomographs, one along the vertical plane between wells UE-25c#1 and UE-25c#2, and the other along the vertical plane between wells UE-25c#1 and UE-25c#3.

3GWF006F Prepare QA drawings for multi-zone packer string
Discussions were initiated with the USBR regarding their preparation of QA drawings for the multi-zone packer string that they are constructing.

Quality Assurance

Planning and Operations

Variations

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 80 hours were spent in support of the following tasks:

Two separate requisitions were prepared for the purchase of a data acquisition system. The software and most of the hardware (probe-signal multiplexer, computer cables, and Analog-to-Digital PC board) were purchased from National Instruments. A special interface, between the thermistor probe and the above multiplexer/cable/A-to-D board, had to be purchased separately from Deban Industries.

Funds were transferred to the USGS/WRD Hydrologic Instrumentation Facility (HIF) to purchase previously-used borehole logging equipment. The equipment will be mounted in an empty logging truck that was obtained from SNL through the NTS surplus yard in Mercury, NV.

Two previously-used trailer boxes (without wheels) have been acquired for the project. A flat-bed trailer is being purchased to mount one of the boxes to. The box/flat-bed trailer combination will be a mobile transportation and storage system that can also be converted into a workshop. This system will be used in support of field work both at Raymond (U.S. site for the DOE-AECL international project) and the c-holes complex (NTS). The truck under item 2 above will be modified to tow this box/flat-bed system.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0B3313G2

Summary Account Manager - E. Majer

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF03CM Cross-hole seismic data to PDA

The first cross well survey began on June 10, 1992, and was completed July 10, 1992. The complete section between wells C2 and C3 was imaged from a depth of 1344 feet to 2952 feet. The space from 2046 to 2952 was imaged at 1 meter intervals. From 1344 to 2046 the interval was 2 meters.

3GWF04C Develop cross-hole seismic profile

Work began on reducing and analyzing the data from the cross-well field work. Initial results suggest a complicated wavefield that is indicative of a fractured layer section.

Quality Assurance

Planning and Operations

Variances

SCP 8.3.1.2.3.1.5 Testing of the C-hole sites with conservative tracers 0G3313H2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF166A Train project members on tracer detection methods

Discussions have been held with K. Stetsenbach, UNLV, on how to train project members on the tracer detection methods that will be used during the upcoming tracer tests at the c-holes. Since prototyping of these tracer tests will be conducted in Raymond, CA (location of the U.S. site for the USDOE/AECL International project), Stetsenbach will commence the training there.

Technical Activities (CONTINUED)

3GWF167A Continue preliminary modeling for tracer tests

M. Umari and G. Patterson met with K. Kipp (USGS/WRD National Research Program) on using the USGS HST (heat and solute transport) 3-D code, written by Kipp, to develop a 3-dimensional porous-medium-equivalent model of the c-hole complex. The model can be used for cross-hole tracer test design, in addition to analysis of the eventual cross-hole tracer test results. A copy of the program was ported from Kipp's workstation to the YMP-USGS LAN SUN file server.

E. Ervin is preparing to use the software package FracMan to develop a 3-dimensional fracture-network model for the c-holes. The model can be used for cross-hole tracer test design, in addition to analysis of the eventual cross-hole tracer test results. Ervin is working in cooperation with the Saturated Zone Fractured Rock Hydrology Project.

3GWF168A Develop techniques for analysis of tracer test results

M. Umari and G. Patterson met with K. Kipp (USGS/WRD National Research Program) on using the USGS HST (heat and solute transport) 3-D code, written by Kipp, to develop a 3-dimensional porous-medium-equivalent model of the c-hole complex. The model can be used for cross-hole tracer test design, in addition to analysis of the eventual cross-hole tracer test results. A copy of the program was ported from Kipp's workstation to the YMP-USGS LAN SUN file server.

E. Ervin is preparing to use the software package FracMan to develop a 3-dimensional fracture-network model for the c-holes. The model can be used for cross-hole tracer test design, in addition to analysis of the eventual cross-hole tracer test results. Ervin is working in cooperation with the Saturated Zone Fractured Rock Hydrology Project.

3GWF151A Construct tracer injection system

Two meetings were held with representatives from Baker Tools to discuss the design and equipment requirements of the tracer circulation/injection system. The downhole tracer injection equipment will be purchased from Baker. The meetings focused on selection of the specific off-the-shelf Baker Tools items.

Quality Assurance

Planning and Operations

Variances

WBS 1.2.3.3.1.3.2 Saturated Zone Hydrochemistry

Principal Investigator - W. Steinkampf

OBJECTIVE

To describe spatial variations in chemical composition of ground-water; to identify chemical and physical processes that influence ground-water chemistry; to use hydrochemical data to aid in the identification and/or quantification of ground-water travel times; flow paths; fluxes to, from, and within the saturated zone; and climatic conditions during past periods of recharge. (SCP Study 8.3.1.2.3.2)

SCP 8.3.1.2.3.2.1 Assessment of saturated-zone hydrochemical data availability and needs 0G3313J2
Summary Account Manager - W. Steinkampf

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWH024A Develop ion chromatograph methods

B. Steinkampf visited the study lab in the HRF building (NTS Area 25) after the Little Skull Mountain earthquake to determine if any damage had occurred. Although minor breakage of glassware occurred, no damage to the ion chromatograph system equipment was detected. He prepared selected reagents and performed preventive maintenance on the system equipment.

3GWH011A Prepare scientific notebook, ion chromatograph

No action regarding SNP preparation since last repair to the chromatograph system (April 1992).

3GWH023A Complete assessment of data (extant), phase 1.

A hard-copy file of regional and NTS data has been entered into spreadsheet files by D. Perfect. File manipulation (sorting and various checks) will begin in August. B. Steinkampf entered historic hydrochemical and isotopic data (ground-water and precipitation) data into a spreadsheet file. The data were checked for accuracy of entry.

Quality Assurance

3GWH001 Grade QA for sz hydrochemical study

Prepared a study breakdown and provided a list of specific tasks to M. Ciesnek for consideration in developing a grading package. The tasks reflect the efforts of the Mission 2001 activity. Discussions of the individual tasks focused on the appropriateness of application of the USGS QA program.

Planning and Operations

Variances

SCP 8.3.1.2.3.2.2 Hydrochemical characterization of water in the upper part of the saturated zone 0G3313K2

Summary Account Manager - W. Steinkampf

Technical Activities

3GWH001B Plan sample-collection methods developments

B. Steinkampf reviewed technical procedure HP-23, R2 (Collection and field analysis of ground-water samples from the saturated zone) to ensure that methods therein reflect the current level of information and technology relative to sample and field data collection.

3GWH006A Sample weapons program (ERTDB) GCP holes

B. Steinkampf spoke with USGS/LV staff to determine the current status of plans for continuation of the ground-water characterization program. Status seems to be indeterminate at this time, although an additional borehole is planned or soon to be started in southern Yucca Flat. This site will be of little or no value to this study, but will likely be of significance to geohydrologic studies.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 110 hours were spent in support of the following tasks:

B. Steinkampf provided equipment, materials and relevant training to C. Savard (USGS/HIP) at the HRF for the collection of ground-water samples and field determinations of selected intensive characteristics.

B. Steinkampf provided materials (containers and reagent) to B. Clark (USGS/GSP) for the collection of $\delta^2\text{H}$, $\delta^{13}\text{C}$, and $\delta^{18}\text{O}$ samples.

B. Steinkampf prepared an abstract for inclusion in the summary report of the results of the workshop sponsored jointly in Denver by the YMP geochemistry and hydrology integration teams. He also participated in a meeting of workshop work-group leaders and YMP staff to synthesize work-group reports for the summary and executive reports to be distributed.

B. Steinkampf travelled to the NTS for laboratory housekeeping, to prepare reagents for collection and treatment of water samples, and to collect water samples and field hydrochemical data from borehole USW VH-1. Samples collected were processed in the SZ hydrochemistry lab and prepared for shipment to Lakewood for submission to the USGS National Water-quality Laboratory.

B. Steinkampf attempted several times to contact R. LaCamera (USGS/LV) to ascertain the status of analytical results for samples from JF-3. No information was obtained.

B. Steinkampf met with staff of the USGS personnel office in Lakewood to clarify document needs relative to the planned hire of a hydrologist to support the SZ hydrochemistry study. Following this meeting and discussions with USGS/YMP administrative staff members, position descriptions were revised/prepared and a list of responsibilities and selective factors were prepared. The documents were submitted for grading by the personnel office. A response is anticipated from personnel in early August, to be followed by announcement of the vacancy in mid August.

B. Steinkampf coordinated the collection and shipment of a sample of J-13 water for investigators in the USGS National Research Program. The water is to be used in an investigation of the influence of microbial activity on the speciation of transuranic elements.

SCP 8.3.1.2.3.2.3 Regional hydrochemical characterization 0G3313L2

Summary Account Manager - W. Steinkampf

Technical Activities

3GWH905 Select sample sites, phase 1

B. Steinkampf prepared a letter to the Superintendent and natural resources staff of the Death Valley National Monument that described in detail his proposed plans for sample and data collection within the Monument. Subsequent discussions with W. Werrell (US National Park Service, Ft. Collins, Co.) and J. Ardahl (USNPS/DVNM) addressed DVNM staff concerns regarding the plans. Although most of the concerns were allayed during the discussions, plans for an August visit to DVNM for further discussion and examination of specific sites were made.

Quality Assurance

Planning and Operations

Variances

WBS 1.2.3.3.1.3.3 Saturated Zone Hydrologic System Synthesis and Modeling

Principal Investigator - E. Ervin

LBL Principal Investigator - K. Karasaki

OBJECTIVE

To synthesize available data to develop a conceptual model; to make a qualitative analysis of how the system is functioning; to develop and evaluate porous-media and fracture-network methods for simulating ground-water flow and solute transport; and to estimate ground-water flow direction and magnitude for input to ground-water travel time calculations. (SCP Study 8.3.1.2.3.3)

SCP 8.3.1.2.3.3.1 Conceptualization of saturated zone flow models within the boundaries of the accessible environment 0G3313A2

Summary Account Manager - E. Ervin

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM003A Review (DOE final) study plan 8.3.1.2.3.3

The draft recompilation of study plan 8.3.1.2.3.3 was sent to the reviewers for their concurrence on March 31. Informal, verbal concurrence has been given by all reviewers of the study plan. There were 115 DOE comments by seven reviewers of Study Plan 8.3.1.2.3.3, Site Saturated Zone Synthesis and Modeling--consisting of 71 minor comments and 44 major comments. The study plan is in final formatting at SAIC before formal transmittal to the DOE reviewers.

3GWM006 Synthesize hydraulic data at "H" wells

G. O'Brien has been examining the water-level data from the "H" wells for their potential for earth-tide analysis. He has been formatting the computer files for the analysis and met with D. Galloway, USGS-Sacramento, formerly of YMP, to discuss performing the earth-tide analysis. Results of these analyses may yield information about transmissivity and storage properties of the volcanic tuff aquifer beneath Yucca Mountain.

3GWM08AA Enter data to geologic model of the C-holes and site

A. Geldon has completed analysis of existing data at the UE25c-well complex compiling television and acoustic televiwer logs, in addition to caliper logs, core analyses, tracejector surveys, temperature logs, static tracer tests and heat-pulse surveys into a conceptual geologic model. A decision has been made at this time, with the concurrence of management, not to pursue use of GIS as a tool to synthesize the geologic data because of the time required to learn the various GIS systems and the need to clarify the roles of other projects, such as 8.3.1.4.2.2, and the applicability of their future GIS product to this study. In the meantime, the geology will be incorporated directly into the preliminary hydrologic models via 3-D discretization of the geology into the model mesh.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

3GWM09AA Evaluation of conceptual model and existing data

E. Ervin spent a week in Berkeley, CA with LBL investigators, including G. Bodvarsson, to become familiar with LBL's TOUGH2 code. This code is being selected for use because of its ability to simulate two-phase flow and true water-table (variably saturated) conditions and to integrate with the unsaturated-zone modelers who are using the TOUGH code. Evaluation of conceptual models of the high gradient area has begun by constructing a simplified 2-D mesh in the vertical plane of the area between WT-6, G-2, and WT-16. Some difficulties were encountered in obtaining the initial conditions for the model; however, work is progressing.

3GWM06AA Prepare report on potentiometric map

E. Ervin has completed text for the report describing the revised potentiometric map of 1988 average water levels for the vicinity of Yucca Mountain (scale 1:24,000). The report also details time-trend analyses, corrections made for temperature and density changes in the water levels of the deep wells, and a conceptual model of the flow system at Yucca Mountain. The report is with co-author R.R. Luckey and should be ready for USGS colleague review soon.

Quality Assurance

Planning and Operations

Variances

3GWM06AA Prepare report on potentiometric map

Delayed two months because of prolonged illness of PI and unexpected difficulty in interpreting corrected water levels. Will delay milestone 3GW06M by at least 2 months, possibly more as review process of that milestone will be more difficult than originally anticipated.

SCP 8.3.1.2.3.3.2 Development of fracture network model 0G3313B2

Summary Account Manager - E. Ervin

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM011B Finish fracture mapping in the Crater Flat Tuff

A field trip to finish fracture mapping at Raven Canyon was planned for September. Mapping in the Prow Pass Member of the Crater Flat Tuff will be completed, as well as examination of how fractures in the overlying Paintbrush Tuff connect to those in the Prow Pass Member.

3GWM017B Continue to assist LBL add outcrop data to model

The paper entitled 'Fracture flow model in the saturated zone at Yucca Mountain', by K. Karasaki, LBL, and E. Ervin has been approved by the Yucca Mountain Branch and has been sent concurrently to DOE and USGS Headquarters in Reston. The paper is being prepared for a special issue of the Radioactive Waste and the Nuclear Fuel Cycle journal and outlines current fracture-collection efforts, use of the data in fracture modeling at the UE25c-Hole complex and the status of current fracture modeling at that multiple-well complex.

The 2x2 m grid maps were digitized, by an LBL summer student, C. Kim, into ASCII format for analysis in relation to the UE-25C-hole complex.

Quality Assurance

3GWM015B Revise fracture mapping technical procedure

E. Verbeek completed his technical review of the hydrologic procedure related to Technical Procedure GP-12, R1 "Mapping fractures on pavements, outcrops and along traverses". The hydrologic procedure focuses on the collection of fracture data for the saturated-zone hydrologic and modeling studies. In the future, it is planned that GP-12 will be revised to include M. Fahey's techniques and the techniques utilized by E. Ervin and M. Chornack. At present, the hydrologic procedure is back with the authors, Ervin and Chornack, for revision in response to the technical review.

Planning and Operations

3GWM008B Coordinate LBL fracture-network modeling phase 2

E. Ervin met with K. Karasaki, LBL, to discuss status of fracture-network modeling. Another paper discussing inclusion of the fracture data from east of Little Skull Mountain into the fracture-network model is being planned.

Variations

3GWM015B Revise fracture mapping technical procedure

Delayed two months because of prolonged illness of Principal Investigator and coordination efforts between HIP, GSP and USBR.

SCP 8.3.1.2.3.3.2 Development of fracture network model 0B3313C2

Summary Account Manager - K. Karasaki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM06CA Complete rad-waste conference journal article

The Radioactive Waste Management and Nuclear Fuel Cycle Journal article entitled "Fracture flow modeling of the saturated zone at Yucca Mountain" by K. Karasaki and E. Ervin, has been sent to USGS for the programmatic review. The article discusses how fracture information is collected and how it will be used to construct a model of fracture flow in the saturated zone. The article also discusses a simulation of flow and transport in fracture networks.

3GWM02CA Write report on borehole fracture data bias

Further revisions were made to the draft report whose preliminary title is "Techniques for evaluating the effects of borehole bias on fracture orientation distributions derived from boreholes".

3GWM07CA Design code cross verification

Test cases for code-cross verification were jointly designed by LBL and LANL. The cases include one and two dimensional transient flow solutions in fracture network.

Quality Assurance

Planning and Operations

Variances

3GWM02CA Write report on borehole fracture data bias

One of the authors is no longer with LBL, causing delay in the completion of the report. The expected completion date is September 30, 1992.

Work Performed but not in Direct Support of the Scheduled Tasks

K. Karasaki reviewed an article entitled "Numerical investigations of steady liquid water flow in a variably saturated fracture network", by E. Kwicklis and R. Healy.

WBS 1.2.3.3.2 Preclosure Hydrology

OBJECTIVE

To examine hydrologic conditions, including flooding, availability of water supply, and characteristics within and above the repository horizon; and to determine whether engineering measures that require excessive cost, or technology beyond that which is reasonably available, will be needed during construction or operation of the repository. (SCP Section 8.3.1.16)

WBS 1.2.3.3.2.1 Flood Recurrence Intervals and Levels at Potential Locations of Surface Facilities

Principal Investigator - P. Glancy

OBJECTIVE

To assess the flood and debris hazards at and near the potential repository surface facilities locations to allow adequate design of facilities to prevent or reduce hazards to an acceptable level. (SCP Study 8.3.1.16.1.1)

SCP 8.3.1.16.1.1.1 Site flood and debris hazards studies 0G3321A2

Summary Account Manager - P. Glancy

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFR016 Analyze & evaluate FY91 flood data

Analysis of FY91 flood data is continuing, but progress in July was minimal because documentation of recent (July 1992) severe flooding in Nevada took precedence over this task (see Activity: Transport Debris by Severe Runoff).

3GFR002 Collect, analyze, evaluate FY92 flood data

A series of thunderstorms in southern, central and northern Nevada occurred during the period July 11-14, 1992. This storm activity was the culmination of about 6 weeks of high humidity caused by low-pressure atmospheric anomalies over Nevada, California, and the Pacific ocean off the California coast. Isolated thunderstorms during this period caused flooding and some debris transport that attracted media attention at Reno, Hawthorne, and in Carson Valley, Nevada. Damage to private and public property was severe in some cases, but no injuries or deaths were reported. Data were collected for floods near Reno where Interstate Highway 80 was blocked by debris for several hours. Also, flooding that seriously damaged Hawthorne was investigated and appropriate data on streamflow and fine-grained debris movements were collected. The Carson Valley flooding, second occurrence this summer, also was documented. At the NTS, data were collected on minor runoff along Cane Springs Wash, and along the Amargosa River at Eagle Mountain, Tecopa, and Westside Road in southern Death Valley.

3GFR018 Recon Yucca Mountain to assess debris hazards

No progress in July. Most of July was spent documenting runoff that occurred elsewhere in Nevada. Documentation of runoff took precedence over this and other tasks.

Quality Assurance

3GFR019 Regrade (QA) for site flood & debris hazards

D. Grasso reviewed the QA grading report (QAGR) for this study and information pertaining to QA grading QMP-3.15. The QAGR (WBS 1.2.3.3.2.1) for the study, which was prepared by P. Glancy on January 17, 1991, clearly covers work in progress and work to be conducted. Specific criteria of the existing QAGR do not need modification and regrading is not necessary.

Planning and Operations

3GFR006 Prepare administrative report: FY90/91 flooding

This activity has been combined under the title "Summary of recon activities" (activity 3GRS009B; SCP 8.3.1.2.1.2.2 "Transport of debris by severe runoff") in the Mission 2001 PACS for FY'93. This activity will involve preparation of a compendium of known (historic) precipitation-runoff events that have occurred within the Yucca Mountain area over the past 10 years (1983-92). Sites of severe runoff will be documented and categorized in terms of their potential for contributing additional information about the processes and products of severe runoff and runoff-related hazards.

Variances

3GFR016 Analyze & evaluate FY91 flood data

Short-term impact caused by the high-priority requirement to document recent severe flooding in Nevada (see narrative of PACS work in SCP 8.3.1.2.1.2.2, Transport of debris by severe runoff).

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 38 hours were spent in support of the following tasks:

D. Grasso attended an HIP Project Review Meeting with Larry Hayes and Dave Appel to discuss progress and delays with Yucca Mountain SCP activities. (12 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

D. Grasso investigated the availability of digital data sets (DEMs and DLGs at scales greater than 1:100,000), as well as climatic (precipitation) and streamflow runoff data recorded to date for the Yucca Mountain area. These data are needed for site flood and debris hazards modeling.

D. Grasso prepared field equipment, maps, satellite images, and other research materials, and was accompanied by P. Glancy as active participants on a regional paleoflood field trip of the lower Amargosa River system. The trip entailed an evaluation of the late-Quaternary geomorphology, sedimentary stratigraphy, and drainage patterns of the Amargosa River and its tributaries. Procedures for modeling the magnitude and frequency of mid-Holocene streamflow were evaluated during a group discussion with Y. Enzel, author and paleoflood investigator of "Holocene streamflow events of the adjacent Mojave River and Silver Lake system". These modeling procedures are very relevant to our work in the lower Amargosa River, and would additionally allow correlations to be made between large-magnitude, historic streamflow and precipitation events.

WBS 1.2.3.6 Climatology and Meteorology

OBJECTIVE

To collect and analyze climatic, paleoclimatic, future climatic, and Quaternary hydrologic data to evaluate the suitability of the site.

WBS 1.2.3.6.2 Climatology

OBJECTIVE

To characterize the present, paleo-regional, local climate, and hydrologic conditions at Yucca Mountain, and to determine the magnitude and likely effects that future changes in climate will have on repository performance.

WBS 1.2.3.6.2.1 Change in Climatic Conditions

OBJECTIVE

To provide a baseline for determining the changes in climate that potentially affect the waste isolation capabilities of the site. (SCP Investigation 8.3.1.5.1)

WBS 1.2.3.6.2.1.1 Modern Regional Climate

Principal Investigator - R. Forester

OBJECTIVE

To develop a synoptic characterization of the modern regional climate to provide a baseline and a background for the interpretation of climatic variation. (SCP Study 8.3.1.5.1.1)

SCP 8.3.1.5.1.1.1 Synoptic characterization of regional climate 0G3621K2

Summary Account Manager - R. Forester

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCR006 Hire personnel-establish criteria

An IPA with Dr. T. Cerling, University of Utah, was signed April 23, 1992.

Quality Assurance

Planning and Operations

Variances

3GCR005 Develop study plan

Current plans are to use or modify the Study Plan developed for SCP 8.3.1.2.1.1 (accepted by the NRC, October 1991).

3GCR007 Analyze precipitation data - regional network and 3GCR008 Create/modify precipitation station

An IPA with Dr. T. Cerling, University of Utah has been in place since April 23, 1992. We have no record of activity from Cerling that any work has been initiated or completed. We expect the August status report to be more complete in this regard.

WBS 1.2.3.6.2.1.2 Paleoclimate Study of Lake, Playa, and Marsh Deposits

Principal Investigator - R. Forester

OBJECTIVE

To establish the nature, timing duration, and amplitude of paleoclimate changes based on paleontologic, stratigraphic-sedimentologic, chemical, and mineralogic analyses of lacustrine sediments in or near southern Nevada; and provide a chronologic frame work for this paleoclimatic information. (SCP Study 8.3.1.5.1.2)

SCP 8.3.1.5.1.2.2 Analysis of stratigraphy-sedimentology of marsh, lacustrine, and playa deposits 0G3621B2

Summary Account Manager - R. Forester

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCLOO4B Sample outcrop sites

K. Futa determined selected major and trace element compositions on playa samples by XRF. Samples from Stewart Valley, Mesquite Flat, Alkali Flat, Sarcobatus Flat, and Bonnie Claire playas were leached in acetic acid and found to contain between 11 and 34 percent acid-leachable fractions. This work is being performed to help isolate unique chemical components within individual playas which may represent sources of eolian fines introduced into Yucca Mountain soils.

3GCLN01M Submit study plan to NRC

This activity was completed December 6, 1991.

Quality Assurance

Planning and Operations

Variances

3GCL002B Conduct reconnaissance of Las Vegas Valley and 3GCL001B Map sediments in the Las Vegas Valley

Reconnaissance and mapping of the Las Vegas Valley deposits have not started. Staffing problems have meant that the field mapper was not in place soon enough to initiate these studies, so mapping has been shifted into FY93 activities. At that time it is hoped to have J. Quade on contract. Quade has mapped these deposits for the state and so he will be able to use his map and add to it to meet project needs, bringing things back on schedule quickly.

Work Performed but not in Direct Support of the Scheduled Tasks

An IPA with Dr. T. Cerling, University of Utah, was signed on April 23, 1992. Cerling will provide valuable input into the understanding of the hydraulic connectivity between the geologic characteristics at the potential waste disposal site and the stratigraphy/sedimentology of lakes, playas, and marshes. At this time, we have no report of progress by Cerling.

WBS 1.2.3.6.2.1.3 Climatic Implications of Terrestrial Paleoecology

Principal Investigator - R. Forester

OBJECTIVE

To determine aspects of past vegetation change; and use vegetation records to provide quantitative estimates of changes in climatic variables for the southern Great Basin. (SCP Study 8.3.1.5.1.3)

SCP 8.3.1.5.1.3.1 Analysis of pack rat middens 0G3621G2

Summary Account Manager - R. Forester

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCL101 Hire and train staff

An IPA with Dr. T. Cerling, University of Utah, was signed April 23, 1992.

3GCL10MN Submit study plan to NRC

This task was completed September 20, 1991.

Quality Assurance

Planning and Operations

Variances

3GCL104 Examine pollen and ostracode spectra

In addition to the work to be done by Dr. Cerling this year, initiation of pack rat midden studies and of microfossils from the Pahrnogat Marshes have shifted to FY93 when it is anticipated that P. Wigand and other contracts will be in place to conduct these studies.

WBS 1.2.3.6.2.1.4 Paleoenvironmental History of Yucca Mountain

Principal Investigator - J. Whitney

OBJECTIVE

To evaluate the paleoenvironmental record at Yucca Mountain and surroundings in light of inferred paleoclimate history of the southern Great Basin; to model soil properties in the Yucca Mountain region; to map surficial deposits; and to reconstruct the eolian history of the region. (SCP Study 8.3.1.5.1.4)

SCP 8.3.1.5.1.4.2 Surficial deposits mapping of Yucca Mountain area 0G3621I2

Summary Account Manager - E. Taylor

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCH001A Complete transition and hire staff
Activity completed April 7, 1992.

3GCH012A Conduct field reconnaissance stratigraphic relationship
Activity completed June 15, 1992.

3GCH011A Create map surface dep-north third Yucca Mountain
Mapping of the 3.75 minute quadrangle #26 (EG&C base map at scale of 1:12,000) was begun by S. Lundstrom. This quadrangle includes extensive surficial deposits along Fortymile Wash from just south of the mouth of Pah Canyon to just north of the mouth of Yucca Wash. It also includes the lower Yucca Wash and northernmost Midway Valley north of the area mapped by J. Westling and others. The area overlaps the area mapped by E. Taylor (1986).

3CCH010A Field check work; collect material for isotope analyses
Field checking of surficial deposits in Fortymile Wash and confluent side canyon drainages was conducted by S. Lundstrom. Recent natural exposures of surface deposits, including surficial and buried soils underlying surficial deposits, were noted, which are useful in constraining deposit thicknesses and geomorphic/climate history. These exposures were used to relate field surface characteristics to mappable photogeologic characteristics of units. Some of these exposures may be used as sampling sites for soil sedimentology and isotopic analyses for deposit age estimation.

3GCH004A Conduct isotope analyses sediments/rocks
J. Paces spent one day on site with S. Lundstrom, J. Westling and others examining soil pits dug into variously-aged surfaces in Midway Valley. U-series dating, if successful, will allow absolute age limits to be placed on the otherwise relatively-dated surfaces. Samples for scoping studies were collected from several surfaces and B. Widmann has prepared five of these samples for U-series analysis.

Quality Assurance

Planning and Operations

Variations

Work Performed but not in Direct Support of the Scheduled Tasks

S. Lundstrom assisted other tectonics section scientists in the search for surface rupture associated with the June 29, 1992, earthquake near Little Skull Mountain. No evidence of surface rupture was found on Yucca Mountain.

S. Lundstrom assisted Menges in mapping stratigraphic and tectonic features exposed in trench 14C.

S. Lundstrom completed one required QA reading assignment.

SCP 8.3.1.5.1.4.3 Eolian history of the Yucca Mountain region 0G3621J2
Summary Account Manager - J. Whitney

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCH020C Conduct analyses-strontium/oxygen/carbon isotope

K. Futa analyzed an additional 12 samples of Paleozoic carbonate rocks from Bare Mountain and Striped Hills for Sr isotopic compositions. These analyses have been added to the database for possible source areas which have contributed to the eolian components with Yucca Mountain soils.

Quality Assurance

Planning and Operations

Variances

WBS 1.2.3.6.2.2 Effects of Future Climatic Conditions on Hydrologic Characteristics

OBJECTIVE

To determine the relations between climatic conditions and hydrologic characteristics in the vicinity of Yucca Mountain during and since the Quaternary; and to predict future hydrologic response to possible future climatic conditions. (SCP Investigation 8.3.1.5.2)

WBS 1.2.3.6.2.2.1 Quaternary Regional Hydrology

Principal Investigator - R. Luckey

OBJECTIVE

To investigate the hydraulic characteristics of paleoflood events and to compare them with modern flooding and related geomorphic processes; to determine past infiltration and percolation history at Yucca Mountain through isotopic and chemical analysis of water from the unsaturated zone; to determine past hydrologic conditions in the regional discharge area; to estimate the conditions and rates of infiltration and ground-water recharge during the Quaternary; and to determine the ages, distribution, origin, and paleohydrologic significance of calcite and opaline silica deposits along faults and fractures. (SCP Study 8.3.1.5.2.1)

SCP 8.3.1.5.2.1.1 Regional paleoflood evaluation 0G3622A2

Summary Account Manager - D. Grasso

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH007A Develop technical procedures

D. Grasso and P. Glancy reviewed the goals of the regional paleoflood evaluation and concluded that an SNP would be most beneficial to the endeavors of this study. Scientific work dictated by the study is of the investigative type for which there are numerous documented and published procedures from which to choose as the need arises. In addition, it is felt that there is no way to foresee exactly what procedure will be required during this early, reconnaissance stage of the investigation. Later in the evaluation, analyses of sites that offer sound paleoflood evidence will be undertaken, and procedures will be chosen, or developed if necessary, to meet the needs of the study. At present, an SNP will better meet the needs of the study. The plan can be written general enough to cover all reconnaissance work, and detailed enough to encompass conventional site-specific evaluations. QA personnel have advised that a new SNP plan procedure is nearly complete, and that this new procedure will be available for use in a few weeks.

3GQH008A Geomorphometric analysis of Yucca Mountain and vicinity

D. Grasso continued preparation of a large, high-resolution digital database for the Amargosa River basin. USGS digital line graph and digital elevation model data (1:100,000) will be used for much of the underlying baseline map information. These data will be combined with aerial reconnaissance information, derived from Landsat TM satellite imagery and high-resolution aerial photographs, for preliminary mapping of regional paleoflood features. Work is underway to delineate drainages and computer basin area measurements for the Amargosa River basin and its second-order subbasins. These activities will provide needed data for quantitative analyses of the relationships between precipitation and streamflow runoff, and ultimately will be used to compare modern and past streamflow events that have occurred in the region. The aim of this study is to determine the magnitude and frequency of past runoff from Fortymile Wash, and other upper Amargosa River subbasins, adjacent to Yucca Mountain. It is anticipated that the sedimentary stratigraphy of the Amargosa River basin will provide essential chronological information for the past 10,000 years of streamflow in the region.

D. Grasso began preparation of Landsat TM image data, and continued to search for other needed digital data to be used for geomorphometric analysis of the Amargosa River drainage basin. Two Landsat TM quarter-scenes (2 digital tapes) were processed; however, the procedure was very time consuming. It will therefore be necessary to find someone to help in processing the remaining 16 tapes. Other high-resolution digital data (i.e., digital elevation models and digital line graphs) also will need to be ordered and processed.

D. Grasso attempted to find someone to help prepare Landsat TM image data. Because there is no 9-track tape drive available, the Landsat scenes on digital tape (18 tapes in all) will have to be downloaded to a useable format.

3GQH003A Reconnaissance of Yucca Mountain and vicinity for paleoflood evidence

D. Grasso, P. Glancy, D. Beck, and T. Kane accompanied Y. Enzel, University of Arizona, on July 27, 1992, to the lower Mojave River and Silver Lake basin, and to the lower Amargosa River basin. Enzel described the techniques and strategies that he successfully used to model streamflow and paleoflood runoff on the Mojave River during latest-Pleistocene and Holocene time. This tour was conducted to assist our YMP efforts by demonstrating his field techniques and strategies. It is felt that a similar effort could be used to evaluate paleoflood discharge from Fortymile Wash and the Amargosa River because of their similar hydrologic and environmental characteristics. One problem in the Amargosa basin is the lack of streamflow gages. For the Mojave River study, Enzel used four gaging stations that are relatively evenly spaced over its 200+ mile course. The success of the model requires that this calibration data be available. The gages now operating will be of benefit, however, and additional data will have to be derived from sedimentary deposits comprising river terraces, springs, and playa lake along the course of the Amargosa River from Yucca Mountain to Bad Water in Death Valley National Monument. Valuable experience and information was gained from Enzel, and he is expected to be of further assistance as strategies are developed further.

Quality Assurance

Planning and Operations

3GQH004A Final DOE review and approval of study plan

S. Keller, SAIC, investigated the unusual delay by DOE in review and approval of the study plan for this activity. He found that only two reviewers had completed verification, and five others had not. Apparently, the reviewers did not receive their review copies from DOE for 2-3 months after transmittal to YMPO on March 31, 1992. It is unknown how much longer this activity will take.

Variances

3GQH004A Final DOE review and approval of study plan

Short-term impact. Apparently, some of the reviewers did not receive their review copies for 2-3 months after transmittal to YMPO on March 31, 1992. It is unknown how much longer this activity will take.

3GQH014A NRC reviews study plan, 3GQH002A Respond NRC/state comments study plan, and G039 Work authorization

These activities have been deleted from the schedule because they are outside of USGS control.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 42 hours were spent in the support of the following tasks:

D. Grasso attended an HIP Project Review Meeting with Larry Hayes and Dave Appel to discuss progress and delays with Yucca Mountain SCP activities. (12 hours)

D. Grasso investigated the availability of digital data sets needed for this activity. Many of the smaller-scale (1:100,000 and 1:250,000) data sets are readily available and will need to be ordered. Higher-resolution digital elevation data (1:100,000 or 1:24,000) apparently are not available for the Amargosa River basin. These data therefore will have to be developed from source materials (maps or photographs) if such large-scale, geomorphometric mapping of the Yucca Mountain region is to be conducted.

D. Grasso spent time trying to locate high-resolution aerial photographs for various regional paleoflood project sites in the Yucca Mountain area.

D. Grasso prepared field equipment, maps, satellite images, and other research materials for a regional paleoflood field trip of the Lower Amargosa River system. The trip included an evaluation of the late-Quaternary geomorphology, sedimentary stratigraphy, and drainage patterns of the Amargosa River and its tributaries.

SCP 8.3.1.5.2.1.3 Evaluation of past discharge areas 0G3622B2

Summary Account Manager - E. Gutentag

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH012 Analyze water by NWQL and GSP isotope staff

All water samples collected during past trips have been analyzed by NWQL, and all Sr 87/86 ratios from prior trips have been run.

Z. Peterman presented an oral presentation entitled "Strontium isotope characterization of the Ash Meadows ground-water system, southern Nevada." The talk was at an international scientific conference entitled Water-Rock Interaction-7, in Park City, Utah.

K. Ludwig and K. Simmons began U-Series analysis by mass spectrometry of NIST standards in preparation for analysis of natural waters.

3GQH028 Analyze faunal samples modern springs FY/92

R. Forester reports that this activity is progressing according to his work schedule.

Technical Activities (CONTINUED)

3GQH004 Study/Analyze results from wet/dry playas

R. Forester reports that this activity is progressing according to his work schedule.

3GQH007 Vegetation mapping phase 1

As of the end of July, two TM data tapes have not arrived from the Federally Owned Landsat Data (FOLD) library; thus, the map cannot be completed.

Preliminary vegetation study began using Environmental Resources Management and Analysis (ERMA) with spectral analyses using normalized difference indices, transformed vegetation indices, and perpendicular vegetation indices.

3GQH005 Conduct field trips modern discharge springs FY/92

On July 30, 1992, well VH-1 in Crater Flat was pumped for water chemistry samples. During this time some of the water was diverted to the microorganism collector. Of the 36,600 gallons pumped, during 5 hours 36 minutes of operation, 20 gallons per minute or 19 percent was diverted to the microorganism collector. The nets will be checked for microorganisms the first week of August.

A field trip was held on July 31, 1992, at Franklin Lake Playa; the field team consisted of E. Gutentag, C. Faunt, Z. Peterman, B. Parks, B. Widmann, and J. Czarnecki and C. Sevard. Water samples for SR 87/86 were collected from 17 wells using a Kemmerer bottle to collect water samples from known well depths. Results from these well samples will be compared to those from the springs collected north of Franklin Lake in Carson Slough.

3GQH008 Collect faunal samples from past discharge sites - FY/92

J. Paces initiated isotope analysis of two additional samples from Site 199 (Crater Flat), which is composed of ground-water discharge deposits. These samples were collected with E. Taylor in hopes of better constraining the duration of spring activity at the site.

Isotope analysis of two additional carbonate-rich horizons from the "Horse Tooth" locality of Downey also known as the "Mammoth Tusk" site, have been started. Since the different ground-water discharge mounds at the south end of Crater Flat are at approximately the same elevation, it is reasonable to hypothesize that they all were active during the same high water table. Results of these samples should test this hypothesis.

3GQH002 Vegetation distribution mapping Amargosa Desert

K. Turner and C. Faunt continued work on vegetation analysis in the Amargosa. This will complete work begun by L. DeMarco. Turner reviewed and checked for accuracy the original DeMarco data sets, which were updated and corrected with field observations taken in April. A manuscript was developed in rough draft form: appendices, tables, and illustrations were developed. GIS methods were used to develop initial vegetation maps.

3GQH011 Prepare report on methods of channel geometry

W. Osterkamp has not worked on this activity this month. The first draft submitted last month has not been completely revised. Osterkamp expects to finish this draft report in September or October.

3GQH300, 3GQH305, and 3GQH306 Collect/sample ostracodes - playas New Mexico/Texas

No work was done for this activity because the playas in eastern New Mexico and western Texas have remained full. Dr. C. Reeves of Texas Tech Univ. is expecting the playa lakes to return to normal sometime this fall if precipitation ceases or slows to normal. These activities have to be postponed due to extremely wet climatic conditions in the field area. Abnormal climatic conditions have prevented collection of data at this time. It is hoped to collect either in October or November if climatic conditions change.

3GQH000 Conduct chemical analysis soil samples

During July the first round of samples were analyzed by the Geologic Division Branch of Geochemistry. These data are ready to be plotted and the results used to verify spectral responses.

Additional samples were submitted during July for analyses. It is hoped that the Geologic Division Branch of Geochemistry will complete the analyses in less than nine months. J. Watson submitted the proper soil submittal forms and transferred the samples and submitted forms to the Geologic Division Branch of Geochemistry.

Quality Assurance

Planning and Operations

Variations

3GQH002 Vegetation map Amargosa Desert

K. Turner and C. Faunt have quality controlled all of L. DeMarco's data. More time was needed to correct some statistical problems with DeMarco's original analyses. The report is almost completed and is undergoing final GIS evaluation and reformatting.

3GQH011 Prepare report channel geometry

Report is due after summer field work by W. Osterkamp on or about September 9, 1992.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 80 hours was spent in support of the following tasks:

A report, on prototype testing for activity 3GQH005 during the stop-work order in 1987 and 1988, was requested by DOE Climate Coordinator. A report has been 65% completed and is entitled "Springs, water chemistry, and Ostracode occurrence in Colorado, Kansas, and New Mexico" by E. Gutentag, J. Downey, R. Forester, K. Conrad, J. Watson, K. Kolm, K. Malmgrem and S. Buchanen. This report will contain the data generated by this activity which was a precursor to developing the collection techniques now in use for site characterization activities.

J. Watson attended a DOE audit concerning calibration and sample tracking for the PI. All questions were answered and Jim's methods were praised.

On July 31, 1992 C. Faunt and E. Gutentag, as part of a water chemistry collection, conducted a single-well specific capacity test at VH1 in Crater Flat to compare 1992 results to those collected during prior tests in 1982.

A report was submitted for review about the 1990 use of the Ground Conductivity Probe EM-34 in the Amargosa Desert. The report is entitled "Detection of faults in Ash Meadows, southwestern Nevada, by electromagnetic terrain-conductivity measurements" by C. Perry, J. Gillespie, D. Hargadine, E. Gutentag, and J. Downey (July 14, 1992 Version).

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH012C Collect/reduce hydrologic data from remote sites FY92

The week of July 27, 1992, was devoted to a field trip. The weather and surface water records were pulled, water samples were collected, and maintenance was done on the equipment by T. Oliver and J. Ashby. B. Lichy observed.

On a daily basis, T. Oliver checked the NWIS database for DCP data and performed weekly data pulls from the LRGs to fill missing data.

3GQH014C Test PRMS model

B. Lichy retrieved and reviewed surface water data, and weather data, to be used as input to the PRMS model calibration for Stewart basin.

3GQH017C Report on chloride-ion method

T. Oliver prepared a summary of equivalent depth of precipitation and chloride concentrations for precipitation and vadose samples collected at Kawich and Stewart basins. These data were given to B. Lichy.

B. Lichy compiled and reviewed chloride data for Kawich and Stewart basins in preparation for developing a chloride-ion balance for the index sites at each basin.

3GQH018C Prepare data report on Kawich: FY91

T. Oliver gave P. McKinley updated water quality data from NWIS in data report format.

P. McKinley prepared an outline for the data report and started to compile the data into report format.

3GQH019C Prepare data report on Stewart: FY91

T. Oliver gave P. McKinley updated water quality data from NWIS in data report format.

P. McKinley prepared an outline for the data report and started to compile the data into report format.

3GQH15CA Complete data report Kawich FY 85-90

T. Oliver gave P. McKinley updated water quality data from NWIS in data report format.

P. McKinley prepared an outline for the data report and started to compile the data into report format.

3GQH16CA Complete data report Stewart FY 85-90

T. Oliver gave P. McKinley updated water quality data from NWIS in data report format.

P. McKinley prepared an outline for the data report and started to compile the data into report format.

Quality Assurance

3GQH014C Test PRMS model

B. Lichty attended a meeting on the QA requirements for modeling software.

3GQH018C Prepare data report on Kawich: FY91

S. Boucher and T. Oliver reviewed equipment malfunctions at Kawich for the 1991 water year. Boucher discussed the malfunctions with W. Rodman to determine if any NCRs need to be completed. It was decided that the equipment malfunctions did not require a NCR.

3GQH15CA Complete data report Kawich FY 85-90

S. Boucher and T. Oliver reviewed equipment malfunctions at Kawich and Stewart for the period from 1985 to 1990. Boucher discussed the malfunctions with W. Rodman to determine if any NCRs need to be completed. It was decided that the equipment malfunctions did not require a NCR.

3GQH16CA Complete data report Stewart FY 85-90

S. Boucher and T. Oliver reviewed equipment malfunctions at Kawich and Stewart for the period from 1985 to 1990. Boucher discussed the malfunctions with W. Rodman to determine if any NCRs need to be completed. It was decided that the equipment malfunctions did not require a NCR.

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 59 hours was spent in support of the following tasks:

B. Lichty and T. Oliver sorted and moved the project records from the old project office to Lichty's office. (24 hours)

P. McKinley provided equipment calibration documentation for DOE audit 92-20. (10 hours)

Annual and sick leave: 25 hours

SCP 8.3.1.5.2.1.4b Geochemistry of arid-zone infiltration 0G3622E2

Summary Account Manager - A. Riggs

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH006D Install long-term meteorological monitoring instrument

The detail work on the shelter and cabling was finished. A complete suite of long-term meteorological instrumentation was installed on the tower at the study site.

3GQH012D Quarterly bulk precipitation collection

Performed the quarterly sampling trip as usual - insects or rodents had chewed through the collector bags at the Safford site and the whole sample was lost. Moth balls were placed under the new bags to discourage any recurrence of chewing.

3GQH003C Soil and moisture chemical sampling

Thirteen soil samples were distilled for soil water and their water contents were determined.

Two bulk and two surface fragment samples were sieved to determine the ratio of fine (<2.36 mm) to coarse material in them.

3GQH010D Analyze/interpret CL-36 by NMINT

Twelve samples were measured for total Cl content - two were measured twice.

Twenty-six samples were mailed to the University of Rochester Structure Research Laboratory for CL-36 analysis (includes 8 boulder samples, 6 calcium carbonate samples, 7 soil cobble samples, 3 surface particle samples, and 2 boulder samples ground to 35 - 60 mesh powder).

Quality Assurance

3GQH006D Install long-term meteorological monitoring instrument

Scientific Notebook #0014 was prepared to document long-term meteorologic monitoring activities.

Planning and Operations

Variances

3GQH004D Install watershed monitoring instrumentation

It is unlikely that installation of watershed monitoring instrumentation can be completed before March 3, 1993 because the majority of the preparation work is being done by D. Helm, who has been heavily involved in other duties. Other problems include long turn around times associated with instrument calibration and the undesirability of putting in long hours of hard manual labor during the Sonoran Desert summer. Short and long term impacts are the starting and ending dates of data collection will be set back. The only realistic corrective action for problems such as this would be to increase manpower.

3GQH002C Long-term watershed monitoring

This can not begin until 3GQH004D is completed; hence, the start date will probably not be before March 31, 1993.

SCP 8.3.1.5.2.1.5 Studies of calcite and opaline silica vein deposits 0G3622D2

Summary Account Manager - J. Whelan

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH803A Analyze isotopes/fossils Canyon & Windy Wash

R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of calcite from 14 samples from site 106. Eleven of these samples ranged from -3.8 to -5.1 ‰ and from 20.4 to 22.5‰, respectively; the other three produced CO₂ that ran very poorly on the mass spectrometer (with very noisy signals suggesting contamination by another gas) and had values ranging from -5.6 to -6.3‰ and from 30.7 to 43.1‰, respectively. The source of this unidentified contaminant gas appeared to be the samples themselves. The isotopic compositions of the samples that produced "clean" CO₂ are consistent with a pedogenic origin.

3GQH803A Analyze isotopes/fossils Canyon & Windy Wash (CONTINUED)

R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 6 samples from the paludal deposits from site 199. These ranged from -1.0 to -2.8‰ and from 18.8 to 21.5‰, respectively; the $d^{13}C$ values of this calcite are similar to those of pond/marshland/playa deposits studied by R. Hay and others (1986), and the $d^{18}O$ values suggest some evaporation of the depositing waters prior to calcite precipitation. This is consistent with the wetland depositional environment postulated by E. Taylor. The $d^{13}C$ values, however, are more consistent with deposition from the waters hosted by the Paleozoic rocks deep in the section than with the waters of the Tertiary rocks that underlie the deposit. Speculation regarding the relatively ^{13}C -enriched compositions of this calcite: (1) waters of the Paleozoic aquifer rose through the section (and through the Tertiary aquifer as well) and flowed on the surface; this is unlikely and apparently inconsistent with Sr isotopic compositions of the site 199 calcite (Z. Peterman and B. Marshall); (2) the wetland plant community imparted carbon to the system that was ^{13}C -enriched with respect to the surrounding dryland plants (this is pure speculation that J. Whelan needs to research more thoroughly); (3) the waters of Crater Flat have interacted extensively with the Paleozoic marine carbonate colluvium that is a major component of the valley fill.

R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 22 samples of vein and pedogenic calcrete from trenches CFS-E, CF-1, CF-2, and 8. These ranged from -3.7 to -6.3‰ and from 19.3 to 23.0‰, respectively, consistent with precipitation in the near surface via soil dominated processes and similar to the values already reported from trench 14.

R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 3 samples of Cenozoic limestone from the Tonopah RR locale in Ash Meadows (-0.7 to -1.1‰ and 15.7 to 17.5‰, resp.). The $d^{13}C$ values, as at site 199, suggest input of Paleozoic carbonate carbon with similar caveats. The $d^{18}O$ values are similar to present day spring carbonates but the possibility of considerably different water $d^{18}O$ values in these lakes/springs/marshes cannot be discounted.

J. Paces continued dating pedogenic carbonates from Site 106, with some difficulty. The second set of residues from HD-151-03, HD-156-02, and HD-157-02 are similar to earlier results from both leaches and residues and do not permit regression of isochrons. This may be related to high-temperature calcining (approximately 900 degrees C) which may homogenize U/Th compositions between the carbonate and residue fractions. An additional experiment will be attempted on un-fired material to see whether unique compositions for each of the two components can be extracted.

3GQH809A Analyze samples trench 14 original exposure

R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 3 trench 14 vein calcites (-4.5 to -6.3‰ and 19.5 to 20.3‰, resp.) and 5 samples of the slope parallel calcrete exposed at the base of the south wall of trench 14 (-5.3 to -5.9‰ and 19.6 to 20.9‰, resp.). All values fall within already existing ranges of data from the trench.

J. Whelan spent a day in the field at Exile Hill and Busted Butte with J. Whitney and C. Menges and two soil physicists (M. Nash and W. Guertal). Future detailed sampling, based on detailed mapping of trench exposures and sandblasted outcrops at these locales, promises to provide some tightly constrained data concerning time/space variations in the isotopic compositions of these calcretes.

S. Mahan finished compiling the Sr document in support of the Trench 14 closure package. The document will be transmitted to J. Stuckless after final review by Z. Peterman.

3GQH809A Analyze samples trench 14 original exposure (CONTINUED)

J. Paces completed chemistry for 7 remaining residues from surface carbonate samples. Leaches have been analyzed by D. Muhs, and results from residue fractions should allow calculation of corrected ages for contaminant Th. All samples are currently counting on alpha spectrometer.

3GQH813A Evaluate total carbonate system-Yucca Mountain area

R. Moscati described and sampled secondary calcite from fracture-coatings or veins from 15 drill core samples from UE25 RF-9.

R. Moscati sampled and purified a second opal sample from HD-356 to replace one sent to Arizona State University for $d^{18}O$ determination.

R. Moscati determined the proper exposure conditions and light setup for photography of calcite and opal fluorescence in both long-wave and short-wave UV.

K. Futa selected and, with the help of B. Widmann, prepared G-1 and G-3 drill-core tuff samples for Sr and Nd analysis. Samples were selected to represent host rock in close spatial proximity to cross-cutting carbonate veins. XRF data on whole-rock powders and the residues after 1.0N HCl leaching indicated from 2 to 10 % acid-soluble material in the most-likely form of Ca carbonate. Sr isotopic compositions were analyzed for both whole-rock and leachate aliquots, and then compared to vein carbonate Sr compositions to determine whether Sr incorporated in veins had a local or exotic origin. Vein carbonates above the water table have $^{87}Sr/^{86}Sr$ ratios substantially lower than the host tuffs, but this difference disappears at greater depths below the water table where the $^{87}Sr/^{86}Sr$ of tuffs becomes progressively lower. The leachates from tuffs above the water table have Sr isotopic ratios that fall between the tuff and vein values, but are much closer to ratios in the veins. Since tuffs and vein carbonates, well below the water table have indistinguishable Sr isotopic compositions, it is not surprising that leachates from these tuffs also have similar Sr isotopic compositions.

3GQH801A Hiring and training of geologists

R. Moscati received training in petrographic description and sampling of secondary mineralization from drill core, pedogenic, and spring deposited samples.

3GHQ806A Analyze isotopes/fossils-deps known origin

R. Moscati determined the $d^{13}C$ (-2.5‰) and $d^{18}O$ (15.4‰) of a sample from Nevares spring deposits in Death Valley; these values are entirely consistent with published values from other spring locales.

3GQH802A Install/calibrate new mass spectrometers

J. Whelan spent about three days receiving training in the operation of the automated carbonate extraction equipment and the new Finnigan mass spectrometer operating software.

Quality Assurance

Planning and Operations

Variances

3GQH802A Install/calibrate new mass spectrometers

Installation of the new Finnigan MAT 252, retooling of the existing MAT 251, and installation of automated extraction instrumentation for stable isotope studies continued to be plagued with problems. The MAT 252 is still in Germany for repairs and failure of electronic components caused delays in the retooling of the MAT 251 and installation of the automated carbonate extraction instrumentation.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Whelan continued preparation of four TDIFs for publication of the CASY paper "Stable isotope geochemistry of fault- and fracture-hosted calcite and ground-water carbonate, Yucca Mountain area".

J. Whelan completed 2 reading assignments and R. Moscati completed 12 reading assignments.

R. Moscati completed training in YMP-QA and in "How to be audited".

J. Whelan constructed a Filemaker Pro stable isotope data base for the Macintosh that simplifies data entry, sorting and retrieval. This database will also run on PCs when the new version of Filemaker becomes available.

J. Whelan attended the July SOC meeting at the SMF.

J. Whelan was on annual leave for 8 days.

B. Marshall prepared a poster presentation entitled "Isotopic studies of fracture coatings at Yucca Mountain, Nevada, USA". The paper was presented at an international scientific conference entitled Water-Rock Interaction-7, in Park City, Utah.

WBS 1.2.3.6.2.2.2 Future Regional Hydrology due to Climate Changes

Principal Investigator - J. Downey

OBJECTIVE

To characterize the impacts of potential future climate changes on the regional and site surface-water system, the site unsaturated zone hydrology, and the regional and site saturated zone hydrology. (SCP Study 8.3.1.5.2.2)

SCP 8.3.1.5.2.2.1 Analysis of future surface hydrology due to climate changes 0G3622F2

Summary Account Manager - D. Grasso

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFH202A Evaluate surface-water models - arid environment

Surface water models, supported by the USGS, are being evaluated for use in this study. The evaluation will determine how applicable each of these models is for use in the arid environment, and how effectively they can predict (model) large-magnitude (flash flood) precipitation-runoff conditions that are common in the Yucca Mountain area. The evaluation will consider a model's (1) overall ability to duplicate measured (known) precipitation-runoff conditions in the arid environment of Yucca Mountain, (2) required input parameters, (3) level of authenticity in terms of output results, (4) ease of calibration, modification, and use, and (4) miscellaneous criteria, including computer platforms, peripheral hardware, and software supported; and the availability of adequate documentation, technical support, and needed data sets.

Quality Assurance

Planning and Operations

3GFH100A DOE approval of study plan

S. Keller, SAIC, investigated the unusual delay in DOE approval of the study plan for this activity. Apparently, some of the reviewers did not receive, or lost, their review copies. In any event, Keller noted that DOE verification "should be very close to being complete."

Variations

3GFH100A DOE approval of study plan

Short-term impact. Apparently, some of the reviewers did not receive, or lost, their review copies. Keller noted that DOE verification "should be very close to being complete." To date, DOE has not notified us as to the status of this activity.

3GFH206A NRC review of study plan

Short-term impact. The start of this activity was delayed by the delayed completion of activity 3GFH100A. This activity will not start until DOE verification and approval (activity 3GFH100A) is complete. NRC then will have 90 days to review the study plan.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 52 hours were spent in support of the following tasks:

D. Grasso attended a HIP Project Review meeting with L. Hayes and D. Appel to discuss progress and delays with Yucca Mountain SCP activities. (12 hours)

D. Grasso investigated the availability of digital data sets needed for this activity. While many of the smaller-scale (e.g., 1:100,000 and 1:250,000) data sets are readily available, higher-resolution data (e.g., 1:24,000) are not. These data will therefore have to be developed from source materials before such large-scale, surface-water modeling of Yucca Mountain can be conducted.

D. Grasso prepared field equipment, maps, satellite images, and other research materials, and was an active participant in a regional paleoflood field trip of the Lower Amargosa River system. The trip included an evaluation of the late-Quaternary geomorphology, sedimentary stratigraphy, and drainage patterns of the Amargosa River and its tributaries. Procedures for modeling the magnitude and frequency of mid-Holocene streamflow were evaluated during a group discussion with Y. Enzel, author and paleoflood investigator of "Holocene streamflow events of the adjacent Mojave River and Silver Lake system". These modeling procedures are very relevant to work in the Lower Amargosa River, and additionally would allow correlations to be made between large-magnitude, historic streamflow and precipitation events.

SCP 8.3.1.5.2.2.3 Synthesis of effects of possible future recharge due to climate changes on hydrologic characteristics of the Yucca Mountain saturated zone 0G3622G2

Summary Account Manager - J. Downey

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFH003C Conduct literature search for GIS and future/Quaternary ground water

C. Faunt continued literature search and reviewed reports on directional statistics, UNIX programming, and SQL.

J. Downey continued literature review on regional ground water flow systems and arid land hydrology. Met with K. Kolm concerning approach for model calculation of ET in ground water flow models.

F. D'Agnese continued literature search and review including: Rantz and Eakin (1971), and Anderson and Woessner (1992).

3GFH023C Develop recharge/discharge estimates

F. D'Agnese continued reformatting precipitation data in CPS-3 and began building precipitation grid in ERMA.

F. D'Agnese met with J. Hevesi in Mercury to discuss use of future climate's digital elevation model for precipitation modeling of regional area.

F. D'Agnese contacted K. Paris (SCS) to acquire soils survey data for state of California. (Since SCS is behind schedule on data base development of soil survey data, recharge and discharge calculations are delayed.)

Two TM data tapes have still not arrived from Federally owned landsat data (FOLD) library.

Preliminary vegetation study began (using ERMA) with spectral analyses, using normalized difference indices, transformed vegetation indices, and perpendicular vegetation indices.

J. Downey met with F. D'Agnese several times to develop methods of calculating recharge and ET losses for the regional 3-D model. The data sets required and their processing were discussed in depth.

K. Turner and C. Faunt continued work on vegetation analysis in the Amargosa which is being conducted in conjunction with past discharge (to complete work begun by L. DeMarco). Turner reviewed and checked for accuracy the original DeMarco data sets, which were then updated and corrected with field check observations taken in April. Manuscript was developed in rough draft form:- appendices, tables, and illustrations were developed. GIS methods were used to develop initial vegetation maps.

3GFH021C Construct 3-D hydrogeologic framework model

C. Faunt continued correlating faults on 2D cross-sections so that correct attribution may be assigned in the computer.

C. Faunt analyzed the effects of calderas on faulting and stress fields.

3GFH005C Analyze hydrogeologic framework

The paper on structural analysis is completed. Final maps and figures are being prepared. A rough draft is being reviewed by F. D'Agnese, E. Gutentag, and A. Turner.

3GFH005C Analyze hydrogeologic framework (CONTINUED)

C. Faunt examined gridded data of least principal stresses that were made to show the distribution of stresses with and without the influence of structural zones.

C. Faunt reformatted some of the fault strike data so that it could be analyzed more easily. The arcs now can be plotted with colors representing strike for a quality control exercise.

A. Turner advised C. Faunt on selection of statistical methods to analyze the fault strike data. Reference materials were ordered by the library.

3GFH030C Construct schema for GSIS

C. Faunt and D. Perfect continued compiling a water chemistry information concerning the regional area from existing USGS files and reports.

K. Malmgren continued entering data into database. C. Faunt also worked with Watson on transferring township/range data to latitudes/longitudes.

F. D'Agnese continued terrain analysis for surface characterization (recharge, discharge, geomorphic, pedogenic, and hydrologic analysis).

F. D'Agnese worked with B. Meier (Intergraph) to develop a 2.5 dimensional terrain model of the study area to be used in visualization of the 3-dimensional model.

A. Turner and F. D'Agnese contacted M. Pearson (Intergraph) to arrange for visit from B. Wales.

F. D'Agnese contacted D. Mullen, T. Ripley, and T. Fisher (Radian) concerning data formatting problems in CPS-3.

3GFH006C Develop flow path hypotheses

Potential flow paths, based on current work by C. Faunt, and several reports including K. Kolm and J. Downey (in prep) and M. Bedinger and others (1989), were drawn as an overlay to the study area hydrogeologic map. These flow paths vectors are being examined for inconsistencies with geology.

Pahrump Valley, Oasis Valley, and parts of the Amargosa Valley have been targeted for flow path modelling based on results from structural analyses.

3GFH026C Software QA documentation

J. Downey, C. Faunt, and F. D'Agnese attended modeling QA meeting in July.

3GFH027C Establish data transfer procedures

C. Faunt, F. D'Agnese, A. Turner, and J. Downey completed drafts of three open-file reports of GSIS data sets. The reports are undergoing final reviews and edits.

Quality Assurance

Planning and Operations

3GFH005C Analyze hydrogeologic framework

B. Wales (Intergraph Corp) sent a preliminary version of his software used to automate the process of "attributing" cross-section units.

Variations

3GFH021C Construct 3-D hydrogeologic framework model

This activity was not completed during the month of July, but is delayed because of the loss of project personnel and the extended period of time required by Intergraph to develop a user defined software code.

3GFH005C Analyze hydrologic framework

This activity was not completed during the month of July because investigators were diverted to other project tasks, and the loss of one investigator has seriously delayed project time schedules.

3GFH022C Modify 3-D hydrologic framework

This activity was not started during the month of July and will not begin until completion of 3GFH021C.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 120 hours were spent in support of the following tasks:

C. Faunt was on annual and sick leave approximately 60 hrs.

C. Faunt attended pump test in Crater Flat and conducted water sampling in Alkali Flat (Franklin Playa) with E. Gutentag (for past discharge and isotope geochemistry). (24 hrs)

1.2.5 REGULATORY AND INSTITUTIONAL

OBJECTIVE

To support the Department of Energy (DOE)/HQ in the development of the site-related aspects of compliance with Nuclear Regulatory commission agreements, requirements, and policies, environmental and permitting requirements, and related DOE orders, and the development of site-related regulatory documentation; to plan and conduct environmental field investigations and transportation studies related to environmental compliance, permitting and repository design; to plan and conduct socioeconomics studies to assess the regional socioeconomic action studies; to coordinate Project activities with the community and state and local governments; and to plan and implement a public communication plan.

WBS 1.2.5.1 Management and Integration

Principal Investigator - L. Hayes

OBJECTIVE

To manage and integrate the activities that support DOE/HQ that are performed within the regulatory and institutional WBS Elements.

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.5.2 Licensing

OBJECTIVE

To support DOE by providing Project coordination and support of NRC interactions by providing input related to site aspects of proposed NRC regulation changes, and evaluate the impact of the regulation changes on the site activities, strategies, and plans; to support DOE/HQ in the development of site technical position papers by synthesizing site and site performance assessment technical information into Project positions; to develop draft position papers which support these positions; to perform technical evaluation of site data and related reports, technical reports, and conclusions, and draft position papers; to coordinate study plan review; to support the preparation of the semi-annual progress report for site investigations and assessments; and to coordinate and perform technical reviews of the site characterization program.

WBS 1.2.5.2.1 NRC Interaction Support

Principal Investigator - L. Hayes

OBJECTIVE

To support DOE interactions on the site program with NRC by providing information, coordination, and support within the Project.

ACTIVITIES AND ACCOMPLISHMENTS

D. Keefer met with NRC and DOE in Maryland concerning changes in the study plan process.

D. Gillies attended the NWTRB full board meeting in Denver on July 7. Of particular interest was a presentation by C. Gertz on the June 29 Little Skull Mountain earthquake. Hydrology program technical staff provided input on saturated-zone water-level and fluid-pressure responses to the earthquake for this presentation.

WBS 1.2.5.2.5 Study Plan Coordination

Principal Investigator - L. Hayes

OBJECTIVE

To coordinate the preparation review and revision of SCP Study Plans.

ACTIVITIES AND ACCOMPLISHMENTS

D. Grasso talked with S. Keller regarding the status of study plan review, verification, and approval by DOE and NRC. At this point, there doesn't seem to be anything that can be done to speed the process.

Study Plan 8.3.1.17.4.4 (Quaternary faulting proximal to the site area within northeast-trending faults) - Revisions were incorporated into the schedule in response to PI review.

YMP-USGS SP 8.3.1.2.3.3 (Site saturated-zone hydrologic system synthesis and modeling) - Author/reviewer concurrences were reached for all DOE review comments, and the document was recompiled for final proofing by the PI and T. Brady. The study plan will be transmitted to the YMPO in early August for verification.

WBS 1.2.5.4 Environment

OBJECTIVE

To identify data requirements; to collect required environmental field data; and to prepare topical data reports.

WBS 1.2.5.4.8 Water Resources

Principal Investigator - R. La Camera

OBJECTIVE

To provide water resources environmental field activity planning documents, field data and analyses, and topical reports describing the results of field data analyses.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWR0001 Ground-water level/spring flow monitoring FY92

Ground-water levels were measured at twenty-five sites. Water-level data were checked and filed, and data entry into computerized USGS databases continued.

3GWR007 Ground water monitoring report third quarter FY92

Water-level and discharge data collected during the third quarter were reviewed and compiled, and report preparation began. Data were requested from U.S. Fish and Wildlife Service and Site Characterization Program for inclusion in the report.

3GWR010 Aquifer pump test JF-3

Checking and entering of data into computerized USGS databases were completed and review of the data began. The data include continuous water-level, periodic water-level, pump discharge, and water-quality data collected at wells J-12 and JF-3 before, during, and after drilling and pumping of well JF-3.

3GWR012 Instrument tracer well

Material for the instrument shelter was purchased. The datalogger, transducer, and barometer were installed in the calibration lab and bench tested. SAIC was contacted to obtain appropriate permits which will allow installation of the instrumentation at the tracer well (AD-7) site.

3GWR014 Capital equipment procurement

Following a reprogramming of items to be procured in FY92 and FY93, all components of a hoist system (cable, reel, and truck crane) were requisitioned. Remaining components of the data acquisition system (personal computer and printer) were approved and an order submitted to the vendor. A memorandum requesting a carryover of \$5,000 unused capital equipment funds to FY93 due to the reprogramming of items is being prepared.

3GWR016 Water-quality network revision

Preliminary evaluations of data on ground-water quality collected to date (with respect to constituent concentrations, variability of parameters, and areal coverage) have continued. Documentation of the network, and any revisions, will be based on such analyses and was not warranted at this time. No revisions are anticipated for this fiscal year and this activity is considered complete.

Technical Activities (CONTINUED)

3GWR017 Water-level monitoring network revision

DOE/YMP met with DOE Weapons Program to discuss concerns regarding MV-1 (Army well #1) pumping and water-level monitoring. No revisions to the network are warranted at this time and this activity is considered complete.

3GWR018 Consult on revision to EFAP

USGS consultation will begin upon initiation of revisions by SAIC, and was not required at this time.

3GWR019 Compile regional water resources data

Publications and USGS databases were searched for data for network monitoring sites. Some of the data were included in the quarterly ground-water monitoring reports. Additional data for monitoring network sites that are found in publications or received from other sources are checked, reviewed, and entered into USGS databases when appropriate.

3GWR020 Compile water-use data FY91

Data was obtained from the Nevada State Engineer's office for the Amargosa Desert area for the calendar year 1991.

Quality Assurance

Planning and Operations

3GWR0001 Ground-water level/spring flow monitoring FY92

Measured ground-water levels and springflow at all accessible sites in the monitoring network, and checked and filed the data collected.

3GWR004A Groundwater quality data collection

Collected water quality samples at selected sites, measured field parameters and sent samples to USGS water quality lab for analysis.

3GWR007 Ground water monitoring report third quarter FY92

Will submit report to DOE by August 15, 1992.

3GWR010 Aquifer pump test JF-3

Continued review of data in computerized database.

3GWR012 Instrument tracer well

Continued to test instruments. Will submit required information for appropriate permit to SAIC.

3GWR019 Compile regional water resources data

Continued to compile data from publications and other sources. Entered data into USGS computerized databases. Prepared data for inclusion in annual report.

3GWR020 Compile water-use data FY91

Compiled, reviewed, and filed available data.

Variances

3GWR0001 Ground-water level/spring flow monitoring FY92

Water-level data were not collected at MV-1, AD-6, or AD-11. MV-1 was not measured because it does not have an access tube to allow water-level measurements. The access problems at MV-1 have been discussed previously with DOE/YMP and alternative corrective actions presented. Water-level data was not collected at AD-6 at the owner's request, because it is temporarily the owner's only production well, and the owner fears a water level measurement may affect the operation of the well. Nearby well AD-5, is being measured to provide for monitoring in the area. AD-11 was not measured due to a piston pump being installed in the well, which prohibits a water level measurement. The piston pump in AD-11 is scheduled to be removed and water-level measurements will resume in August.

3GWR010 Aquifer pump test JF-3

Entry of electronically collected data into a computerized database was delayed by modifications required to permit proper identification of data sets. Modifications and review of the data have been started. Delay in reviewing the data will not impact other monitoring activities.

3GWR014 Capital equipment procurement

Procurement of mobile water quality lab will not be possible until FY93. Alternative vehicles will be used in the interim and the delay will not impact water-quality data collection. A reprogramming of capital equipment to be procured in FY92 was initiated and related equipment has been requisitioned.

Work Performed but not in Direct Support of the Scheduled Tasks

Project Chief attended a meeting with National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service and DOE/YMP to discuss concerns about Devils Hole and Ash Meadows.

Staff attended the project review with HIP in Denver.

Staff attended a meeting at UNLV lab to discuss it's use for water-quality analysis.

Staff attended a meeting with YMP environmental monitoring project managers to discuss presentation of project activities and costs to YMPO.

1.2.9 PROJECT MANAGEMENT

OBJECTIVE

To provide overall management of the Yucca Mountain Project including: project control, quality assurance, technical integration, and interaction with other OCRWM Program demands on Project management activities.

WBS 1.2.9.1 Management and Integration

OBJECTIVE

To provide overall management of the Yucca Mountain Project including: technical integration and interaction with other OCRWM Program elements.

WBS 1.2.9.1.4 Records Management

Principal Investigator - L. Hayes

OBJECTIVE

To provide a Yucca Mountain Project Records Management System that will meet the requirements of: DOE-NNWSI, Quality Assurance Plan, DOE-NNWSI/88-9; DOE-OCRWM Records Management Policies and Requirements, DOE/RW-0194; and the Licensing Support System (LSS); and to establish and operate all local records centers.

ACTIVITIES AND ACCOMPLISHMENTS

Final instruction for the Records Inventory and Distribution Schedule (RIDS) was provided to the USGS by the YMPO July 23, 1992. All records held by YMP-USGS personnel are to be inventoried and the information provided to DOE-OCRWM by September 15, 1992. The inventory forms have been developed and a data base created. Several work groups have been inventoried and that information input into the data base.

QMP-6.01, Document Control, was revised and the draft prepared for management review.

An IRM workshop in Las Vegas was attended, which provided an opportunity to integrate the computer support personnel with the records management personnel. Detailed requirements of the RIDS inventory was provided.

Procurement packages for NCR-91-25 were processed by the Procurement Department and are ready for QA review and subsequent submittal to the LRC and audit verification. Procurement packages for FY92 will be submitted to the LRC when the earlier years' packages are complete. FY93 packages should be submitted according to the proper schedule.

The YM-CAR-92-030 regarding document control was closed during the DOE Audit YMP-92-20. The handling of confidential records was audited and no deficiencies were identified. A modification to QMP-17.03 was issued for clarification. Discussions regarding the proper handling of data before they become a record and at what point they become a record, have resolved several issues and identified others which will be researched and resolved in the near future.

Twenty-four criteria related record packages and 211 stand alone documents were received into the LRC and date stamped.

Seven criteria related packages were transmitted to the Central Records Facility (CRF) consisting of 624 records and 91 individual packages containing 1,661 pages.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

The following Technical Procedures were distributed:

GPP-01, R2	Gravity Methods (The first two pages only of this procedure were distributed due to a problem found in the printing.)
GPP-11, R0	Magnetic Methods
HP-236T, R0	Installation and Operation of PVC Straddle Packer String in UZ Boreholes for Gas and Water Vapor Sampling
USBR-GPP-01, R0	Electrical Resistivity Measurements Using the ABEM Terrameter SAS System

Numerous routine document control activities were performed, including issuing procedures to new copy holders; distributing replacement documents; sending out follow-up DTN's; sending information copies to various agencies/persons; contacting YMP Document Control, Las Vegas, about YMP-USGS participants concerns/problems with YMP controlled documents; and transmitting DTN record packages to the LRC.

WBS 1.2.9.1.5 Training

Principal Investigator - L. Hayes

ACTIVITIES AND ACCOMPLISHMENTS

Various routine training functions were performed including distributing individual reading assignments; scheduling DOE General Employee Training (GET); administering GET Refresher Exam for Denver participants; providing information regarding the status of participants' instruction assignment completions; distributing first reminder notices to participants with overdue reading assignments and second and third reminder notices to their appropriate managers; and processing USBR training records.

A reading assignment was distributed for HP-236T, R0, Installation and Operation of PVC Straddle Packer String in Unsaturated Zone Boreholes for Gas and Water Vapor Sampling.

Reading assignments with an accompanying highlight sheet were distributed for the following procedures:

AP-6.3Q, R1	Procedure for Requesting Samples for Examination at Yucca Mountain Site Characterization Project Sample Management Facility
AP-6.4Q, R2	Submission and Documentation of Non-Borehole Samples to the Sample Management Facility
AP-6.26Q, R0	Procedure for the Submittal, Review, and Approval of Requests for YMP Geologic Specimens

Two YMP-USGS Orientation sessions were provided in Denver. YMP-USGS Orientation Parts I, III, and IV were video taped (Part II previously completed) and subsequently supplied with accompanying handout materials to the University of Nevada, Reno participants. Arranged for the YMP-USGS Records Coordinator to provide YMP-USGS Orientation at the Nevada Test Site on July 20, 1992. General Employee Training (GET) sessions were coordinated at Menlo Park on July 14, 1992 and at the University of Nevada Reno on July 20, 1992. Video viewing assignments were distributed for QMP-3.15 (Application of Graded Quality Assurance).

Participated in DOE Surveillance 92-019 and subsequently provided additional information as requested by the auditor. Also participated in DOE Audit YMP-92-20.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

Coordinated the assembly and distribution of "User's Guide for the USGS Yucca Mountain Branch Nevada Test Site" to appropriate personnel.

WBS 1.2.9.2 Project Control Principal Investigator - L. Hayes

OBJECTIVE

To provide Project management support in the areas of cost and schedule planning and control; to develop and maintain an integrated project management system; to implement performance measurement; to support the change control system; and to establish WBS.

ACTIVITIES AND ACCOMPLISHMENTS

Summary account budgets used in the Mission 2001 planning exercise were verified. Corrections were made as necessary and the budgets in the workstation now support the Mission 2001 budget targets.

June schedule status and actual cost data were entered and transmitted to PACS in Las Vegas via the work station. Approximately 360 bar charts showing the baseline plan versus the current plan were plotted and distributed to the PIs. A variance report showing the difference in days between the two plans was also provided.

About 200 time-scaled logic networks were generated and distributed to the PIs. The diagrams reflected the final plan associated with the Mission 2001 exercise. Special runs of the network (about 300 plots) were also provided to the M&O contractor. The network was used to help the M&O develop a project summary schedule (PSS) layout for summarizing the network activities to major activities and milestones in the PSS.

Twenty plots summarizing status information were generated for a GSP Manager. This information was used in variance discussions with the DOE WBS Managers and M&O personnel.

A cost and schedule analysis was prepared for the USGS Technical Program Officer (TPO) for FY92 through May. The analysis used performance data only and included (1) a manual roll up of data from the summary account level to the third level PWBS element, (2) a narrative analysis which addressed the overall USGS effort, (3) a CPR showing the status of the 10 P&S accounts having the most significant variances, (3) a narrative analyses addressing the status of the 10 P&S accounts, and (4) a P&S account package for each of the variant accounts. Each package included a P&S summary schedule, summary account schedule, and milestone status. Approximately 120 plots were generated for the analysis meetings.

During July, several open ends were closed within the network; interface connections with other participants were established. Special reports were generated for the Technical Data Management Specialist and the Project. Worker Data Forms for the second quarter of 1992, with projections for the third and fourth quarters, were submitted to the DOE Project Office.

Within the support group, a change from the C DOS network to a Novell network was made to provide more flexibility using the workstation. Two staff persons from the project control group attended a training course in Las Vegas on using the Primavera 5.0 version.

WBS 1.2.9.3 Quality Assurance

OBJECTIVE

To establish and implement a Yucca Mountain quality assurance program.

WBS 1.2.9.3.1 Quality Assurance Program Development

Principal Investigator - T. Chaney

OBJECTIVE

To establish and maintain the QA program descriptions.

ACTIVITIES AND ACCOMPLISHMENTS

The following Quality Management Procedures (QMPs) were drafted or changed as requested and returned to their respective authors:

QMP-3.04, R4 Technical Review, Approval, and Distribution of YMP-USGS Publications
QMP-6.01, R6 Document Control

The following draft QMPs were sent for review.

QMP-4.01, R4 Procurement Document Control
QMP-5.01, R5 Preparation of Technical Procedures
QMP-7.01, R5 Control of Purchased Items and Services
QMP-7.04, R0 Vendor Evaluation

WBS 1.2.9.3.2 Quality Assurance - Audits and Surveillances

Principal Investigator - T. Chaney

OBJECTIVE

To verify the QA program through periodic audits and surveillances of Project activities.

ACTIVITIES AND ACCOMPLISHMENTS

Responses to audit finding and observation responses from Audits USGS-92-03 and USGS-92-04 were evaluated. Audit observation USGS-9204-OBS1 was closed.

Planning and preparation for upcoming audits and surveillances were conducted. These included planning for an audit of SCP activity 8.3.1.5.2.1.4b (Audit USGS-92-07), an audit of the Branch of Geologic Risk Assessment (Audit USGS-92-08), and a field surveillance of trench work in Midway Valley being performed by a vendor, Geomatrix (Surveillance 92-S12).

The annual requalification audit of the USBR was conducted, resulting in approximately ten AFRs and the temporary stopping of all USBR technical work. A draft audit report was written.

Surveillance report 92-S11, Certified Balance Service, Inc. was prepared and submitted, recommending retention on the YMP-USGS AVL.

Vendor evaluations of Eppley and Radiation and Energy Balance Systems, Inc. were completed and reports were written. Both vendors were retained on the AVL.

Vendor evaluations 92-E21, Storage Technology Corp. and 92-E23, Intertyme Metrology Corp. were prepared and submitted recommending retention of both vendors on the AVL.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

Nonconformance reports USGS-NCR-92-34 and -35 were initiated regarding Scott Specialty Gases' certification of gas mixtures and HIP's procurement activities with Scott.

WBS 1.2.9.3.3 Quality Assurance - Quality Engineering

Principal Investigator - L. Hayes

OBJECTIVE

To provide quality engineering support to the project through reviews of documentation and assistance with QA training.

ACTIVITIES AND ACCOMPLISHMENTS

The Open Items Committee met once during July to discuss various open items relating to NQA-1/1989 Criterion 4, 7, 8, and 12. These open items were anticipated to be covered by DOE during Audit YMOAD 92-20. The committee also discussed the status of various open items and agreed upon a schedule for submitting the final input for the July trend analysis report. The following open items were addressed during the month.

External Item(s): DOE/YMPO CARs YM-91-74 through YM-91-76 (software requirements), YM-92-028 (instrument traceability), YM-92-029 (records packaging), YM-92-030 (document control); and SDR-018 (calibration).

Internal Item(s): AUDITS: 9110-02 (YMP-USGS qualification records), and 9203-04 (TDIF submittals per PACS schedules); CARS: 91-01 (graded QA transition), 91-03 (unapproved vendors), 91-05 (procurement records), 91-07 (misinterpretation of QMP requirements), 91-09 (misinterpretation of software requirements), 91-10 (misinterpretation of exemptions from procurement QA requirements), 91-11 (scoping activities without documented authorization), 92-03 (management agreements), 92-04 (work authorization for SCP Activity 8.3.1.2.2.6.1), 92-05 (problems with manuscript processing), 92-06 (technical procedure requirements), 92-07 (USBR QA program problems), 92-08 (AP-5.1Q data submittals to LRC/CRF), and 92-09 (seismic monitoring activities for 6/29 earthquake); NCRs: 90-37 (calibration standards), 91-25 and 91-26 (procurement records), 91-31 (QA Balance calibrations), 92-02 (SGBSN management agreement), 92-06 (seismic publications), 92-08 (report processing), 92-13 and 92-14 (report processing), 92-19 (change requests), 92-26 (LBL activities), and 92-30, -31 and -32 (report processing problems).

Other miscellaneous actions involved monitoring the status of open and/or overdue training assignments, coordinating response and/or actions for DOE YMPO-issued Affected Document Notices, and statusing various GSP technical activities and TPO action items.

A mid-course review of Branch of Geologic Risk Assessment activities for the GD-WRD MOA concerning transition efforts for the SGBSN was accomplished.

The YMPB data coordinator was assisted in resolving data submittal/ schedule issues identified by AFR 9203-04 and CAR-92-08.

Approximately 30 software documents have been received, reviewed, and/or processed by the software configuration management (SCM) coordinator in accordance with QMP-3.03, R3. The configuration status log has been updated and technical contacts have been notified of status of their software documents.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

The configuration status log quarterly update has been provided in accordance with QMP-3.03, R3 for the quarter ending June 30, 1992.

The format of the software configuration management status report has been updated to reflect changes in QMP-3.03. A copy of this report for HIP and GSP have been provided as requested by the software quality assurance (SQA) specialist.

Corrective action for USGS CAR-91-09 has continued. These actions include tracking and follow up for 250+ software classification and control recommendations. A supplemental response was provided to update the status of corrective action associated with this CAR.

The SQA specialist was assisted in providing input to the YMP software advisory group regarding Supplement I of the draft Quality Assurance Requirements Document (QARD).

WBS 1.2.9.3.4 Quality Assurance - Quality Overview

Principal Investigator - T. Chaney

OBJECTIVE

To provide reviews, analysis, and interpretations of QA requirements and application of QA to technical and scientific disciplines.

ACTIVITIES AND ACCOMPLISHMENTS

The June open items and trend analysis report was issued. The second quarter 1992 open items and trend analysis report was written.

Missing data was researched and entered into the new open items database, to provide a more comprehensive and accurate open items status report, as well as accommodate the monthly trend analysis report system.