rec'd with letter dtd 10/15/92

Department of the Interior
United States Geological Survey
YUCCA MOUNTAIN PROJECT
Monthly Highlights and Status Report
MAY/JUNE 1992

DISCLAIMER

Quality Assurance checks on data contained in this report have been performed only to determine that the data have been obtained and documented properly. Any information is preliminary and subject to change as further analyses are performed. This report has not been reviewed for conformity with U.S. Geological Survey technical and editorial standards and stratigraphic nomenclature. Company names are for descriptive purposes only and do not constitute endorsement by the U.S. Geological Survey.

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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
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

ACRONYM LIST (Continued)

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
EEI	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

ACRONYM LIST (Continued)

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	Geostatisical 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
GMT	Greenwhich Mean Time
GOCO	government-owned contractor-operated
GOES	Geostatisical 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
ISO	International Standards Organization
ITR	Information Technology Resources
IVV	Independent Verification and Validation
JGR	*Journal of Geologic Research*
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	maim 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

ACRONYM LIST (Continued)

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	*Nuclear Waste News*
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	*Pure and Applied Geophysics*
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
PDCR	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
PTP	Prototype Test Plan
PTS	Petroleum Testing Services

ACRONYM LIST (Continued)

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 Evauation 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
	reference repository location
	Regulatory and Site Evaluation Division
	Raytheon Services Nevada
	request to initiate site activity
	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
The Participant Data Archives (PDA) accepted eight Technical Data Information Forms (TDIFs) during the month of June covering Site Characterization Plan (SCP) Activities 8.3.1.5.2.1.5, 8.3.1.9.2.1.5, 8.3.1.17.4.1.2, and 8.3.1.17.4.5.1.

The second set of backlog data requests was received from Sandia National Laboratories for the Site and Engineering Properties Data Base (SEPDB). This task, involving location of the data, creating TDIFs and connections between the data and the old reports, entering all information into the Automated Technical Data Tracking System (ATDT) along with all Technical Data Base (TDB) update information, should be completed by mid-July.

One data request from outside the Project was filled and transferred. The data requested was for GU-3, WZN-54, and UZN-55 core analyses.

Ongoing changes to the ATDT were accomplished.

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

3GPA006 Test new neutron calibration in 1-D model

The 1-D model results indicate that the preliminary neutron moisture meter calibration is adequate for preliminary modeling purposes. The matrix properties data seem to be the limiting factor for modeling. Although this activity is complete it will be repeated as more data become available.

3GPA002 Develop analytical solution to model imbibition

The improved water characteristic curve developed by Zimmerman at LBL has been sent to the USGS in Mercury. With this information the analytical solution has been completed but future work will be helpful in refining the technique as more data become available (See 3GPA003). The application of the equation and the analytical solution will continue as more data become available.

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

A variably spaced grid is required to achieve convergence in modeling while maintaining a computationally efficient code. Several additional neutron holes will be tested to determine if the various units penetrated during the neutron hole drilling at Yucca Mountain behave similar to USW UZN-55.

3GPA003 Imbibition experiments for input to analytic solution

Imbibition experiments have begun to provide input data for the analytical solution to imbibition. Rock outcrop samples from all of the major units on Yucca Mountain are being used to help determine the range of sorptivities and the variety of analytical results that could be expected.

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 initial tests have been completed and it has been determined that the physical properties were changed by heating in a manner which was expected. The porosity, particle density and sorptivity went up, while the bulk density went down. Although the sorptivity change was permanent, the other properties returned to normal when rewet. Currently, air and water permeabilities are being run to further quantify the effects of heating.

3GVF006 Develop software preliminary analysis thermal conduct heat capacity

The software has been developed to process the data generated from the thermal probe. A standard of known thermal properties is going to be used to test the software before it is used on core data. Once the software has been tested core samples at different saturations will be tested. The heat capacity change is known and can also be used as a test of the software.

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

The technical report is currently in process. A draft has been completed and is being reviewed by the authors to determine if further work is needed to complete the study. The report is being considered for submission to the International High Level Waste Symposium in Las Vegas.

3GVF015 Finalize geostatistical software and text

The user's manual for the software is still being written. The software is also being tested by the USGS in Mercury. Further delays are not expected to delay any other activities.

Quality Assurance

Planning and Operations

Variances

3GVF015 Finalize geostatistical software and text

The Geostatistical text and software are taking longer to process than expected. This delay has no negative impacts on other work but will delay VF15M.

VF15M Document submittal

Due to the delay in completion of the software and text this submittal is being delayed.

3GVF010 Analysis of MTL core data for model input

The MTL has not completed the core analysis at this time, so analysis is not possible.

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

Tests currently are being run to determine the influence of rock fragment size and external humidity conditions on the measurement. Various size fragments of rock samples are measured while the atmospheric moisture content surrounding the CX-2 is varied. Samples have been saturated and crushed so that known water potentials can be used (0 MPa are anticipated; however, it is expected that some sample handling effects may cause a reduced value). A comparison of samples is being carried out by using the CX-2, the SC-10 and peltier psychrometers will help to standardize the results.

3GPC005 Collect additional transect samples

All required transect samples have been collected and are being processed in the laboratory. No additional samples appear to be required at this time, but the option is open if needed. The remainder of the work will be accomplished using the existing samples.

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 - Branch 0G3192B1

Summary Account Manager - L. Ducret

ACTIVITIES AND ACCOMPLISHMENTS

R. Craig attended the YMPB staff meeting in Denver on June 15; the Technical Integration Group on June 4 and 18; the Technical Project Officer's open and closed session on June 12; and the joint meeting of Hydrochemistry and Hydrology Integration groups in Denver on June 9-11.

M&I - Geologic Studies Program 0G3192G1
Summary Account Manager - J. Stuckless

ACTIVITIES AND ACCOMPLISHMENTS

J. Stuckless completed Memoranda of Agreement (MOAs) with the Geologic Division including new isotope work and economic geology; continued work on the start up of GSP, adding B. Parks to the staff; and continued work on Trench 14 issue resolution with H. Moomey (SAIC) and D. Vaniman (LANL).

Most of the effort was dedicated to the Mission 2001 exercise and responding to the ICE team report.

M&I QA Implementation GSP 0G3192G2
Summary Account Manager - J. Stuckless

ACTIVITIES AND ACCOMPLISHMENTS

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

GCP-27, R0	Determination of Temperature and Salinity from Mineral-Hosted Fluid Inclusions
GCP-28, R0	Uranium Isotope Geochemistry
HP-126, R1	Extraction of Residual Water from Tuff Samples by Vacuum Distillation
HP-117, R1	Installation, Examination, and Maintenance of Scour Chains at Streamflow Gaging Sites
HP-179, R2	Field Measurement of Precipitation Using a Tipping Bucket Rain Gage
HP-223, R0	Method for Pore-Water Extraction Using One-Dimensional Compression
HP-229, R1	Determination of Water Content and Physical Properties for Laboratory Rock Samples

The following preliminary draft technical procedures and/or modifications were prepared as first drafts or changed as requested:

HP-54, R1	Water-Flow Measurements Using Weirs, Flumes, and Barrels
HP-100, R1	Stream Discharge Measurement Using a Type-AA Price Current Meter
HP-117, R1	Installation, Examination, and Maintenance of Scour Chains at Streamflow Gaging Sites
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
HP-238T, R0	Injection of a Trace Gas for Determining Atmospheric Contamination in a Dry-Drilled Borehole
HP-240, R0	Method for Analysis of CO_2 Gas Samples by Gas Chromatography Using Summit Interests SIP 1000
HP-241, R0	Air Permeability Testing
HP-244, R0	

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

HP-244, R0 Technical Procedure for Stemming and Instrumenting Unsaturated Zone Hydro Instrumented Boreholes

HP-245, R0 Technical Procedure for Stemming and Instrumenting Unsaturated Zone VSP Boreholes

HP-246, R0 Mapping Fractures on Traverses and Outcrops for Hydrologic Studies

HP-247, R0 Thermistor Calibration Procedure for Pneumatic Testing Section of Unsaturated Zone Borehole Testing Program

The Technical Procedure Status List was updated and forwarded to the YMP-USGS QA Office.

A Quality Assurance Grading Report for the U.S. Bureau of Reclamation (USBR) was submitted to the QA Review Board for review. This grading report was tabled by the QRB. A new page was resubmitted to accommodate the requirements of the Board Chairman concerning identification of the location of the activity.

Continued to coordinate orientation, training, document control, and personnel qualifications for new GSP personnel; to monitor the Test Planning Package and Request for Proposal (RFP) for the seismic reflection line; and to follow up and track overdue Document Transmittal Notices (DTNs) and instruction assignments for the GSP.

Monitored and/or provided input to the following open items: YM-CAR-92-28, YM-CAR-92-29, YM-CAR-92-30, CAR-90-04, 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, and NCR-92-26.

Assisted with actions associated with procurement, calibration, personnel qualifications, software, and technical procedure revision for Activity 8.3.1.4.2.1.2. Revised Test Planning Package TPP-92-03 to include gravity and magnetic surveys. Numerous TDIFs were prepared for the GSP.

Participated in YMP-USGS surveillance of Certified Balance Service, Inc. as an observer.

Provided assistance to GSP investigators R. Zartman, J. Whelan, W. Simmonds, and V. Langenhiem; and Geologic Division (GD) personnel C. Bufe and K. Fox in the preparation of acquired and developed data TDIFs in support of their CASY papers to be published in an upcoming Bulletin.

In response to the QA office review, Modification QMP-3.07,R4-M1 was revised and replaced with Modification 2.

Two MOAs between the GD and the Water Resources Division (WRD) were distributed for the Southern Great Basin Seismic Network (SGBSN) and for the Lead Isotope Study of Surface and Subsurface Carbonate and Silicate Systems at Yucca Mountain.

An evaluation of the SGBSN transition plan was prepared and submitted to the Chief, YMPB and the QA Manager, YMP-USGS.

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

Memorandums were prepared to inform GSP personnel and GD seismic personnel of the upcoming July DOE audit. At the request of R. Rogers (M&O), four R1 pages of Study Plan 8.3.1.2.2.1 were prepared and sent to him via overnight mail. W. Wendt (USGS, Menlo Park) was assisted with the processing of his DTNs and reading assignments. Assistance was provided to E. Majer, YMP-LBL, in the orientation and technical procedure training of LBL personnel working in the field to SP-13, R0, VSP and Crosshole Tomographic Surveys.

Coordination efforts continued for completing Affected Document Notices (ADNs). The completed ADNs will be forwarded to the M&O contractor.

M&I - Hydrology Program Management and Administration 0G3192H1

Summary Account Manager - D. Gillies

ACTIVITIES AND ACCOMPLISHMENTS

All 60 USGS and LBL summary-account schedules were statused as of the end of April using schedule-status and progress information provided by each summary-account manager. No status reports were prepared for the month of May because priority was given to the Mission 2001 PACS replanning exercise for FY93/94.

Hydrology program management prepared detailed Mission 2001 guidance for summary-account managers and held a meeting in Denver on May 12 to discuss the exercise and to review M&O changes made in PACS for FY93/94.

New PACS schedules and work-scope descriptions for FY93/94 were prepared for over 50 USGS and LBL hydrology/climate summary accounts in support of the Mission 2001 replanning exercise. Outyear schedules were reviewed and modified for consistency with higher-level schedules for surface-based testing, ESF, and license application.

D. Gillies attended the Project Control Steering Committee meeting in Denver May 29 and made a presentation on the problems associated with the PACS formulas for calculating percent complete, BCWP, and schedule variances. Gillies requested that serious consideration be given to revision of the formulas because, at present, they are so punitive they are nearly useless as management tools.

D. Gillies attended the YMP Project Manager's/TPO/Planning & Budget meetings in Las Vegas on June 12.

D. Gillies gave a presentation on the Yucca Mountain Project to a Denver Kiwanis club on June 17. Slides and handouts for the meeting were provided by the YMP Speaker's Bureau.

M. Chornack and D. Gillies helped coordinate the compilation of data on water-level responses to the two California earthquakes of June 28 and the Little Skull Mountain earthquake of June 29.

M&I QA Implementation, Hydrology 0G3192H2
Summary Account Manager - W. Causseaux

ACTIVITIES AND ACCOMPLISHMENTS

S. Frans of HIP is currently processing 38 hydrologic procedures and scientific notebook plans.

Four approved technical procedure packages were submitted to SAIC by S. Frans.

On June 25, 1992, S. Frans distributed a matrix to all HIP supervisors to update Technical Procedure training needs.

In June, M. Pabst worked on the comment resolution process for HP-54, HP-100, HP-117, HP-166, and HP-219.

M. Pabst assisted the surface based studies staff in preparing a controlled SN for HP-231T, R0. Additionally, Pabst prepared an SN tracking system to examine semi-annual records center submittals for entries in controlled SNs within the UZ section.

W. Rodman and W. Causseaux met to discuss clarification of QA requirements for documentation of selection of technical procedure reviewers.

J. LaMonaca responded to the management reviews of QMP-3.04, R4 and submitted the concurrence draft to the YMP-USGS QA office on June 3, 1992.

J. Woolverton proposed a modification for QMP-5.01, R4, which would allow TP modifications to run with the life of a TP revision. It is similar to the process used with QMP modifications.

W. Causseax met with A. Handy on May 5, 1992 to discuss the current guidelines for Readiness Reviews for Investigators needing to start new work. The outcome of the meeting was a perception that the YMPB does not have in place, clear guidelines for the investigator.

The HIP reviews of the April 28, 1992 concurrence draft of QMP-5.05, R3; the May 4, 1992 concurrence draft of QMP-6.03, R0; and the April 7, 1992 concurrence draft of QMP-16.04, R0, were completed by W. Causseaux.

On June 30, 1992, J. LaMonaca initiated NCRs 92-30, -31, and -32, against three reports authored by UZ personnel, which were published without the proper approvals.

J. Woolverton assisted A. Flint and G. Abend in preparing initial responses for AFR No. USGS-9204-04, AFR No. USGS-9204-05, and Audit USGS-92-04 Observation No. 1.

J. Woolverton worked with J. Ziemba to clarify resolution issues regarding USGS NCR-91-21.

J. Woolverton continued to work to establish a cause and action to prevent recurrence for NCR 92-14.

M. Pabst assisted the UZ hydrochemistry staff in developing a response for NCR 92-25.

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

During a verification attempt by J. Ziemba to close NCR 91-31 on QA balance services, it was determined that one of the two scales in A. Yang's lab, used for quality affecting work, was actually used by the analog recharge study, not UZ hydrochemistry. M. Pabst is coordinating the transfer of disposition responsibility for NCR 91-31 from the UZ section to the SZ section.

The HIP was represented by W. Causseaux at the monthly meetings of the YMPB Open-Items on May 27, 1992 and June 30, 1992.

Forty-seven (47) of the 130 procurement packages cited in NCR 91-25 were reviewed by W. Causseaux on June 24, 1992 as part of the HIP completion process for the NCR.

Action Item No. 1 of CAR 92-029 (Audit YMP 92-13), was completed by J. LaMonaca on May 29, 1992.

M. Pabst and J. Woolverton assisted the UZ PIs in preparing and processing four Management Agreements between HIP and staff members of the WRD NRP, and Geologic Division members.

J. Woolverton continued the processing of the management agreements between UZ hydrochemistry and the GD, Branch Petroleum Geology, and the Stable Isotope Lab. Completion of the MA is required for resolution of AFR 9112-02.

During June 1992, M. Pabst processed D. Thorstenson and R. Healy's MAs through final approval. Additionally, Pabst continued coordination and processing of MAs with Okoren and Winegarden, and with R. Getzen.

The MA between the HIP and the NDO WRD was processed and reviewed during June 1992.

J. Woolverton and M. Pabst coordinated data parameter screen reviews by UZ section Pis. Results of the review were compiled in a report which was submitted to the YMP-USGS data coordinator for inclusion into the YMP data parameter dictionary.

J. Woolverton continued to summarize the DOE data parameter screen reviews for activity 8.3.1.2.2.6.1.

J. Woolverton summarized all existing Level III QALAs for the UZ section in order to provide a basis for each UZ project chief to develop graded QA ACSRs at the sub-activity level.

J. Woolverton attended the question and answer session for implementing QMP-3.15 on May 29, 1992.

M. Pabst and J. Woolverton traveled to Las Vegas and the HRF on May 18-20, 1992. The purpose of the trip was to continue review of data parameter screens with A. Flint, review progress on the resolution of SDR-018, and to discuss proposed responses for Audit USGS-92-04.

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

M. Chornack, M. Pabst, and J. Woolverton met on May 1, 1992, to discuss the status of open items for UZ investigators. Key points of discussion included the resolution of SDR-018, Management Agreements for USGS-CAR-92-03, and data evaluation for activity 8.3.1.2.2.6.1 under USGS-CAR-92-04.

J. Woolverton met with D. Gillies on June 25, 1992, to discuss the application of graded QA and its relationship to PACS used to assess expenditures and deliverables.

M. Pabst worked with J. Ferarese and D. Valega to investigate Scott Specialty Gas Certificates for inclusion of proper documentation as required by YMP-USGS QA requirements.

M. Chornack, E. Weeks, C. Peters, and J. Woolverton met on June 16, 1992, to develop final responses to the State of Nevada's comments on the gaseous phase circulation SP. Input by D. Thorstenson and W. Causseaux was developed and used based on an earlier meeting.

On June 16, 1992, C. Peters, M. Pabst, and J. Woolverton met with D. Porter, A. Handy, T. Chaney, A. Whiteside, M. Mustard and T. Mendez-Vigo, to conduct a graded QA Workshop for the UZ Hydrochemistry study.

J. Woolverton, A. Whiteside, J. Ziemba, P. McKinley, M. Pabst, and M. Mustard met on June 3, 1992, to discuss implementation of AP 5.1Q, and a strategy to resolve AFR 9204-04.

On June 3, 1992, P. McKinley, N. Stuthmann, M. Pabst, B. Kerans, B. Oatfield, and J. Woolverton met to discuss data parameter codes as they are being developed for the DOE and the process to integrate DOE's data parameter codes with the USGS NWIS II system.

On June 2, 1992, D. Appel, W. Causseaux, S. Boucher, and J. Woolverton met to discuss the status of MA's needed for the resolution of CAR 92-03.

W. Causseaux, C. Peters, S. Boucher, M. Pabst, M. Ciesnik, J. Watson and J. Woolverton met on June 2, 1992, to discuss internal plans to implement graded QA activity control specifications reports (ACSRs) within HIP.

Four published GSP publication packages and one HIP publication package were submitted to the LRC by J. LaMonaca in June.

Five HIP abstract packages were submitted to the LRC by J. LaMonaca in June.

W. Causseaux met with D. Porter, A. Handy, and T. Mendez-Vigo, on June 23, 1992 to develop a consistent rationale for the designation of PI for SCP studies and activities.

Computer Operation & Data Management, Hydrology 0G3192H3
Summary Account Manager - C. Washington

ACTIVITIES AND ACCOMPLISHMENTS

NOVELL System

The Local Records Center database was installed on HIP's Novell file server. The preceding was made possible by purchasing, installing and testing Packet Burst NLM to ensure the access speed of the LRC's personnel was adequate.

Assisted ISD Reston in analyzing the structure of the Novell LAN they are installing for the Administration Section in Building 25.

Ordered additional disk drives to handle the increase in user storage requirements.

Parfet Bldg

The Computer Operations Unit (COU) has been assigning one of the staff members to the Parfet Bldg each morning from June 1, 1992 to assist in resolving computer related problems. They are in the Administration Section every morning from 8 - 10 am.

In order for us to increase the speed of the LRC personnel, their PC ethernet cards and memory was upgraded and a memory manager was installed to allow them access to the additional memory.

The upgrade of the LRC benefitted the entire staff of the Parfet Bldg because we were able to decrease the amount of network hardware, thus speeding up access for everyone.

A Data General workstation was setup and installed in the Administration Section.

Unix Systems

The SUN and Data General servers and workstations operating systems were upgraded.

ARC/INFO was upgrade to Rev 6.0 and demonstrated to the GIS group using a X-windows package for the PC. This X-windows package allows access the SUN and DG software packages that requires a X-windows environment. The X-windows package can save us thousands of dollars in DG purchases.

Miscellaneous

The contract for the 386/40MHz computer was awarded June 30, 1992. The delivery date should be around August 15, 1992.

Meetings and/or Conferences

C. Freestone attended the NCTM in Norfolk, Va.

S. Buchanan attended the Novell Systems Administrator class in Denver.

Scientific Reports and Project Documents, Hydrology 0G3192H4
Summary Account Manager - T. Brady

ACTIVITIES AND ACCOMPLISHMENTS

HIP is currently processing 87 YMP-HIP scientific publications, 53 YMP-GSP scientific publications, 8 YMP-LBL scientific publications, and 20 abstracts.

Twenty-one GSP CASY reports received HIP review by T. Brady.

The HIP review of the following reports was completed by T. Brady: "Seismicity and focal mechanisms for the southern Great Basin of Nevada and California in 1991"; "Gravity and magnetic data of Forty Mile Wash, Nevada Test Site, Nevada", by D. Ponce, S. Kohrn, and S. Waddell; "Earthquake induced water-level fluctuations at Yucca Mountain, Nevada"; and "The use of forward- and back-scattered P-, S-and converted waves in cross-borehole imaging", by A. Balch, H. Chang, G. Hofland, K. Ranzinger, and C. Erdemir.

The HIP review of the following abstracts was completed by T. Brady: "Permeability and matrix flowpaths in tuffs from the unsaturated zone at Yucca Mountain, Nevada", by D. Soeder and J. Dishart; "Geologic and geophysical anomalies along a southeast-trending transect through Yucca Mountain", by R. Spengler; "Numerical investigations and physical experiments of flow in unsaturated, fractured rock", by E. Kwicklis, F. Thamir, and R. Healy; and "Fast pathway definition and detection features based drilling program", by J. Rousseau, was completed by T. Brady.

The Project Technical Review of other participant study plan 8.3.1.12.2.1, R1 - Meteorological data collection at the Yucca Mountain site, was performed by D. Ambos and forwarded to the Project Office by J. LaMonaca on June 15, 1992.

W. Causseaux and M. Chornack completed the HIP preparation of the USGS response to 12 comments by the State of Nevada on SP 8.3.1.2.2.6 on May 22, 1992.

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, entry of 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 Local Records Center for storage in their fire proof vault.

The data management unit staff attended the InfoCom conference in Denver on May 6-8. Useful highlights included sessions on Windows, software quality management, relational databases, and computer-system risks and decision analysis.

B. Oatfield, B. Kerans, and N. Stuthmann met with P. McKinley, J. Wolverton, L. Ducret and M. Pabst to discuss the needed flags in the WRD database to handle the various kinds of data in the Yucca Mountain program. A memo was prepared to send to WRD headquarters requesting the addition of an area in the database for such user defined flags. If the flags are not provided in the WRD software, it will be necessary for us to program a shell over the database to provide for the necessary flags.

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

A number of meetings were held to discuss various aspects in entering data into the NWIS. The first was a meeting with the E. Gutantag group to discuss entry of old data collected during the weapons program time. A follow-up meeting was held at the Las Vegas office. A memo will be prepared summarizing the results of these meetings.

N. Stuthmann, B. Kerans, P. McKinley and G. Heitland met to discuss the DOE parameter code list and attempt to coordinate this list with the NWIS constituent list. A meeting was then held in Las Vegas with J. Beckett to discuss the DOE database and to emphasize the need for these lists to match in order to provide passing of the USGS data to DOE.

Two meetings are scheduled in July to promote the eventual move from NWIS-I to NWIS-II. We are attempting to provide a backup position to allow HIP to make the move by the end of fiscal year 1993, regardless of the success or failure of the WRD database at the time. One meeting will be with G. Rogers to discuss his progress in transport the ADAPS code and to join with E. Dryer to provide the necessary information in the satellite transmission of data. The second meeting will be with C. Gerlitz to look at a possible replacement of code to handle the Quality of Water data.

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

During May, K. Futa analyzed samples (of the Topopah Springs Member of the Paintbrush Tuff) spiked with Sr/Rb tracer isotopes from G-4 drill core for Sr initial isotopic ratios in order to substantiate the isotope composition vs. depth variations observed previously in samples from UE-25a. Previously analyzed samples were not spiked and therefore did not have accurate determinations of Sr and Rb concentrations which are needed for calculation of age-corrected initial Sr isotopic compositions.

K. Futa continued to analyze samples from G-4 drill core in June for precise Sr initial isotopic ratio determinations. Data will be used to test the application of high-precision isotope stratigraphy within an otherwise monotonous thickness of tuff representing the potential repository horizon. High Rb concentrations in rhyolitic tuffs require more accurate Rb/Sr determinations than typically obtained by the standard XRF analytical technique in order to make age corrections for initial $^{87}Sr/^{86}Sr$ isotopic compositions. Samples were processed to determine Rb by isotope dilution mass spectrometry, and will be used with previously obtained Sr data to calculate initial Sr isotopic compositions. The more precisely determined initial Sr isotopic ratios will help to alleviate some of the "noise" observed in earlier depth vs. composition profiles.

Installation of the IGG's new Finnigan MAT 262 thermal ionization mass spectrometer was completed and tested. B. Marshall and Z. Peterman reviewed the test results and the machine was accepted on May 8. Marshall, S. Mahan, K. Futa, J. Paces and Peterman received technical training (to varying degrees) from the Finnigan engineer over a week-long period. Marshall and Mahan further tested the instrument by running multiple analyses of the USGS standard EN-1. Results from these tests indicate that spectrometer performance exceeds our highest specifications delivering better than 30 ppm external precision for 13 analyses. Marshall also tested a blank rhenium filament (used for holding and ionizing strontium samples) and found no contaminants which would interfere with Sr analysis, indicating that the new Finnigan filament outgasser also performs adequately.

B. Marshall revised Finnigan MAT run parameters during May for Sr analysis of typical YMP samples and devised standard procedures for Sr analysis, including detailed documentation for other users.

B. Marshall modified the isotope lab database during May to report Sr blanks more appropriately. Procedures for analyzing samples with low Sr contents require that clean laboratory blanks be monitored and reported more carefully.

Technical Activities (Continued)

3GGU002A Geochemical isotopic sampling and analysis, phase 1 (Continued)

B. Marshall wrote software code during June for generic (rather than element-specific) exponential mass discrimination and spike subtraction corrections for isotopic data obtained by solid-source mass spectrometry. This code was written in preparation for implementation on the new Finnigan MAT 262. Code was tested on neodymium, strontium and calcium mass spectrometer data and found to work correctly for all cases sampled. In addition, a new procedure for naming files in the new mass spec was implemented, and a method of accessing previous run data was established.

Marshall also studied the Finnigan MAT 262 operating software in June in order to implement the exponential mass discrimination and spike subtraction corrections for isotopic analyses. These codes will be written soon and tested this summer.

B. Marshall upgraded the YMP Sr database system to a new package capable of operating on a PC platform during June. This also involved purchasing new hardware and software so that the recently acquired PC, which will be devoted to the geochemical and isotopic database, can be networked to the existing computing facilities this fall when software becomes available for Windows operating environment. In addition, a new grid system for south-central Nevada was implemented within the YMP Sr database in order to facilitate locating points on maps and plotting geographic information system (GIS) data.

K. Futa calibrated cation exchange columns for Sr in June in order to check for possible changes in the elution position. Results indicate a slight up-field shift, and columns should now yield higher Sr recoveries with less interference from other cations.

3GGU010A Compilation of existing boreholes, lithologic logs

The start on this activity has again been deferred during the section chief's involvement in detailed budget planning and in responding to concerns on the Independent Cost Evaluation (ICE) and the rewriting of PACS schedules and cost allocations. There is no milestone impact at this time.

3GGU003A Review samples from prototype (YM) hole, UZ holes

No start to this activity due to the slow progress of drilling.

Quality Assurance

3GGU002A Geochemical isotopic sampling and analysis, phase 1

B. Marshall reviewed Technical Procedure GCP-28 "Uranium isotope geochemistry" in May for K. Ludwig, USGS, GD.

J. Paces created a new bottle of secondary Th standard, HU-2, and calculated theoretical U and Th concentrations for the purpose of spike calibrations during May. The old bottle of standard solution was suspected to have changed concentrations over time. New spike calibration aliquots were produced and are currently being analyzed.

B. Marshall completed five QA reading assignments in May and June; J. Paces completed seven QA reading assignments in May.

Quality Assurance (Continued)

J. Paces continued calibration in June of mixed U-Th spike as per GCP-22, using HU-2 and OCB-66-15 standards.

Five electronic and mechanical weighing scales used for YMP quality-affecting work by IGG and MOA staff (K. Futa, J. Paces, B. Zartman, K. Ludwig) were cleaned and calibrated by Certified Balance Service during June. All scales were certified, and calibration status reports were submitted to the QA Manager.

Planning and Operations

The study plan for Study 8.3.1.4.2.1 has finally been released by DOE (June 22, 1992) after extensive efforts by the section staff to satisfy demands of YMPO. Changes in the SCPB affecting seismic work (8.3.1.4.2.1.2) have also been approved.

3GGU002A Geochemical isotopic sampling and analysis, phase 1

Z. Peterman and J. Paces rewrote PACS activities and schedules in May for FY93/94, and for the outyears FY95-99. Work descriptions and schedules were revised in detail for SCP activity 8.3.1.4.2.1.1 Stratigraphic Studies.

K. Futa, S. Mahan and J. Paces received training in May on new exchange chromatographic resins from Dr. Phillip Horwitz of Argonne National Lab.

Z. Peterman spent three days in May as host to Dr. Steven Moorbath, Oxford University, England. Discussions included the role of isotope geochemistry in Yucca Mountain site characterization studies.

J. Paces continued efforts during June to finalize PACS activity narratives and schedules for 8.3.1.4.2.2.1 (Mapping of Zonal Features) during FY93/94, and outyears.

J. Paces began planning and ordering materials and supplies in June to expand present YMP clean-lab space to facilitate U-series analysis by mass spectrometry. This technique is much more sensitive to environmental blank levels than the alpha-counting technique, and it must be done under highly controlled laboratory conditions.

3GGU12AA Write criteria letters G-5

This activity has not started. G-5 has been pushed out on the drilling schedule to FY94.

Variances

3GGU12AA Write criteria letters G-5

The criteria package has not been started. Scheduling of drillhole G-5 is now scheduled for FY94. There may be indeterminate impact, but the slippage of the drilling schedule should provide necessary flexibility.

Corrective action: the criteria letter will be written when appropriate schedule specifics are available.

Variances (Continued)

3GGU003A Review samples from prototype (YM) hole, UZ holes

No start to this activity due to the slow progress of drilling. Corrective action: we have had discussions with HIP investigators concerning logging and sampling, and with new staff available, we will be able to respond to sampling needs. No impact is anticipated, long- or short-term.

3GGU010A Compilation of existing boreholes, lithologic logs

The start on this activity has again been deferred during the section chief's involvement in detailed budget planning and in responding to concerns on the Independent Cost Estimate (ICE) and the rewriting of PACS schedules and cost allocations.

Corrective action: this activity was scheduled with adequate flex to allow for delays caused by conflicts in work priorities with no impact. There is no milestone impact at this time.

SCP 8.3.1.4.2.1.2 Surface-based geophysical surveys 0G3221B2

Summary Account Manager - C. Hunter

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU221 Complete report gravity/magnetics Fortymile Wash

Compilation and technical review of previously acquired gravity and magnetic data from Fortymile Wash is complete. The Ponce et al. (1992) 36-page report on Fortymile Wash referenced below was reviewed by three geophysicists, revised, and approved at Branch level for forwarding to BWTR and to DOE for approval. The report shows a shallow-source magnetic anomaly directly over the Wash which does not appear to be related to topographic or magnetic terrain effects. The cause of the anomaly may be fluvial basalt debris carried downstream from the basalt flows at Dome Mountain.

Manuscript submitted for Director's approval:

Ponce, D.A., Kohrn, S.B., and Waddell, Sandra, 1992, Gravity and magnetic data of Fortymile Wash, Nevada Test Site, Nevada: U.S. Geological Survey Open-File Report 92-xxx, 36p. [DOE]

3GTQ005J Write seismic contract

This task is 100% complete. The Request for Proposal was released to potential bidders on June 17, with close of bids set for July 17. A site visit for potential bidders was held June 30. C. Hunter revised the documents numerous times, as required, with the substantial effort finally culminating in release of the RFP.

T. Brocher located potential locations of shot points on strip maps obtained from EG&G by R. Spengler. C. Hunter and Brocher annotated area maps for transmittal to DOE for planning of environmental, archeological, test interference, and other pre-work surveys. Hunter revised and rewrote the Test Planning Input letter and provided additional detailed information to DOE for the planning process.

Technical Activities (Continued)

3GGU222 Submit status of regional geophysical for review

Chapter authors of the proposed USGS bulletin "Status of regional geophysical studies at Yucca Mountain and vicinity, Nevada and California" have been contacted to answer review comments and to submit revised chapters to H. Oliver. Ten chapters have been submitted, totaling 179 pages and including a geologic summary, and results of gravity, magnetic, MT, seismic refraction and reflection, teleseismic stress and heat-flow studies. All chapters have been through two reviews, and revised manuscripts are due August 1 for expected Branch approval by end of the fiscal year.

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

This activity to collect magnetic and gravity data in investigations to support interpretation of the seismic lines to be run in Yucca Wash is awaiting approval of the study plan by the NRC, but additional lines crossing Yucca Wash and Midway Valley are expected to be started in July. Planning for fieldwork supporting the seismic transect is underway, with expected fieldwork late in the fiscal year. Data from this activity will be used to target the location for proposed corehole USW G-5 and will also provide constraints on the interpretation of regional variation in the stratigraphic relationships at Yucca Mountain. There is no milestone impact at this point, due to rescheduling of G-5 (currently set for FY94).

3GGU201 Collect and reduce magnetics/gravity data along seismic profile

There is no start to this activity due to delay in approval of the study plan.

Quality Assurance

3GGU220 QA documentation of software

D. Plouff submitted magnetic media and printed copies for software products under QMP-3.03, R2. Additional software products were reviewed by the Configuration Control Committee in response to his submittal of Software Control Forms under QMP-3.03, R3. He spent significant time analyzing the complexities of three major software products, preparing for conversion of computer program usage from a VMS VAX system to a UNIX/Windows-based workstation system. Included in this effort are devising validation tests and preparing user documentation.

This effort has required more time than planned, but no impacts are expected (due to field contract and study plan approval delays). During May, Plouff tested comparisons with published values to validate the HANDTC program on VAX. He also obtained published tide-table data and is preparing lists of LaCoste table values for potential YMP gravimeters to be tested in validating the OG- reduction program.

A QA problem developed in May for the planned use of the truck-mounted magnetometer to obtain mag data this fall along the seismic transect across Yucca Mountain. M. Gettings (Branch of Mineral Deposits) has written a C-language program that operates the equipment and reduces the data, but he is the only person qualified to "QA" the program and to carry out field tests for the required DOE validation. Unless the YMP is willing to fund Gettings for these needs, we will have to conduct the work on foot.

Planning and Operations

3GGF223 Study plan approval

The study plan for this activity, included under approval of the 8.3.1.4.2.1 "Vertical and lateral distribution of stratigraphic units within the site area" study plan, has been released by DOE Headquarters and transmitted to the NRC.

In related work, C. Hunter devoted substantial effort to rewriting of the SCPB chapters covering the current planning for the seismic transect. That document also has been approved, after long effort.

3GTQ006J Oversee field operations

There is no start to this activity due to delay in approval of the study plan.

Variances

Several of the activities in this account are behind schedule, largely due to delay in approval of the governing study plan and delays in initiating seismic work, including 3GGU250, 3GGU201, and 3GTQ006J. The study plan is now at the NRC, with approval expected before mid-September.

3GGU220 QA documentation

QA activities for software are underway. There should be no impact, and corrective action will involve completion of documents required by the configuration committee.

Work Performed but not in Direct Support of the Scheduled Tasks

The manuscript "Seismic reflection profiling across Tertiary extensional structures in the eastern Amargosa Desert, southern Nevada Basin and Range Province, United States," by Brocher et al., has been accepted for the Geological Society of America Bulletin. DOE approved publication of the manuscript on May 14.

T. Brocher reviewed TP SP-13 on VSP and crosshole tomographic surveys. The TP has been approved.

T. Brocher and staff planned the staking of the seismic transect for environmental surveys. Brocher and staff along with C. Hunter arranged the site visit for bidders June 30.

R. Spengler presented a paper titled "Site-scale geologic and geophysical anomalies along a southeastern transect through SE Yucca Mountain, Nevada" at the DOE Geochemistry/Hydrology workshop in Denver June 6-9.

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 evaluation of commercially available downhole electrical logging methods in comparison tests between Dresser-Atlas and Schlumberger in logging runs in USW G-2 culminated in completion in April of the draft open-file document (P. Nelson, co-authored with R. Schimschal) tentatively entitled "Assessment of geophysical logs from borehole USW G-2, with recommendations for future logging at Yucca Mountain, Nevada". This report describes evaluation of a variety of logs and different models of logging tools for acquisition of each log type. The review process will continue for an indeterminate period, but Branch reviews have been returned to the authors and revisions made to the report. There is no anticipated milestone impact associated with the review process, and the results have already been fed to activity 3GGU362 (Specify logging tools for future YMP work) below.

3GGU362 Specify logging tools for future YMP work

P. Nelson and U. Schimschal received Branch reviews of an open-file report which assesses logging results by Atlas Wireline and Schlumberger from borehole G-2 (tentatively entitled "Assessment of geophysical logs from borehole USW G-2, with recommendations for future logging at Yucca Mountain, Nevada,"). This report provides recommendations for use of specific logging tools in applications at Yucca Mountain. Nelson and Schimschal found no appreciable differences between results from the two suppliers with some tools, but others appear to show a clear advantage with the Schlumberger methods and tools. Schlumberger's 40kHz induction tool and their epithermal neutron technique provide operational advantages. Neither supplier provided K, U, and Th estimates from spectral gamma-ray logging that agreed satisfactorily with core analyses.

As a continuation of analysis on the G-2 logs, P. Nelson and J. Mikesell met with Schlumberger staff in May to discuss the reduction of data from the geochemical (neutron activation) log run in borehole G-2 last year. Schlumberger has received funding to commence conversion of the yields to chemical weight percent and to do an estimate of mineral abundance.

3GGU392 Compute algorithms to density and resistivity logs

No activity during the reporting period. In this ongoing work, preliminary plots of log and core data have been presented to the UZ modeling group at LBL. Better results seem to be available from the smaller holes, with more calibration work needed on larger holes.

3GGU364 Write procedure for magnetometer logging

P. Nelson and colleagues began work in May on the calibration of the magnetic susceptibility tool at the test pits at the Denver Federal Center. This work is preparatory to writing technical procedures for operating the tool at Yucca Mountain. This work continued in June.

Quality Assurance

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

Installation of the IGG's new Finnigan MAT 262 thermal ionization mass spectrometer was completed and tested. B. Marshall and Z. Peterman reviewed the test results and the machine was accepted on May 8. Marshall, S. Mahan, K. Futa, J. Paces and Peterman received technical training (to varying degrees) from the Finnigan engineer over a week-long period. Marshall and Mahan further tested the instrument by running multiple analyses of the USGS standard EN-1. Results from these tests indicate that spectrometer performance exceeds our highest specifications delivering better than 30 ppm external precision for 13 analyses. Marshall also tested a blank rhenium filament (used for holding and ionizing strontium samples) and found no contaminants which would interfere with Sr analysis, indicating that the new Finnigan filament outgasser also performs adequately.

B. Marshall revised Finnigan MAT run parameters for Sr analysis of typical YMP samples in May and devised standard procedures for Sr analysis, including detailed documentation for other users.

B. Marshall modified the isotope lab database in May to report Sr blanks more appropriately. Procedures for analyzing samples with low Sr contents require that clean laboratory blanks be monitored and reported more carefully.

No new analyses were collected for this activity during June.

Technical Activities (Continued)

3GGF182A Analysis of samples (Continued)

Z. Peterman, J. Paces, R. Spengler and J. Everenden spent 1½days in June at the site investigating some of the tuffs on the southern end of Yucca Mountain purported by the proponents of the upwelling hot-water hypothesis to be hydrothermally altered and explosively brecciated along faults. Field checks of these localities, which are critical to the upwelling water model, revealed that primary volcanic features have been grossly misinterpreted by upwelling proponents. All tuffs examined were fresh, glassy, non-welded airfall and non-welded pumiceous ashflow deposits. Well-sorted airfall ("popcorn" ash) beds are white to light buff, whereas non-welded ashflow units are pink to light orange, particularly in the upper portions of each cooling unit. All tuffs contain individual pumice clasts (up to 5 to 8 cm) which retain delicate glass bubble walls and shard structures. Preservation of these delicate, highly porous features which react readily to warm circulating fluids, is conclusive evidence that hydrothermal alteration did not take place. The proponents of upwelling base their entire hydrothermal argument solely on coloration of the tuffs with no other mineralogical, geochemical or physical evidence. Instead, the observed reddish coloration of ashflow units is a classic example of high-temperature oxidation of ferrous iron during cooling and degassing immediately following emplacement of thicker ashflow deposits. Also, no evidence for brecciation associated with faults was observed at the same outcrops identified by the upwellers. We can only conclude that they misinterpreted primary ashflow textures (e.g., pumiceous and lithic clasts supported by a fine ash matrix) as their fault-related "breccia". Everenden is preparing an open-file report which will detail these arguments.

B. Marshall wrote software code during June for generic (rather than element-specific) exponential mass discrimination and spike subtraction corrections for isotopic data obtained by solid-source mass spectrometry. This code was written in preparation for implementation on the new Finnigan MAT 262. Code was tested on neodymium, strontium and calcium mass spectrometer data and found to work correctly for all cases sampled. In addition, a new procedure for naming files in the new mass spec was implemented, and a method of accessing previous run data was established.

B. Marshall also studied the Finnigan MAT 262 operating software in June in order to implement the exponential mass discrimination and spike subtraction corrections for isotopic analyses. These codes will be written soon and tested this summer.

B. Marshall upgraded the YMP Sr database system to a new package capable of operating on a PC platform during June. This also involved purchasing new hardware and software so that the recently acquired PC, which will be devoted to the geochemical and isotopic database, can be networked to the existing computing facilities this fall when software becomes available for Windows operating environment. In addition, a new grid system for south-central Nevada was implemented within the YMP Sr database in order to facilitate locating points on maps and plotting geographic information system (GIS) data.

K. Futa calibrated cation exchange columns for Sr in June in order to check for possible changes in the elution position. Results indicate a slight up-field shift, and columns should now yield higher Sr recoveries with less interference from other cations.

Technical Activities (Continued)

3GGF184A Structural analysis of exposed fault zones

A. Braun and colleagues R. Linden, L. Martin, and R. Blackburn continued mapping and measurement of fault characterization parameters along and within the Ghost Dance fault on Yucca Mountain, with emphasis during May and June north of Whale Back Ridge. The work utilizes the rectilinear grid reported earlier and characterizes a large number of parameters which will be integrated into the geologic model. Mapping continued in May in the northern area within Block 6362. The northernmost four areas were completed on the May trip, along with field checking to the south. Forty-seven of 61 areas were completed by late May. Remaining areas were mapped on the June trip. All 61 areas in the original proposal have been completed.

The map grid has been extended southward to the proposed location of the southern ramp (NV State coordinates, 757,000 North). This grid consists of 60 additional 200-ft by 200-ft areas with a maximum width of 1200 ft, designed to cover all mapped (Scott and Bonk) splays of the Ghost Dance fault. Nineteen additional areas were laid out between Antler Ridge and Live Yucca Ridge, with a grid width there of 400 ft (200 ft additional to be surveyed at a later date). Only 3,600 ft out of 11,600 ft of the total length of the Ghost Dance fault within the proposed repository site remains to be gridded.

D. Ross-Brown visited the site May 11 and 12. Field progress and procedures for map point control and descriptive protocols were discussed by the group. Database format and minor changes in recording forms were discussed to assure QA standards are being met.

Exposures in the northern part of the map area are much greater than in the southern part, so structures are seen in greater detail. The Ghost Dance Fault Zone extends across most of the 600-ft wide mapped area on the south side of Antler Ridge. Barren and breccia-filled fractures can be seen in outcrop trending mostly north-south. It also appears that NW-trending fracture zones become larger toward the north.

F. Singer and J. Nelson, constructed illustrations using SURFER software as a data-entry tool to create isopach maps and 2.5-dimensional views of the total lithologic thicknesses of the Tiva Canyon, Yucca Mountain, Pah Canyon and Topopah Spring Members of the Paintbrush Tuff, and tuffaceous beds of the Calico Hills, Prow Pass, and Bullfrog Members of the Crater Flat Tuff. As part of this effort, they compiled a database consisting of drillhole and measured-section locations with respect to all of these members. These data were then converted to a grid mesh- interpolated through Dynamic Graphics software systems (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 allow visualization of the differences in thickness of units across the site area and are the first step in the development of the 3-dimensional model of the geologic framework of Yucca Mountain.

Technical Activities (Continued)

3GGF124 Reconnaissance of study area

This work by R. Dickerson to conduct detailed investigation of stratigraphically and structurally complex terranes at a scale of 1:12,000 in the area north and east of Prow Pass is complete, as of June 15, 1992. Numerous faults (unmapped in this detail) have been observed in the upper units of the Paintbrush; these will be one focus of the detailed mapping to be done in the northeast sector of the site area. In May, a portion of the Rhyolite of Calico Hills was mapped in detail, and a stratigraphic section 183 m thick was measured and sampled in upper Paintbrush Canyon. This section contained three distinct rhyolite lava flows and two distinct bedded ash-flow tuffs, one of which contains a tentatively identified surge deposit at its base. Several previously unmapped NW- to SE-trending faults displaying oblique slip and strike-slip movement have been observed in upper Paintbrush Canyon. Numerous other faults and several additional lava flows remain to be mapped in the Calico Hills section of upper Paintbrush Canyon.

3GGF125 Geologic Mapping of Northeast Corner of Site Area

This work by R. Dickerson will carry out detailed mapping of stratigraphically and structurally complex terranes in the northeastern corner of the site area. An area 2 km x 0.5 km of stratigraphically complex Calico Hills Rhyolite has been mapped in detail in upper Paintbrush Canyon. Six separate rhyolite flows were mapped, one of which was identified as a compound flow unit containing two distinct rhyolite lavas. Three separate bedded tuffs with probable time-stratigraphic significance were also mapped, with sedimentary and surge features observed in several. Local angular unconformities were recognized within two of these units. Numerous previously unmapped faults were mapped, with the faults variously displaying strike-slip, dip-slip, and oblique movement. Samples were taken for petrographic studies of lava flows and tuffs within the Rhyolite of Calico Hills, and an expanded sampling program and cooperative petrographic study with C. Hunter and D. Buesch was planned. New hire Buesch accompanied Dickerson during four days of fieldwork in June as part of his orientation.

3GGF131A Field check southern and western YM mapping

Field mapping continued in May and June by C. Fridrich in Crater Flat west of Yucca Mountain. Initial results suggest structure similar to Yucca Mountain, with northward-decreasing offsets on north-trending normal faults and northward increase in left-lateral oblique slip. Exposures of the wall of the Claim Canyon caldera segment have been located. Fridrich has identified a well-defined arch separating the structural domains of the Bullfrog Hills (including the area just north of Bare Mountain) and northern Crater Flat.

3GGF101 Review, revise outcrop sections of Tpt

This activity has not started. The process to fill vacancies in rock characteristics has resulted in hiring of D. Buesch, a volcanic stratigrapher who will undertake review of Paintbrush Tuff section. No milestone impact is anticipated at this time.

3GGF160 Revise technical procedure on analysis of volcanic rocks

This activity has not started. New hire (June 1) D. Buesch will revise these procedures. There is no milestone impact at this time.

Quality Assurance

3GGF182A Analysis of samples

B. Marshall reviewed Technical Procedure GCP-28 "Uranium isotope geochemistry" in May for K. Ludwig, USGS, GD.

J. Paces created a new bottle of secondary Th standard, HU-2, and calculated U and Th concentrations for the purpose of spike calibrations in May. The old bottle of standard solution was suspected to have changed concentrations over time. New spike calibration aliquots were produced and are currently being analyzed.

J. Paces continued calibration in June of mixed U-Th spike as per GCP-22, using HU-2 and OCB-66-15 standards.

B. Marshall completed five QA reading assignments in May and June; J. Paces completed seven QA reading assignments in May.

Five electronic and mechanical weighing scales used for YMP quality-affecting work by IGG and MOA staff (K. Futa, J. Paces, B. Zartman, K. Ludwig) were cleaned and calibrated by Certified Balance Service during June. All scales were certified, and calibration status reports were submitted to the QA Manager.

Planning and Operations

3GGF182A Analysis of samples

Z. Peterman and J. Paces rewrote PACS activities and schedules in May and June for FY93/94, and the outyears FY95-99 . Work descriptions and schedules were revised in detail for portions of Activity 8.3.1.4.2.2.1 (Mapping of Zonal Features.)

K. Futa, S. Mahan and J. Paces received training during May on new exchange chromatographic resins from Dr. Phillip Horwitz of Argonne National Lab.

Z. Peterman spent three days in May as host to Dr. Steven Moorbath, Oxford University, England. Discussions included the role of isotope geochemistry in Yucca Mountain site characterization studies.

J. Paces continued efforts during June to finalize PACS activity narratives and schedules for 8.3.1.4.2.2.1 (Mapping of Zonal Features) during FY93/94, and outyears.

J. Paces began planning and ordering materials and supplies in June to expand present YMP clean-lab space to facilitate U-series analysis by mass spectrometry. This technique is much more sensitive to environmental blank levels than the alpha-counting technique, and it must be done under highly controlled laboratory conditions.

Planning and Operations (Continued)

3GGF184A Structural analysis of exposed fault zones

Recent interest by DOE in having the USGS submit a 3-dimensional geologic model has prompted F. Singer and J. Nelson (at the direction of R. Spengler) to investigate available modeling software packages. Activity during May and June included demonstrations of various software systems, particularly the LYNX Geosystems package. This software (in conjunction with Dynamic Graphics ISM and GMP) will be used to generate a 3-D display of the geologic framework of the site. In addition, a database of structural information will be constructed to describe the structural history of the site. To accomplish this task, balanced section software (paleoreconstruction modeling) packages have been investigated. TECTONICS by Midland Valley Associates (New Orleans) has been ordered.

Variances

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 and analyze fractures in Tiva Canyon Member

Statistical analysis for existing Tiva stations continued in May and was completed in June (histograms and stereo-analysis). Histograms of azimuth and dip are complete; data have been verified against field sheets. Stereo analysis was 80% complete in May and completed in June. Cluster analysis to identify fracture sets is 80% complete.

Fracture data were collected in May from four bedded-tuff stations and one upper-lithophysal station. The bedded tuff outcrops are located on the west side of Fran Ridge in the vicinity of drillhole UE-25- P-1. The Upper Lithophysal station is at the location of the NRG-1 drillhole. Work was performed in accordance with GP-12. The bedded tuff units are fractured.

Pavement 500 was occupied in June. Validation of existing data is 50% complete. Six traceline surveys approximately 100 ft long have been added to the database to supplement existing data. Evaluation of the Scott and Bonk fault mapping at Pavement 500 is complete. There are no major faults at this location. A correction needs to be made to the SEPDB as this pavement was incorrectly located according to EG&G maps.

A major transverse trend which appears to line up with changes in fabric trends at Fran Ridge suggests a newly recognized (June) component to the tectonic trends in the region.

Map construction continued in May for the Tiva fracture sets. Map preparation is 50% complete. This effort is aimed at the revised deadline for the preliminary Tiva map (activity 3GGF10AA) now set at June 30, 1992.

3GGF159A Design fracture database; software QA

The database structure was completed during the March 1992 reporting period.

Technical Activities (Continued)

3GGF150A Develop Tiva fracture model phase I

Pavement 500 provides corrections to the existing tectonic models of fracture development at Yucca Mountain. Corrections to Scott and Bonk's mapping are required as the major fault zone shown in their OFR does not appear on the pavement. Fractal modelling with respect to the orientation also does not appear appropriate contrary to Barton's model of the area. A hierarchical model is favored. Figure 1 shows an interpretation consistent with this model. There are two "sets" of discontinuities: a long, relatively smooth, early set and a secondary short set. The heavy line weights of Figure 1 show the early set and the red highlighted shows the secondary set. "Corners" are torn or broken from the larger blocks. These block sizes are appropriate data for fluid flow modelling. The secondary set suggests a reloading of the blocky rock mass at a later time. This fabric is highly oriented except where local perturbations (corner breakage) occurs.

3GGF160A Revise technical procedures, grid design, RC gauge development

Revision of the data notebook technical procedure is complete, after discussion with the USGS QA staff.

Quality Assurance

Planning and Operations

Variances

Slippage in scheduled tasks under this account are a result of delay in clearing the Fran Ridge pavement, responsibilities of other accounts.

3GGF10AA Tiva map and report

The expected submittal date for the map and analysis to the review process is July 30, 1992. Work on geologic cross-sections for Soil and Rock took precedence over this task as well as 3GGF100M. A specification through RSN was required to be completed.

3GGF151A Collect vertical continuity data

This task will start mid-July 1992, with a week's field work at Solitario Canyon in the vicinity of UZ-6. No impact is anticipated from the delay in start-up.

3GGF080 Clear pavement at Fran Ridge and 3GGF130A Map and analyze fractures Fran Ridge ESF pits area

The clearing and mapping at the Fran Ridge pavement are dependent on another activity to contract and pay for the clearing. Anticipated start of this clearing is end of July 1992 per Memo from R. Oliver (March 31, 1992), Test Planning Package 92-7. The criteria letter was delayed until early July due to tracer changes required by DOE. Logically, all Fran Ridge activities follow from this clearing. The resulting apparent variances must be fairly recognized as arising from delay in other outside activities.

Work Performed but not in Direct Support of the Scheduled Tasks

The PI and summary account manager worked extensively with the section chief's staff during May to develop input for the updated Mission 2001 exercise. Detailed plans, schedules and justifications were provided for integration into the schedule. (30 hours)

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

J. Wright contacted the Stanford University Rock Geophysics Lab in May to discuss QA requirements for data reduction software. The work statement for the Stanford group was prepared in June to cover QA technical procedures for collection and reduction of televiewer data. The Stanford group will contribute expertise in state-of-the-art digital analysis.

3GGU006F Edit, review existing data; data log-in

J. Wright continued review of existing data.

Quality Assurance

Planning and Operations

3GGU07AF Prepare specifications for data collection

The specifications document for collection of fracture data was completed as scheduled in May. These specifications incorporate the experience of other analytical groups and describe appropriate techniques for collection of fracture data using borehole television and the televiewer method.

3GGU07AM Specifications for data acquisition

Specifications were completed May 4, 1992. This milestone feeds to the effort to prepare QA documents for data collection in proposed drillhole G-5, currently moved out on the schedule to FY94.

3GGU09AF Design fracture database compatible with surface fracture network

This task is indicated as underway as of this reporting period. No description of work was reported during the period. This task will coordinate database design to accommodate integration of data from borehole and surface fracture distribution studies.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

The PI and summary account manager worked extensively with the section chief's staff to develop input for the updated Mission 2001 exercise. Detailed plans, schedules and justifications were provided for integration into the schedule. (40 hours)

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

Quality Assurance

Planning and Operations

3GGF006B Excavate test pit

The Job Package and Test Planning Package for pit deepening and pavement clearing around the pits have been opened, and coordination work is continuing toward field work in late July and August. Personnel at Raytheon Services Nevada, REECo, and DOE are proceeding with development of the Job Package. S. Beason met with J. Katozzi and T. Leonard of REECo at Fran Ridge on June 18 to discuss and explain the upcoming work.

S. Beason completed and submitted the Criteria Letter for the deepening of the Fran Ridge pits and cleaning around the pits.

3GGFO22B Upgrade computer equipment

S. Beason and J. Coe met with representatives of DEC and Leica in May (new plotter manufacturer/ representative) to discuss options relative to the type of computer driver (whether DEC or PC compatible) appropriate for a new plotter and purchase of a second analytical plotter. The avenue being explored is purchase of a new computer that would accommodate both the current plotter and a new addition. Beason prepared a justification letter to USGS management for the purchase of a second DSR-series photogrammetric work station.

S. Beason and M. McKeown met with representatives of LLNL, the M&O contractor, and DOE to familiarize the M&O with the Underground Geologic Mapping activity and previous efforts to integrate the mapping activity with the construction process.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

The PI and summary account manager developed input for the updated Mission 2001 exercise. Detailed plans, schedules and justifications were provided for integration into the schedule. (24 hours)

S. Beason completed the position description, justification and approval for hiring an analytical photogrammetrist. The USBR Personnel office is proceeding with classification and advertisement of the position.

S. Beason completed paperwork for the Tracer and Fluids Materials survey.

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 during May on ANI90 and VELIN3D with actual borehole data from Yucca Mountain to ensure compatibility of methods with the proposed repository setting. Data obtained from previous drilling in the C-hole complex was incorporated into a database for use in preliminary modeling efforts. This data modeling is underway and will be used in preparation for code testing and for determining initial design parameters for the VSP field work anticipated for late summer 1992.

Work during June with ANI90 involves modeling the VSP work being planned for the P-1/C-complex wells. The V_p and V_s profiles obtained from well logs in the C-hole complex (V_s derived using a Poisson ratio of 0.27) were used as an input model for the matrix velocity. Various combinations of anisotropy, as derived from fracture density logs in the wells, were used to model the effect of fracture anisotropy on the VSP source locations. Model studies on optimal VSP design will then be conducted as ongoing work in this activity.

3GGF031B Update ESF planning documents

No activity during the reporting period. The delay of this activity is tied to failure by DOE to finalize the ESF structural design. The resulting apparent variance must be fairly recognized as arising from delay in activities outside this study. No impact is expected given the timeframe and scale of the ESF construction project.

3GGF035M Report: progress VSP

Input for updated PACS schedules and work statements were submitted to the section office in May. Planning continued for VSP work anticipated for late summer 1992.

Technical procedures were updated, reviewed, and accepted as final. Technical Procedure SP-13, "Vertical seismic profiling and crustal tomographic surveys," received final QA acceptance and full signature approval in mid-May. All technical procedures are now in place to carry out the VSP field work. The PI and his support team are ready to go to the field for data collection pending NRC approval of the covering 8.3.1.4.2.1 study plan.

Plans to integrate VSP and seismic reflection are underway but remain incomplete at this time. DOE transferred 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.

Planning continued in June for carrying out VSP late this fiscal year in UE-25-P-1 or in a C-complex well. VSP in P-1 will require removal of two strings of tubing prior to work. One string carries instrumentation for temperature measurement, and the other is for hydrologic measurements. If P-1 cannot be used, then VSP will be done in a C-hole location. This would be advantageous because of "piggy-backing" with current cross-hole seismic work being done on the C-complex holes under other activities. That work has revealed surprising high-frequency propagation through the saturated zone. It also is apparent from the seismic work that fractures are seismically visible in the frequency range being used. The link with the VSP is important to establish the visibility of the fractures below 500 Hz in order to assess the utility of VSP for site-scale characterization.

Quality Assurance

Planning and Operations

Variances

3GGF031B Update ESF planning documents

There is no start to this task due to delay in finalizing the ESF structural design. No impact is anticipated. This apparent variance is properly charged to the responsible outside activity.

Work Performed but not in Direct Support of the Scheduled Tasks

The PI/summary account manager developed input for the updated Mission 2001 exercise. Detailed plans, schedules and justifications were provided for integration into the schedule. (50 hours)

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

Continued work on manuscript entitled: "Volumetric analysis of debris eroded off a hillslope near Yucca Mountain Nevada during a single rain storm".

J. Coe submitted, to the annual GSA meeting 1992, an abstract entitled: "Photogrammetric analysis of modern hillslope erosion at Yucca Mountain, Nevada". The abstract describes results of the photogrammetric scoping study at Yucca Mountain.

Quality Assurance

Planning and Operations

Variances

3GER002A Write report on erosion rate for existing data

Progress was delayed because the principal author was involved in the Mission 2001 exercise and earthquake activity at the site. Deadline for this report is determined by the DOE deadline for DOE position paper on erosion at Yucca Mountain. The delay in submittal of report: Yucca Mountain Erosion will only result in minor budget adjustment and will not affect long term schedules.

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 0G3253A2

Summary Account Manager - C. Fridrich

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

The report on the large hydraulic gradient (36TW021M) has been in USGS review since late March.

Quality Assurance

Planning and Operations

3GTW020 Compile existing information water table elevation

The June 29 earthquake near Yucca Mountain, and (temporally) related earthquakes in southern California provided the best natural experiment to date for the response of the water-table elevation to seismic events at Yucca Mountain. Communication with hydrologists was established to obtain water-table data.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

C. Fridrich attended a 3-day joint meeting of the Hydrology Integration Task Force and the Geochemistry Integration Team in Denver.

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

A preliminary draft of the study plan was prepared for peer review.

Quality Assurance

Planning and Operations

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
Summary Account Manager - M. McKeown

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GSR005 Field exploration-mapping, drilling, excavation

All North Ramp ESF test pits were excavated and in-place testing completed in May. Logging of the test pits is complete. Removal of the typical one to two feet of topsoil to the widespread caliche-cemented gravelly material should provide an excellent foundation for the anticipated North Ramp Surface Facility structures.

3GSR006 Materials testing: soil/rock physical/mechanical properties

Testing was a major effort in May and June with gradations, and relative and/or Proctor densities determined for seven representative locations. These evaluations will be used in the design of foundations for surface facilities. Work continues on remaining test pit data.

3GSR007 Design data submittal of north ramp

Informal submittal of geotechnical design data to Raytheon Services Nevada (RSN) continued through June. A draft report will be submitted in early July.

3GSR012 Draft report field testing physical properties north ramp

This task was completed June 5 with submittal of draft report.

3GSR14 Draft report mechanical properties field north ramp

This task was completed June 5 with submittal of the draft report.

Quality Assurance

Planning and Operations

3GSR005 Field exploration-mapping, drilling, excavation

The site for drill hole SRG-1 was inspected and the necessary environmental, archeological, etc., surveys planned. SRG-1 was completed in June. Testing will commence with arrival of core at the lab in Denver. Logging was performed by SMF staff to USBR requirements. Gas tracer injection also was performed by the SMF.

The criteria letter for incidental test pit excavation for geotechnical exploration for roads, leach fields, and materials testing was completed in May. An existing concrete aggregate pit was visited; the pit will be sampled and tested. The job package is being prepared by the Project.

Planning and Operations (Continued)

3GSR016 Draft report on engineering geophysics

Planning continued on the borehole engineering geophysics specifically required for the Soil/Rock investigations. This includes density and caliper logs and a check shot of NRG-1. Approximately eight resistivity surveys were performed at the NRSF site and one at a proposed pumping plant site. Data are submitted to RSN as acquired. A preliminary summary report has been submitted to the USGS for transmittal to DOE and design users.

Variances

The schedule assumed field and laboratory testing would begin in mid-November, but the failure to complete the Test Planning Package and begin North Ramp soils investigations until March resulted in slippage of dependent activities including an impact on Title II design.

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 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 frantic effort to get minimal data to the designers for their use in design. Lesson learned: three or more months should be included in any schedule for DOE job package preparation before actual start of work after criteria letter submittal [activities 3GSR012 and 3GSR014].

The failure to complete drill hole NRG-1 on schedule (the hole may be drilled in June) has resulted in rock testing data not being submitted according to schedule for Title II design. At least a month will be required to perform required testing after completion of the hole [activities 3GSR012 and 3GSR014].

The resulting apparent variances must be fairly recognized as arising from delay in other outside activities.

Work Performed but not in Direct Support of the Scheduled Tasks

The PI and summary account manager developed input for the updated Mission 2001 exercise. Detailed plans, schedules and justifications were provided for integration into the schedule. (16 hours)

Geological cross-sections along the ramps and drifts were prepared for RSN.

Work began on responses to State of Nevada comments on the soil and rock study plan (8.3.1.14.2.2). This will be a major effort in July.

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

3GSM157A Continue testing lab/field equipment
Lab testing was completed on one telemetry node and G station processors. The plans for deployment were finalized.

3GSM160A Monitor 1992 seismicity
Monitored the June 29 earthquake. Sent personnel to the NTS to install portable seismic stations to monitor aftershocks.

3GSM153A Install SGBSN stations (6)
Shoshone Peak USNSN station was installed in time to provide recordings of the June 29 earthquake.

Quality Assurance

Planning and Operations

Variances

3GSM022A Prepare FY91 earthquake catalog
Progress on the catalog was delayed due to earthquake activity at the site.

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 checks and review of contacts were conducted during this reporting period.

3GFP001 Excavate and log soil pits

Eleven soil pits were excavated: MWV-P-7, 8, 9, 10, 12, 16, 17, 19, 20, 21, 28.

Quality Assurance

Planning and Operations

3GFP001 Excavate and log soil pits

Prior to excavation criteria letters were written, job packages assembled, and safety and environmental studies were performed.

Variances

Eleven soil pits were excavated. Logging soil profiles in the pits was not completed due to the number of pits and schedule of pit excavation. This is a short term impact and will not affect planned activities significantly.

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

3GFP007 Excavate and log trench through proposed ESF

A 1,200 ft long trench (MWV-T5-A) was excavated through the proposed ESF. Safety inspections have prevented logging activities from starting until the trench walls are determined stable. Preliminary examination revealed a fault, and an additional trench (MWV-T6) was excavated parallel to the long trench. Logging activities are pending approval of the safety inspectors.

3GFP009 Clean and log Trench 17

Trench 17 (MWV-T4) was deepened and existing walls cleaned. Logging activities are pending approval of the safety inspectors.

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

This task has been postponed until late FY92 or early FY93.

Conduct study Bow Ridge Fault

Criteria letters and job packages were amended in May and a work plan formulated for the excavation of trenches 14c and 14d. Environmental studies were completed and the trenches were excavated in June. Trench 14c was gridded and logged. Trench 14d was gridded and a preliminary examination performed.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks
Training and field orientation of D. O'Leary and R. Cress. Completed requisitions to obtain field equipment for logging trenches. B. Swan attended a meeting with H. Oliver for geophysical support along line parallel to the long trench.

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
3GTQ001B Draft technical procedure - aerial photo
Revision of draft technical procedure is in progress.

3GTQ002B Compile map - Quaternary faults within 100 km
Work continues on compiling data.

Quality Assurance

Planning and Operations

Variances
As reported in the May report, the delay 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.

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

3GTN007 Compile/analyze map/satellite imagery

Compiled bibliography of all reports relevant to Study 8.3.1.17.4.4; acquired digital elevation data and digital contours of study area proximal to Yucca Mountain.

3GTN008 Conduct field work-three fault zones

Field work was conducted June 3 and 4 to observe trenching operations and to receive advice on techniques and procedures for trenching and trench logging. Coordinated with EG&G Las Vegas office for access to archived baseline data prior to field work.

3GTN009 Write interim report-field examination fault zone

Began preparation of interim report.

Quality Assurance

Planning and Operations

3GTN006 Revise study plan through USGS review

Study plan 8.3.1.17.4.4 revised following USGS review; revised version of study plan submitted to YMPB for comment resolution (June 11, 1992).

Variances

3GTN008 Conduct field work-three fault zones

Preliminary field work curtailed because of problems associated with relocation, of new staff. This was a unique, short-term problem with minor impact on overall schedule.

Work Performed but not in Direct Support of the Scheduled Tasks

Completed GET training in Las Vegas on June 2, 1992. (8 hours)

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 detachment faults

No progress during this reporting period; principal investigator was out of the country.

Technical Activities (Continued)

3GTD007B Complete geologic map of Calico Hills

Conducted three days of field work mapping the upper plate of a low angle fault in the Paleozoic rocks near the center of the Calico Hills. Compiled field maps, photos, field notebooks, and chemical data in preparation for TDIF submittal.

3GTDB03M Study plan submittal to NRC

Study plan is currently being reviewed by NRC.

Quality Assurance

Planning and Operations

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, publish/unpublished mapping

No progress during this reporting period; principal investigator was out of the country.

3GTD020B Begin scoping study-altered conodonts

This study was not funded by YMP. The work was completed and the results will be shared with YMP.

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

3GPF08A Complete field mapping strip map YM fault zone

Detailed fault zone mapping was obtained from previous workers (field maps and copies of field notes).

Quality Assurance

Planning and Operations

3GPF08A Complete field mapping strip map YM fault zone

Communication established with EG&G to plan appropriate base map preparation, scale, and digitization of fault strip map data.

Variances

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

3GPF17A Relog TR-8 Solitario Canyon Fault

Prepared job package and work plan for cleaning trench 8. Environmental studies were completed and a backhoe was requested.

3GPF09A Study Paintbrush Canyon Fault at Busted Butte

Prepared, reviewed and submitted the criteria letter for cleaning natural exposures at Busted Butte. Job packages and work plans were prepared and environmental studies were completed.

3GPF25A Conduct study Stagecoach Road Fault

Prepared, reviewed and submitted the criteria letter, job package, and work plan for excavating trenches along the Stagecoach Road Fault. Conducted field and environmental surveys of trench sites.

Quality Assurance

Planning and Operations

3GPF15A Hire staff--shallow seismic reflection study

Alternatives to reflection studies were examined and the TEM method was selected as a more suitable method for determining shallow bed rock configuration.

Variances

3GPF17A Relog TR-8 Solitario Canyon Fault

Trench 8 along Solitario Canyon was not cleaned because of backhoe obligations in Midway Valley. This will result in a short term delay in the report on Solitario Canyon Fault, but will not affect scheduled activities significantly.

3GPF11M Report: Trench logs of Windy Wash Fault

The Windy Wash trench log report has been rescheduled for FY93 due to administrative duties of the PI. This will result in a short term delay in the report on the Windy Wash Fault, but will not affect scheduled activities significantly.

Work Performed but not in Direct Support of the Scheduled Tasks
Assisted in field investigations of the June 29 earthquake at little Skull Mountain, including aerial overflight and ground reconnaissance searches for earthquake related surface breakages in epicentral area.

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

Quality Assurance

Planning and Operations
3GTE001K Draft study plan and USGS review
Study plan is with PI for review. No progress during this reporting period; principal investigator was out of the country.

3GTE06JA Order thematic map -- 1:100,000
Requisition sent to NASA-JPL. JPL received work order - QA personnel met and decided not to place NASA-JPL on the approved vendor list.

3GTE06JM Enhanced thematic mapper of Yucca Mountain
Order for TM imagery at JPL. Awaiting processing and delivery.

3GTE01KM Study plan submitted for review
No progress during this reporting period; principal investigator was out of the country.

Variances
Study plan not submitted to USGS for review. PI has been out of the country and unable to approve or modify study plan. This is a short term impact and will not delay planned work significantly.

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
Work continued to monitor and maintain each weather station and tipping bucket precipitation gauge.

3GMM03A Calibrate tipping-bucket rain gauges
No progress due to diversion of personnel resources to other activities. No impact has resulted.

3GMM05A Acquire regional meteorological data FY92
Precipitation and evaporation data acquisition continued in May and June. The BPO with the Western Region Climate Center (Carson City) has not yet been established. The addition of complete sets of historic precipitation data for selected stations surrounding Yucca Mountain will enable us to evaluate the relative frequency of present day precipitation events versus the recent climate record in Southern Nevada.

Technical Activities (Continued)

3GMM07A Monitor collection gauge network FY92

The collection gauge network was prepared for the onset of the summer monsoon season which occurs in July and August in southern Nevada. May and June were very dry, with below-normal precipitation. Rainfall events occurred on May 6, 8, 22 and 26 at Yucca Mountain. However, amounts were light. The month of June, traditionally the driest month of the year, lived up to its reputation and then some. There were no precipitation events in June. The network was expanded with the addition of a plastic wedge and a plastic 4-inch canister gauge at N37. The total number of wedges and 4-inch gauges is now 119. Some sites have both a wedge and a 4-inch gauge as cross checks and verification of accuracy.

3GMM10A Analysis of station data FY91

Work continued to check data from the 5 weather stations and place the data into a useable format.

3GMM23A Collect NTS lightning data FY92

Thunderstorm activity was prevalent in southern Nevada during May and the first week of June. Lightning was observed and documented within the Upper Amargosa River Watershed (UARW) on 13 days in May and 3 days in June. Precipitation was very light at Yucca Mountain.

3GMM034 Analysis of regional data FY91

A study was started to investigate the correlation of lightning strike data with rainfall amounts. Daily precipitation measurements from regional stations are compared with lightning patterns in the vicinity of each station. The goal is to develop a positive relationship between lightning strikes and rainfall amount and to apply this relationship to areas within the UARW that do not and will not have precipitation gauges. This eventual relationship can be used to provide an estimate of precipitation as a boundary condition in a net infiltration model of the UARW. We estimate that several more years will be needed to gather enough data since thunderstorm activity is limited primarily to the spring and summer months.

3GMM070 Collect GOES data FY92

Collection and archival of three-hourly GOES satellite imagery continued. We have two data sources at present - one is via the Weather Facsimile (Wefax) system which provides the three-hourly imagery and the other is a drop off the Weather Service Nuclear Support Office's GOESTAP. The GOESTAP drop provides hourly images of the southern Nevada area. The GOESTAP data is also of higher resolution than the Wefax data (1/2 mile versus 4 mile, respectively). We are evaluating the value of each type of image.

3GMM080 Analysis of Yucca Mountain precipitation data FY91

Precipitation data Yucca Mountain was studied in relation to lightning strike data as discussed in 3GMM034 (Analysis of regional data FY91) above.

3GMM100 Monitor daily weather patterns FY92

We continue to receive the periodical, Daily Weather Maps - Weekly Series. This provides a daily review of weather patterns affecting the U.S. This information can then be matched with the North American weather types proposed by Elliott (1943) which, in turn, can be used to determine the statistical frequency of precipitation-producing weather patterns affecting Yucca Mountain.

Quality Assurance

3GMM067 Implementation of all QA requirements

All QA requirements were accomplished. Work was begun to identify tasks under this activity which directly contribute to site characterization and which do not. A YMP-USGS Activity Controls Specification Report will be submitted specifying which tasks and resulting data do not fall under graded QA controls.

Planning and Operations

3GMM060 Design optical lightning detection network

This activity has been terminated because instrumentation presently available from the manufacturer will not operate in the field as originally intended. Work in this area will not resume until further engineering developments occur at the manufacturer.

3GMM38A Procure/install optical lightning detectors

This activity has been cancelled. See 3GMM060 (Design optical lightning detection network).

Variances

3GMM15A Prepare criteria letter

All proposed sites for additional tipping bucket rain gauges have not yet been marked. Some proposed sites are not as accessible as previously thought. Therefore, some redesign of the expansion network will have to be accomplished before the criteria letter can be prepared.

Work Performed but not in Direct Support of the Scheduled Tasks

Supported tours of the HRF. (8 hours)

Logged neutron boreholes in Solitario Canyon. (6 hours)

D. Ambos served as the technical reviewer of the T&MSS Study Plan 8.3.1.12.2.1, R1 - Meteorological Data Collection at the Yucca Mountain Site. (approximately two days)

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

Streamflow sites located on NTS, recorded no runoff during either May or June.

The average precipitation in June for the entire network was 0.08 inches, on a par with the previous month of May. The exceptions were Stockade Pass above area 12 which recorded 0.30 inches in June (after 0.65 in May) and Amargosa River at Tecopa which recorded 0.40 inches.

The Amargosa River at Tecopa CA, station 10251300, eighty miles south of the test site, continued to flow the entire month of June with an average discharge of less than 1 CFS, for most days. This followed a peak discharge, at midnight May 31, of 218 CFS, which was calculated for the recorded peak gage height of 3.07 ft.

On May 28 - D. Bauer and P. Cooley referenced a flow peak which occurred on March 30, 1992 at the Amargosa River near Eagle Mountain CA, discharge to be calculated once a rating is developed.

During May, levels were run by D. Bauer and P. Cooley at Amargosa River near Beatty, station 10251220, tying a peak to gage datum recorded on or about March 30, 1992. An estimated flow of 12 CFS. was determined by slope conveyance method. Levels were also run by T. Kane and Bauer at Fortymile Wash near Amargosa, station 10251258, to establish true gage datum.

May 17-20 - PI attended an "Alert user's seminar". The main focus was on the current weather service software and its relationship to ongoing needs of the Surface Water Monitoring Project, such as early flood warning data.

June 2 - PI attended a training course on "The Alert" systems lightning format.

June 23 - T. Kane (PI), met with A. Flint (PI) unsaturated-zone infiltration studies. Reconnaissance was conducted for a new stream-gaging site on the eastern slope of YM.

3GRS022A Complete FY83-85 data and prepare report

Records were reviewed at Carson City and returned to PI May 12, 1992. Data report from first typing was reviewed by PI. Records are undergoing updates based on reviewers comments. Data report awaits final record updates and then will be submitted to Carson City for final typing.

3GRS006A Reduce FY86-89 data and prepare report

Data undergoing review by PI; compilation of records for final review by PI continues.

Quality Assurance

3GRS002A Collect FY92 runoff and streamflow data

June 19 - T. Kane (PI), P. Cooley attended QA training.

3GRS027A Complete technical procedures for streamflow data collection

HPs 100R and 166R are at YMP QA, Denver. HP 219 RO is at SAIC for typing and will go back to YMP QA for signature. HP 117R1 is completed and is effective June 30, 1992.

Planning and Operations

3GRS002A Collect FY92 runoff and streamflow data

May 26-June 4, and June 8-11 PI worked on PACS schedule and work scope for FY93/94 for Mission 2001.

June 30, July 1 - Monthly PACS update and status report.

3GRS016A Complete installation of two Amargosa gages

Work packages with designs and environmental statements were submitted in May by USGS to BLM (through DOE), but no response has yet been received. Therefore, this activity has been redirected in that DOE is presently conducting environmental and archaeological studies at several other proposed streamflow sites on Yucca Mountain while awaiting a response from BLM.

3GRS029A Continue reconnaissance for new sites

Activity started June 23, 1992. DOE is presently responding to site selection of Pagany Wash, site SY15 near well UE-25 UZ#4. A reconnaissance of this site was done by T. Kane (PI) in conjunction with A. Flint (PI), for unsaturated-zone infiltration on June 23, 1992.

Variances

3GRS016A Complete installation of two Amargosa gages

The inability to receive permits from BLM (CA) has caused a redirection of this activity. On May 21, DOE was again contacted as to the status of both Eagle Mountain and California State Line installations. The PI was told that after more than four attempts, with re-submittals of design plans each time, that BLM showed no signs of acting on our request. Installations of these sites have been postponed indefinitely. Our emphasis will now be moved to the installation of an additional site to be placed on the eastern slope of Yucca Mountain, for which DOE now is conducting environmental and archaeological surveys.
Impact: schedule delayed indefinitely; gages for Eagle Mountain and Stateline have been postponed.

3GRS027A Complete technical procedures for streamflow data collection

All procedures presently are at HIP QA.
Impact: schedule delayed - estimate additional month to complete. However, data collection is not affected by revision of these procedures because it can continue under the earlier versions.

3GRS022A Complete FY83-85 data and prepare report

Schedule delay caused by Mission 2001 exercise, training, and office relocation. Records submitted to Carson City reviewer on March 10, 1992. Data report submitted to Carson City for typing January 23, 1992, returned for first typing review to PI on April 3, 1992. First type review completed by PI April 17, 1992. Data report awaits resubmittal for final typing.
Impact: Schedule delayed one month. PI to address reviewers comments and make final changes to data report.

3GRS006A Reduce FY86-89 data and prepare report

Schedule delay caused by preparation of PACS schedules and work scope for Mission 2001 exercise, and QA training.
Impact: this activity may have to be moved into FY93.

Work Performed but not in Direct Support of the Scheduled Tasks
Prepared PACS input for Mission 2001. (64 hours)

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
3GRS006B Aerial reconnaissance of severe runoff features

P. Glancy studied Landsat TM satellite imagery of the Fortymile Wash area, provided him by EG&G, to assess the likelihood of whether this major drainage has flowed to the Amargosa River during historic times. The most likely and recent event for such a flow would have been in January and February, 1969, during which time major floods occurred in nearby areas.

D. Grasso studied photographs and maps of the Potosi Mountain area to develop procedures for investigating the four, July 1990, debris flows that occurred in the area. An abundance of evidence existed that will be useful in developing needed parameters of debris flow due to severe runoff.

D. Grasso procured 1969 climatic data set for Nevada, a year of major region-wide winter storms. In January and February, 1969, a major storm system caused extensive severe flooding throughout the area. These data will provide a basis for comparison between precipitation amounts and flood discharge measurement.

P. Glancy confirmed that the Copper Canyon mudflow, west of Walker Lake, Nevada, occurred between late-July and late-August of 1990. Additional effort was made to locate the source area of the mudflow, and to isolate the specific tributary drainage basin where the bulk of the debris was derived.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks
An estimated 68 hours were spent on the following:

D. Grasso and P. Glancy spent a considerable amount of time working on FY 93/94 PACS planning, revisions, and budgetary summaries for the Mission 2001 exercise.

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

D. Grasso and P. Glancy attended the ALPHA Paleohydrology Workshop and Field Trip. The field trip was particularly relevant to this activity in that it presented abundant stratigraphic evidence of historic flooding in northern Arizona and southern Utah. Most of these floods occurred due to increased runoff that was generated by intense storms. Dateable materials, enclosed within flood debris such as slack-water deposits, provided flood chronologies that are attributed to climatic change (e.g., El Nino years or latest Holocene glacial events). Additionally, methods for deriving the recurrence intervals of large debris flows in vegetated drainages, especially those containing large long-growth trees, were presented. The trip provided an excellent overview of the processes and products of severe runoff in the arid southwestern United States.

D. Grasso spent time configuring computer system hardware and software, processing data sets, and testing different numerical techniques needed for aerial reconnaissance work of this activity.

D. Grasso spent time developing a site form to record all necessary data regarding sites of severe runoff. This form will enable all site information to be consistent and insure that the necessary information (e.g., computer-compatible location data) gets recorded for each site investigated.

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 continued to assemble and process existing log data from mining-company drillholes constructed in the Amargosa Desert. Keller spent several days in the field correlating rock outcrops with cuttings collected from mining-company boreholes. He also met with mining-company representatives and W. Carr (USGS retired) to discuss processing of the field and log data as an Open-File Report. M. Ciesnik started to prepare a sample tracking system for rock samples (including borehole cuttings for activity 8.3.1.2.1.3.2).

Technical Activities (Continued)

3GRG053 Locate additional piezometers in the Amargosa

S. Keller made arrangements with a mining company representative to receive accurate map locations for mining-company exploration boreholes in the Amargosa Desert. J. Czarnecki learned of potential access to holes to be drilled by two different concerns in the southern Amargosa Desert on California State Lands. M. Ciesnik identified water wells that are part of the project's monitoring network on 1:100,000-scale topographic maps. Ciesnik incorporated water-level data from the monitoring network into a computerized spreadsheet.

3GRG054 Prepare report on existing regional water level data

M. Ciesnik initiated the compilation of water wells as part of the project's monitoring network and associated database.

3GRG003 Measure water levels in Amargosa Desert

No activity. Personnel vacancies have been advertised to fill a field hydrologic technician position, whose responsibility would, in part, be to measure water levels.

3GRG009 Analyze hydrostratigraphy and structure

S. Keller began preparation of a cross-section of hydrostratigraphic units for a section within the Amargosa Desert with a cluster of data from mining company exploration boreholes.

Quality Assurance

Planning and Operations

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

J. Czarnecki spoke with personnel from the Nevada BLM and California State Lands Commission regarding access to wells in the Amargosa Desert. BLM conducted site visits to specific deep piezometer sites in the Amargosa Desert to verify that reclamation work by the mining company had been completed. M. Ciesnik verified the locations of several water wells in the Amargosa Desert from a list submitted through the DOE to the BLM for access permits.

Planning and Operations

3GRG007 Prototype equipment testing for small diameter wells

J. Czarnecki and B. Davies installed another 160 ft of 1-inch galvanized steel pipe and sucker rod in a 2-inch piezometer west of Stateline, NV. An electric winch was added to a modular tripod to facilitate installation of the pipe, and resulted in much easier installation. Also added during the installation was a "stuffing box" used to keep water from discharging past the sucker rods. The piezometer was pumped at a rate of about 5 gallons per minute, for a combined total period of about 2 hours, but for only 15 minutes per pumping cycle because the piezometer would go dry.

Variances

3GRG007 Prototype equipment testing for small diameter wells

Although several tests of the jack pump installed in the well have been successful, several other tests are needed to further develop techniques for pumping and sampling small-diameter wells. There is no impact on the long-term schedule.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 130 hours were spent on the following:

M. Ciesnik prepared a QA package with the final dispositions to USGS-AFRs 9204-01 and 9204-02 and sent it to the QA office. He also wrote and sent amended responses to USGS-AFRs 9203-01, -02, and -03, as well as amended responses to USGS-NCR 92-18. He also discussed with A. Riggs the QA issues of SCP activity 8.3.1.5.2.1.4 with regard to the upcoming internal audit. In addition, he provided assistance to J. Ziemba (SAIC/Golden) in establishing a tentative timetable for the audit. Ciesnik also reviewed issues regarding QA compliance within SCP activity 8.3.1.2.3.3.2 as well as a list of outstanding open items for activity 8.3.1.2.1.3.2. He completed the following QA reading assignments: QMPs 3.07, R4-M1; 12.01, R5-M2; and 3.15, R0. He also participated in a training session on QMP-3.15, R0 (Application of Graded Quality Assurance). Ciesnik reviewed Study Plans and the PACS schedules for SCP Activities 8.3.1.2.1.4.2, 8.3.1.2.1.3.3, 8.3.1.2.1.3.4, 8.3.1.2.1.4.2, 8.3.1.5.2.1.4, 8.3.1.2.3.2.1, 8.3.1.2.3.2.2, and 8.3.1.2.3.2.3. Lists were prepared of subactivities proposed for grading-out according to guidelines described in QMP-3.15, R0. Ciesnik prepared a spreadsheet for hydrochemical samples using Quattro Pro 3.0, and prepared TDIFs for data from the following project activities: 8.3.1.2.1.3.2--lithologic data from oil-test holes in the Amargosa Desert (J. Czarnecki); 8.3.1.2.3.3.3--field measurements of rock fractures orientation (E. Ervin).

J. Czarnecki repaired a Panasonic KX-P4450 laser printer, performed an annual employee performance appraisal of C. Savard, and prepared PACS scheduling and budget data for FY 93-94 for SCP activities 8.3.1.2.1.3.1-4 and 8.3.1.2.1.4.2.

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. Planned publication medium for the two-part report will be a technical journal. The first journal article will describe the methodology used and will use data not associated with the Yucca Mountain project. The data and interpretations for the Amargosa River and Fortymile Wash will be in a second journal article as a sample application of the methodology used.

3GRG004B Develop infiltration test procedure

Held discussions with B. Guertal and L. Hoffman concerning falling head and constant head infiltration tests. It is not known which test will work best in the sand and gravel soils on and near Yucca Mountain. Both tests need to be run and practical experience gained before a final procedure(s) is decided upon. Since neutron log holes in Fortymile Wash are not scheduled to be started until 1996, incorporation of neutron logging is not needed at this time. Large scale tests probably will not be attempted until neutron logging holes are complete. Finalized procedures will be completed after prototype testing. This activity is complete.

3GRG005B Complete procurement of infiltration test equipment

Major equipment needed to run infiltration testing has been procured. Additional equipment needs will be determined during and after prototype testing. This activity is complete.

3GRG012B Non-linear analysis of regional streamflow

The poster titled 'Looking for chaos in streamflow with discharge-derivative data, Savard, C. S.' was presented on May 14 at the American Geophysical Union Spring 1992 meeting, in the special session 'Predictability of Climatic and Hydrologic Systems: Insights from Nonlinear Dynamics'. The poster provided information about the underlying nonlinear dynamics of streamflow. The predictability of streamflow is important in the Yucca Mountain area to define ground-water recharge. This activity is finished.

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 an ongoing recharge event and effects from the Rock Valley earthquake. Discussed runoff observations, precipitation data, neutron logging results, and depth-to-water measurements with a USGS tour.

3GRG013B Analyze Fortymile streamflow for transmission loss

Began appreciating the coupled behavior of climatic events such as El-Nino and streamflow in the Fortymile Wash watershed at talks and poster presentations at the AGU meeting. The coupled behavior may lead to a characterization of the streamflow source term needed to understand ground-water recharge.

3GRG025 Construct ponding/infiltration sites

Field reconnaissance was made for several sites.

Technical Activities (Continued)

3GRG101A Perform prototype infiltration test

Discussions were conducted with Artificial Recharge personnel from the Unsaturated Zone concerning type of infiltration tests to run. The merits of falling head or constant head tests were discussed.

Observed Artificial Recharge personnel performing prototype infiltration tests.

Performed preliminary prototype infiltration test in Topopah Wash in central Jackass Flats. Because of the high infiltration rate of the streambed materials, a system to deliver the volume of water needed in a short time without disturbing the streambed material needs to be devised.

Quality Assurance

Planning and Operations

3GRG001B Complete criteria letter ponding sites

Continued to draft criteria letter.

3GRG006B Complete criteria letter FM and FMN holes

Continued to draft criteria letters.

3GRG010B Continue to site FMN and FM holes

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

Variances

3GRG001B Complete criteria letter ponding sites

Ponding sites are not finally located. 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 and FMN holes

Additional time is needed to complete the draft criteria letters. Hole locations need to be sited. Sampling schedule during drilling defined. No impact on major deliverables is expected.

3GRG010B Continue to site FMN and 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 impacts 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 impacts on major deliverables is expected.

Variances (Continued)

3GRG109A Procure equipment for air-k tests

Air permeability tests need to be reevaluated for their help in determining recharge from Fortymile Wash. Experts in the field will be consulted to determine if the costs and effort to obtain air-k data will be useful for Fortymile Wash recharge objectives. Any delay will not impact major deliverables.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 72 hours were spent on the following:

Labeled photographs documenting the operations used for ground-water sampling in the Regional Potentiometric Level Network. Forwarded negatives to SAIC for processing and inclusion in poster material used in Public Update meetings.

Represented the saturated zone during a Public Open House tour of the Yucca Mountain Project.

Prepared FY93/94 PACS information for review by USGS management.

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

Assisted Site Saturated Zone personnel in removing an old pressure transducer, measuring water level, and installing and calibrating a new pressure transducer in WT-13.

Located historic water level measurements in USGS files for UE-29 UZN#91, UE-29 a#1, and UE-29 a#2. Analyzed the data by plotting the data and looked for trends and responses to past recharge events.

Learned how to operate portable Magellan Global Positioning System units. The units and post-processing software need to be evaluated for possible use in determining location and elevations of well sites in the Amargosa Desert.

Loaned negatives of February runoff events in the Fortymile Wash watershed to Surface Water monitoring group of the Nevada District. A list was provided with the time and place of the photograph.

Assisted paleohydrology personnel in having their Las Vegas based GSA vehicle serviced.

Delivered 1000 ft of pipe to the USGS staging area in the Amargosa Desert for use in regional saturated zone groundwater sampling studies.

Cleaned up office after June 29 Rock Valley earthquake.

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

3GRG208A Purchase materials for piezometer nests

1000 ft of 1-inch diameter steel piezometer pipe and sucker rod were purchased for use in piezometer nests and in deployment of a small diameter pump in deep piezometers.

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

No activity. This activity has been placed on hold until the project chief can be freed to work on it. Results from this effort will feed G006.

3GRG030 Select wt/et sites

A determination of which sites are to be used for piezometer nests can not 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 greatly minimize the need for piezometer nests. J. Czarnecki discussed chloride profiling with S. Tyler (DRI, Reno) who provided several papers on the subject.

3GRG201A Perform prototype tests on ET measuring technique

J. Czarnecki and D. Stannard (USGS CRR) worked on configuration of a Bowen ratio station for obtaining estimates of ET. The system employs dew-cell hygrometers/thermistors, a net radiometer, and soil heat flux plates connected to a Campbell Scientific datalogger. Czarnecki became familiar with the software and computer interfaces for programming the datalogger.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 16 hours were spent on the following:

J. Czarnecki prepared changes to a poster for the 7th International Conference on Water-Rock Interaction (WRI-7) meeting and completed registration materials for the meeting. A final version of a paper entitled "Hint of recharge at Franklin Lake Playa, Inyo County, California" was prepared with changes per USGS Director's office and sent to WRI-7 organizers.

M. Ciesnik discussed various options of input/output devices used with portable microloggers with technical staff from Campbell Scientific, Inc.

J. Czarnecki discussed plans for a 30-50 m deep corehole at Franklin Lake playa for use with a multilevel sampler with R. Forester (USGS/GSP). It was agreed that this hole could be beneficial for characterizing past climates and discharge environments at Franklin Lake playa.

J. Czarnecki performed a final review of retyped text for the report entitled "Geohydrology and evapotranspiration at Franklin Lake Playa, Inyo County, California." The report (USGS WSP-2337) was sent on for final processing.

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

J. Czarnecki helped organize and participated in a joint meeting of the Hydrology Integration Task Force and the Geochemistry Integration Team held in Denver on June 9-11, 1992, entitled "Fast Pathways: Definition and Detection." Czarnecki presented a talk on the subregional ground-water flow system with emphasis on uncertainty regarding flow coming into Yucca Mountain. This analysis was done by examining hydrologic and hydrochemical data. Participants broke into separate working groups to identify strategies for identification of fast pathways and making recommendations to DOE for accomplishing this task.

3GRM014A Verification problems, MODFE computer program

The task is finished. M. Ciesnik successfully tested ground-water flow problems using the computer program MODFE on a 386/20 microcomputer. The output matched that which was provided by L. Torak (USGS/Georgia). Ciesnik had discussed with Torak the transfer of the source code via the Prime computer. All prime files were subsequently downloaded to the 386/20 PC. Output files pertaining to a documented radial flow problem were compared for runs made on Prime and PC computers and were found to be acceptable. Ciesnik continued gaining familiarity with the MODFE code and its documentation. He also reviewed the SOLD debugger which is part of the Lahey F77L-EM/32 FORTRAN compiler.

J. Czarnecki and M. Ciesnik participated in two UNIX users classes (DG/UX System and X-Windows).

3GRM015A Test finite-element mesh generator

J. Czarnecki began installation of the software package GRID BUILDER and was diverted from completing this task. He was successful in loading the FORTRAN compiler that was provided for running this software.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 20 hours were spent on the following:

M. Ciesnik installed and tested the statistical software package, GEOEAS, for its possible use in activities 8.3.1.2.1.3.2 and 8.3.1.2.1.3.4.

J. Czarnecki acted as representative of hydrologic studies and answered questions from the public at DOE sponsored update meetings in Pahrump, Las Vegas, and Reno, NV.

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 GSIS with ground-water models

J. Downey modified PREMOD code (on loan from International Ground Water Modelling Center) in order to port same to run on the IBM model RS6000 RISC system.

PREMOD is a software package that allows for the manual development of input arrays for MODFLOW (the standard USGS 3D finite difference) model. The modified PREMOD was changed to allow for the large arrays that will be generated by the 3D modelling activity.

Quality Assurance

Planning and Operations

3GRM040 Interface GSIS with ground-water models

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

3GRM08A Begin calibration of numerical model

Prototype model test runs with large model grid (200 X 240 X 10) have begun. J. Downey and K. Kolm began conducting software code tests on model dimensions and memory constraints. Modified MODFLOW executable code (on loan from IGWMC at CSM) has been ported for use on an IBM model RS6000 RISC system at the Colorado School of Mines. This work will help to solve some of the expected software/hardware problems due to occur when formal model calibration begins.

This work is necessary so that a 10 layer GW model with 240 nodes on a side can be operational in the near future. At the present time the node size is about 1 Km.

3GRM13A Develop visualization software

During ESF Conference (C. Faunt, F. D'Agnese, and K. Turner):

-Met with S. Houlding (Lynx Geosystems). Houlding offered to have the LYNX staff test their visualization and modelling software with YMP data sets. This offer will save this activity approximately 2 man-months of time testing visualization software.

-Met with I. Nixon (Intergraph). Nixon acquainted group with Intergraph's new 3D visualizing software that will be available third or fourth quarter of 1992.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

J. Downey was involved in the prepa.ation of many administrative memorandums and letters required in the conduct of the project activities by program management. (100 hours)

J. Downey finished code development for SNODIF, version 1.0, and model was used in the development of figures for Water Resources Research paper by H. Claassen and Downey. Paper has been submitted to the manuscript section for final typing and submission to the Director's office for approval. (80 hours)

C. Faunt, F. D'Agnese, and K. Turner prepared for, traveled to, and attended the European Research Conference on "Space-Time Modeling of Bounded Natural Domains: Tools for 3-D Representations" held at Il Ciocco, Castelvecchio Pascoli, Lucca, Italy from May 31 to June 4. The Conference was sponsored by the European Science Foundation and attendance was only by invitation to scientists considered to be conducting innovative research in the field of 3-D GIS. This meeting provided considerable information into approaches others are taking towards the application of 3-D GIS to earth science problems. (120 hours)

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 potentia; 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

3GUI002A Analyze rock outcrop samples

It was decided that it was not feasible to submit the Shardy Base horizontal variability study as a proceeding in the International Geostatistical Congress in October 1992, in Portugal; it will be submitted to the High Level Waste Conference instead. All samples have been analyzed as part of this activity and TDIFs have been submitted.

3GUI004A Compile and analyze existing soils data

Compilation and analysis of existing soils data has been completed, and geostatistical analysis on these data has been performed, indicating spatial correlation in sand content of approximately 1000-2000 ft while there was a pure nugget effect in bulk density. GWC had a lag of about the same as % sand. Due to the large scale of the study area, reconnaissance information is progressing to highlight new understanding and to address where additional information is needed to plan full scale field sampling scheme to adequately characterize field soils.

3GUI005A Install and check geophysical instruments

All tools were installed in the geophysical logging van, have been tested and are in working condition. An additional person is being trained to get this activity in full operational level and is currently being familiarized with operation of the logging van and additional radiation safety training. Test runs in N54 and N55 will be performed, and the calibration will be checked against the known borehole conditions and measured core densities.

3GUI007A Analyze spatial variability of soil physical properties

This activity is in the planning stages to develop a sampling scheme based on preliminary data. This will describe the variability of soil physical properties in two small watersheds, Split Wash and Pagany Wash by collecting samples in ridge to ridge transects and several grid networks. This activity will support the development of small watershed models until the Mission 2001 activities begin in October, when it will be directed towards the development of a map of infiltration-runoff surficial units.

3GUI020A Prepare OFR outcrop samples

The TDIFs for all the outcrop data have been submitted and a preliminary outline for the open file report has been begun to present all laboratory data from seven surface outcrop transects.

Quality Assurance

3GUI023A Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

3GUI005 Test borehole logging tools in new neutron hole

This activity will be completed as a part of activity 3GUI005A (install and check geophysical instruments), which will proceed in its place using the new tools and logging van. Rather than using the old tools, it was decided to wait for the new tools and van. Installation and check-out of the new geophysical tools has been done and the borehole testing will proceed.

Variances

3GUI025A Procure SPARC station for GIS program

This activity is still delayed due to delays in procurement process. The GIS program has not been impacted to any degree because the position has not been filled. The person has been selected but is currently filling a position in the Meteorology program that cannot be vacated until he is replaced. However, several days have been spent in the last two months advancing computer interfacing capabilities.

Work Performed but not in Direct Support of the Scheduled Tasks

Support for Yucca Mountain Tours. (8 hours)

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

Due to the Mission 2001 PACS endeavors this activity will be redirected. There will be two small watershed models developed using the initial efforts in Pagany Wash, from this activity and an additional location in Split Wash. The small watershed models will be applied to a large watershed model in FY94 and in the meantime will utilize data from all three infiltration activities to develop a model that can accurately predict current field conditions and reasonably extrapolate over time given climatic changes. These two washes have been undergoing digitizing in the last two months. In addition, efforts to update neutron log files for analysis (activity 3GUI311A) have been required in order to supply the necessary components for the 1-D model in terms of surface boundary conditions.

3GUI304 Initiate large scale deterministic model

This activity has been terminated because it was replanned as part of the Mission 2001 exercise. It was decided that the small-scale deterministic model be expanded into two small watershed models, one over the repository zone at Split Wash and one further north where there is more exposed fractured bedrock and higher rainfall in Pagany Wash. It was considered that additional effort spent on these two models was needed prior to the development of a large scale model.

3GUI311A Continue analysis of moisture profiles

The large dataset collected during the winter and early spring has required additional time for organization and analysis. Due to lack of personnel in the previous year most of the neutron logging data was not checked for consistency, checking the changes in opening and closing counts over time, as well as deviation in average 10-counts for a given meter. These checks would offer validity to short term changes in water content, suggested by high rainfall, to be infiltration. Therefore, due to the very wet winter and large changes in water content, it has been crucial to proof all the data sets carefully. Before any more serious analysis is done using the moisture profiles, the dataset will be cleaned up so the counts can be reconverted to volumetric water content using the new field calibration equations for each meter. Current data is suggesting that evaporation of water from boreholes in alluvium is much faster than boreholes in bedrock, as well as relating to total depth of alluvial cover.

Technical Activities

3GUI315 Prepare technical paper small scale model

Progress on this paper is awaiting further evaluation of the model using measured data to represent upper boundary conditions. This paper will consist only of work done on the 1-D model but may be delayed to incorporate better analysis from neutron holes using new field calibration equation to provide better mass balance calculations for the surface boundary conditions.

3GUI324 Initiate tritium sampling program

N-55 LEXAN samples chosen for tritium analyses by the infiltration and geochemistry groups were delivered to the HRF, packaged and delivered to C. Peters to be transported to Denver for analysis.

3GUI358 Collection and analysis evaporation pan data

Data was being collected from the new automated evaporation pan but in mid-June a problem arose with corrosion in the float and the water level wasn't maintaining stability. This is being redeveloped.

3GUI377 Field calibration of neutron-moisture meters

Final core analysis has been completed on the three neutron holes selected as calibration holes, N55, N54, and N27. Preliminary field calibration equations and methodology have been completed and the procedure to use a transfer equation from the calibration tanks is being outlined. As the procedure is being written, equations for each meter will be finalized.

3GUI381 Log neutron access boreholes FY92

Monthly logging was completed in May and June for all of the neutron holes. Except for the newly drilled N53 all new holes have been added to the logging schedule. The deep holes (>100 feet) were logged only to 60 ft (except for N-11 which was logged to total depth (TD) of 125 ft), but will be logged to TD approximately every 6 months.

3GUI386 Continue drilling new neutron access holes

N-53 was completed to 250 feet in WT-2 Wash next to N-54 using the CME 850 track mounted rig. All remaining neutron holes have been staked and the next holes are planned to begin in mid-July following all environmental compliances.

3GUI389 Calibration & testing of cross-hole gamma probe

The laboratory calibration of the cross-hole gamma probe has been completed. Field use will now proceed along with the automated TDR system.

3GUI396 Testing and calibration of prototype TDR

This activity has been completed and it will be incorporated into the calibration activities of the CSI TDR system.

3GUI404 Installation of TDR network

TDR system arrived in late June and preparations are being made to coordinate field activities with personnel in the Artificial Infiltration program. The field calibration site is in place and a field site at the mouth of Pagany Wash is planned to accompany the ET measurements ongoing in that location. Installation of that network will proceed as soon as field calibrations have been completed, and no delays are expected in any following activities.

Technical Activities (Continued)

3GUI340 Procure tritium analysis

Analysis of tritium has been arranged for with the USGS-YMP Geochemistry group.

3GUI369 Initiate collection and analysis ET data

Data has been collected from the Bowen ratio station in Pagany Wash and has been parsed and organized for preliminary analysis to calculate evapotranspiration from all measured parameters. Preliminary calculations suggest there may be errors in the soil heat flow measurements and this is being looked into. Alternative methods for collecting soil heat flow data is being evaluated.

Quality Assurance

3GUI409 Graded QA and other QA requirements

Implementation of all QA requirements were performed as needed.

Planning and Operations

3GUI368 Procure instrumentation for ET

Instrumentation required to collect evapotranspiration data, soil heat flux, and wind speed is in procurement.

3GUI388 Procure and calibrate sensors for borehole monitoring

Sensors for borehole monitoring of temperature, pressure and water potential have been ordered.

3GUI405 Procure CSI TDR

This activity was completed with the CSI TDR system being received in June.

3GUI391 Siting boreholes for cross-hole gamma

Siting of boreholes for cross-hole gamma will be ongoing with ET studies. First holes are in place in Jackass Flats near the evaporation pan. Additional holes are planned for the ET site at the mouth of Pagany Wash, along with a site in Split Wash where an additional Bowen ratio station will be placed. The boreholes will be installed with the jackleg drill according to research showing that this tool causes minimal disturbance.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

A variety of tours were conducted in the HRF. (24 hours)

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

Single ring, double ring, and compact constant head infiltrometers were tested under various field conditions. A variety of different ring types and sizes have been evaluated.

Technical Activities (Continued)

3GUI608 Develop sampling scheme/field infiltrometer study

Several different sampling schemes and sampling devices are being evaluated. Optimal sample size, sample containers, and techniques for taking whole soil samples, coarse fragment samples, and fine (2.00 m or less) soil samples are being investigated.

Quality Assurance

3GUI695 Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

3GUI617 Prototype ponding study

This activity has been cancelled for FY92 due to changes in the drilling schedule and the late arrival of project personnel. This work has been replanned for FY93.

3GUI618 Prepare criteria letter/field infiltrometer study

This activity has been cancelled. It has been determined that a criteria letter for the field infiltrometer study is not needed.

3GUI631 Criteria letter for drilling at infiltration plots

Due to changes in the drilling schedule this activity has been delayed to FY94.

3GUI632 Drilling test plan pkg pond SPRS and LPRS

Due to changes in the drilling schedule this activity has been delayed to FY94.

3GUI638 Conduct readiness review for field infiltrometer study

This activity has been canceled. A readiness review for the field infiltrometer study is not required.

3GUI690 Conduct readiness review drilling pond, SPRS/LPRS boreholes

This activity has been terminated. A readiness review for the drilling of neutron-moisture access tubes at the ponding and SPRS/LPRS sites is not required. Further, the drilling has been postponed to FY94.

3GUI691 Initiate/prepare technical procedure for artificial infiltration studies

This activity has been cancelled due to unforeseen changes in the drilling schedule. Procedure development will resume in FY94 after completion of prototype ponding/SPRS/LPRS study.

Variances

3GUI606 Prototype infiltrometer field testing

Due to the late arrival of the project personnel, additional time is needed for continued evaluation of infiltrometer prototypes. Infiltrometer evaluation will continue through September 30, 1992 and into FY93, indicated on the replanned schedule.

3GUI616A Develop prototype ponding study

Due to unforeseen changes in the drilling schedule, and the late arrival of project personnel, technical planning for this study will continue through September 30, 1992 and into FY93, indicated on the replanned schedule.

Work Performed but not in Direct Support of the Scheduled Tasks
Supported tours. (16 hours)

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

3GUP009A Construct and test low-flow permeameter
Construction was started on this apparatus in June. Engineering drawings were prepared and all remaining components, mainly valves and tubing, were ordered. Work was begun to refinish the mounting rack and prepare it for assembling components. Most of the pressure vessels, transducers, and flow sensors have arrived, along with the precision pump.

3GUP013A Model imbibition to verify lab measurements
This work is continuing in cooperation with Lawrence Berkeley Laboratory to develop a new formalism for the water characteristic function and the permeability function to match our laboratory imbibition data. It is expected that verification of the data and application to unsaturated flow models will be completed soon.

3GUP17AA Water retention from SPOC analyses
Work is continuing on this apparatus by M. Humphrey at Oregon State University. An eight-cell unit is being constructed for installation into a controlled-environmental chamber at the HRF.

3GUP019A Water retention pressure plate tests
No new pressure plate measurements were made during May or June. Data from earlier experiments on about 70 plug samples were being interpreted, and additional measurement runs were planned.

3GUP023A Develop pore geometry technique
Experiments with several dye combinations and a variety of strong, low-viscosity epoxy cements led to excellent impregnations and slide mounts of tuff samples from Yucca Mountain. J. Dishart made successful thin sections from these using a simple lap polishing wheel and hand finishing. Petrographic analysis on fluorescent dye-impregnated thin sections of Yucca Mountain rock has begun.

Technical Activities (Continued)

3GUP25AA Chilled-mirror psychrometer verification

M. Nash has nearly completed the technical verification of the CX-2 device by studying the influence of aggregate size on measured rock water tension. As expected, water potential varies with particle size on samples that are in equilibrium in a sealed container. The degree of variation seems to be related to lithology, with Tiva columnar samples behaving very differently from Tiva shardy base samples. Experiments are underway to determine water retention curves on solid slices of rock core, and to test a new sample cup design with an o-ring seal. Some cooperative tests are also being made with Joe Rousseau's fast response thermocouple psychrometers and the CX-2 to verify the accuracy of both methods. A technical procedure for using the CX-2 on Quality-Affecting core has been written and is undergoing review.

3GUP26AA Transect sample statistics

Statistical and geostatistical analysis of data collected from the transect samples has been completed. C. Rautman (SNL) and A. Flint are using it to determine if more surface outcrop samples are needed to study spatial variability in rocks at Yucca Mountain.

3GUP27AA Permeability of selected transect samples

Single-phase (saturated) permeability to water and air was carried out on about 50 outcrop samples of Calico Hills tuff and lower nonlithophysal Topopah Spring tuff in the new permeameter. These samples were from a special high-temperature experiment performed by A. Flint to determine the effect of heating on hydrologic properties. Permeabilities of the selected transect samples were completed in May. An abstract titled "Porosity and permeability of tuffs from the unsaturated zone at Yucca Mountain, Nevada" by D. Soeder and J. Dishart was approved by the Regional Hydrologist and submitted to the Geological Society of America for their 1992 Annual Meeting in Cincinnati, Ohio in October.

3GUP028A Imbibition measurements on transect samples

These measurements have been completed on the composite transect samples and, except for a couple of verification reruns, essentially have been completed on the heater experiment samples as well. A decision to run imbibitions on other transect samples, such as the shardy base of the Tiva Canyon, may cause this work to continue.

3GUP028AA Psychrometry on selected transect samples

No progress was made on this activity in May or June due to the ongoing calibration and verification work with the CX-2 psychrometer. Both the chilled-mirror psychrometer and thermocouple psychrometer will operate more reliably in the environmental chamber.

3GUP029A Transect moisture characteristic curves

Moisture characteristic curves were run on approximately 70 composite transect samples using the water-retention pressure plate measurement described in 3GUP019A. M. Nash is running tests to determine if moisture characteristic curves (sorption/desorption) can be determined on rock slices in the CX-2 psychrometer.

Technical Activities (Continued)

3GUP30AA Neutron core physical property measurements

This activity is continuing. Core samples from the N-37, N-27 and N-11 boreholes were started through the HP-229 procedure in May and June. Cores from the N-15, N-16, N-17, N-36, N-38, N-53 and N-64 holes have been received from the Sample Management Facility (SMF) and are awaiting processing.

3GUP32AA Neutron sample statistics FY92

Statistical analysis of the HP-229 data obtained from N-54, N-55, N-37 and N-27 is being conducted by A. Flint and L. Flint. This work is ongoing and proceeding as scheduled.

3GUP037A UZP-6 core physical property measurements

The drilling of UZP-6 has been canceled by DOE; therefore, this activity is canceled.

3GUP038A UZP-6 sample statistics

The drilling of UZP-6 has been canceled by DOE; therefore, this activity is canceled.

Quality Assurance

3GUP003A Continue QA procedures, training and calibration FY92

QA training and equipment calibrations were carried out as required. The laboratory balances at the HRF were calibrated by REECo on May 5, 1992, as requested on our 6-month calibration schedule. Procedures are in various stages of progress for the pycnometer, chilled mirror psychrometer, and the high-flow permeameter.

Planning and Operations

3GUP16AA Matric potential from tensiometer--transducer

This activity has been canceled for FY92. Although equipment is available to make these measurements, it is only one of several techniques being considered for measurement of matric potential in core samples. Because the chilled-mirror-psychrometer method seems to be working well (see 3GUP25AA) and because of calibration problems with the transducer-tensiometer method due to the dryness of YM cores, further experimentation is being postponed until FY93 or FY94.

Variances

3GUP17AA Water retention from SPOC analyses

Construction of the eight-cell unit is taking longer than expected, but the work is proceeding successfully and the delay is not expected to impact any other activities at this time.

3GUP25AA Chilled-mirror psychrometer verification

Although delayed, technical verification of this method has made excellent progress and is nearly complete. No significant impact on future work is expected.

3GUP009A Construct and test low-flow permeameter

Delays in procurement of the less-critical components have delayed final construction of the low-flow permeameter. However, this probably will not impact milestones on upcoming permeability measurement tasks.

Variances (Continued)

3GUP30AA Neutron core physical property measurements

Measurements of physical properties of cores from new neutron-access boreholes will be extended through September 30, 1992, because more holes are being drilled in FY92 than originally planned. Although this is a variance from the original schedule, it represents very positive progress for the matrix-properties program.

3GUP31AA Neutron core gas pycnometry measurements

A technical procedure for the gas pycnometer was written in March and is undergoing review. Therefore, these analyses cannot be completed until the technical procedure has been approved by QA. No impact on the long-term schedule is expected because matrix-property testing of neutron-borehole cores actually is ahead of the original schedule because more holes are being drilled in FY92 than originally planned.

3GUP018A Matric potential from heat-dissipation probes

These measurements have not started because the heat-dissipation probes have not been received from the manufacturer, despite several inquiries by r atrix-property project staff. Although this is a viable method that will be evaluated as part of the matrix-properties prototype-testing program, other methods still are available and site-characterization measurements probably will not be adversely impacted. Project staff will engage in a more intense dialogue with the manufacturer to resolve the problem of late delivery of the probes.

Work Performed but not in Direct Support of the Scheduled Tasks

Public tour (open house). (12 hours)

Clean up earthquake damage. (8 hours)

SCP 8.3.1.2.2.3.2a Surface-based boreholes studies 0G3312V2

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP053E Develop electronic diagnostic/performance verify SPECS of electronic equipment

All equipment for this activity has been ordered and delivered. Preliminary testing has been conducted to establish the practical performance limits of conducting in-house verification checks of electronic equipment used for data acquisition in the field and in the calibration laboratory. The purpose of this procedure is to eliminate the need for routine recalibration of DAS components.

3GUP040E Acquire, install, evaluate optical disk media

Four optical disk, data storage, systems have been delivered. Two of these systems have been installed and are being used to service the HRF prototype boreholes. The other two systems will be installed as part of the IDAS operations SA 8.3.1.2.2.3.2c. This activity is complete for SA 8.3.1.2.2.3.2a.

Technical Activities (Continued)

3GUP046E Complete development/design of Denver database

This activity is essentially complete and can be closed out. Design specifications and software were developed in conjunction with HRF borehole monitoring program.

3GUP003E Instrument and monitor HRF boreholes

Monitoring of HRF boreholes continued throughout the reporting period. System was taken off-line for approximately 10 days to allow IDAS to take over monitoring from the local DAS.

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

The first multi-station gas sampling apparatus has been assembled and wired to the electronic data acquisition system. Apparatus is undergoing leak testing at this time. Software for running this system is approximately 90% coded. Extensive shakedown testing of this system is still required. The HRF boreholes and the two pressure humidity generators will be used to simulate gas sampling experiments from deep boreholes at Yucca Mountain. This system is not needed until the first deep UZ borehole is instrumented - September 1993.

3GUP059E Complete processing thermistor, pressure transducer, psychrometer technical procedure

All three technical procedures have been written. Major revisions to the thermistor calibration procedure are being made. The pressure transducer and psychrometer technical procedures are pretty much ready (with minor revisions that incorporate reference to the electronic diagnostic technical procedure) for review. This activity has a very high priority for the program. Sensor calibrations for the first deep UZ hydrologic instrumented boreholes need to begin in early October 1992.

3GUP055E Write technical procedure for diagnostics of electronic equipment

A draft outline of this procedure has been written. Compilation of the procedure cannot be completed until most of the work under 3GUP053E is completed.

7201M Deep UZ borehole (VSP-1) drilling (start)

Drilling of UZ-16 (VSP-2) commenced on May 27, 1992. As of June 30, 1992, total cased/reamed depth was approximately 100 ft.

Quality Assurance

Planning and Operations

3GUP035E Prepare for instrumentation of UZ-16

Work continued on this activity throughout the reporting period. J. Rousseau coordinated with tubing suppliers and RSN engineers involved with designing the geophone cable mounts. An outline of a technical procedure for instrumenting UZ boreholes has been developed. The USBR was advised of the need for future CAD/CAM support to provide preliminary stemming plan drawings and final as-builts. Instrumentation of UZ-16 is tentatively scheduled for May 1993.

Planning and Operations (Continued)

3GUP060E Hire and train new staff

Vacancy announcements to fill two professional level positions in the calibration laboratory have been advertised. As of June 30, 1992 no candidates have been identified. This activity is being closed out for FY92 because funding precludes hire prior to start of FY93. The two positions being advertised are considered critical to program needs. Program can survive for the time being, but could be in serious trouble later if the drilling program picks up momentum.

3GUP020E Acquire/install mass flow

The bench-top mass flow calibrator from Sierra Instruments is scheduled for delivery at the end of July 1992.

3GUP047E Prepare procurement documents, 2nd gas sampling system

Approximately 30% of the materials, equipment, and supplies for the second gas sampling system have been procured. Because funding is insufficient to complete procurement of the rest of this system in FY92, the activity has been terminated. (Funding for the remaining procurement of this activity has been diverted to the hire of temporary employees and detailees to support UZ-16 drilling operations).

3GUP045E Order additional microwave telemetry

Activity is still on hold pending approval of FCC license application. REECo communications group is in the process of attempting to acquire the equipment on a loan basis to determine if it will work as anticipated. Impossible to predict completion date at this time.

3GUP042E Prepare procurement documents for UZ-9 bh instrument

All sensors for instrumenting the first deep UZ borehole have been procured. Procurement documents for fabrication of the downhole instrument station apparatuses (DISAs) have been processed, and bids have been submitted to Central Region Procurement Division. A pre-award survey of the low bid vendor will be conducted during the week of July 6th. Units will be manufactured locally. Quotes for sliding screen assemblies have been received from Baker Tools. The issue of who (USGS or REECo) will actually procure bulk materials and supplies (i.e. electrical cable, teflon tubing, sliding screens, central support tubing, grout, poly beads, etc.) still needs to be resolved. Specifications for all materials and supplies are available.

Variances

3GUP053E Develop electronic diagnostic/performance verification SPECS of electronic equipment

Completion date of this activity has slipped five months to November 30, 1992. Work on this activity was temporarily suspended in March 1992 to accommodate other higher priority needs (i.e. drilling start-up at UZ-16). Work on this activity will resume in late August 1992. Procedure is not needed until after the first deep UZ borehole is instrumented (i.e. September 1993). Slippage will not affect instrumentation schedule for deep UZ boreholes.

3GUP020E Acquire/install mass flow

Acquisition of the mass flow calibrator (bench -top unit) has slipped one month. No impact on project schedule is anticipated. Cause: delay on the part of the procurement process and the manufacturer.

Variances (Continued)

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

Activity has not started yet; it has slipped approximately five months. Work on this activity will begin as soon as the majority of the testing on the gas-sampling apparatus has been completed (i.e. probably around November 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

Developed/revamped PACS schedules - Mission 2001. (40 hours)

Wrote technical procedure for use of six-wire Peltier cooled psychrometer to measure core water potential. (40 hours)

Conducted experiment for measuring core water potential using the six-wire psychrometer developed for the *in situ* instrumentation and monitoring program. (80 hours)

Reviewed and evaluated ICE cost estimates for surface based studies. (16 hours)

Assessed earthquake damage to facilities at NTS and coordinated repair of damaged facilities (IDAS facility firewall in HRF). (10 hours)

Participated in Fast Pathway Integration meeting in Denver. (40 hours)

Prepared and processed employee performance appraisals and FY93 work plans. (28 hours)

Prepared QA grading reports for surface based studies. (4 hours)

SCP 8.3.1.2.2.3.2b Vertical seismic profiling 0G331232

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP025B VSP prototype field test and data analysis

Two boreholes at Bergen Park have been drilled, and a 10 ft section of surface casing set. Cross borehole recording equipment was borrowed/rented from OYO, Inc. Preliminary data was acquired and data quality is good. More testing will be required before acquiring actual production data.

3GUP035B Design/test/evaluate geophone mounts

Two preliminary designs have been submitted, one by RSN and the other by the USGS. Design concepts will be reviewed by an independent third party and a final design established. RSN will arrange for procurement of the mounts.

Technical Activities (Continued)

3GUP045B Identify/evaluate seismic source tool

An orbital vibrator, made by OYO, Inc., under license from Conoco has been identified. This vibrator generates clean horizontal (Sh) and compressional waves in a dry hole. The source will be evaluated at the Bergen Park site during the summer.

3GUP019B Continue VSP lab/physical and computer simulation: 2-D method

Very extensive image processing of the Yucca Mountain physical model data is under way. An elaborate processing sequence that involves "upwave filtering" before imaging, and weighted stacking of partial images is yielding excellent P-P images of the reflectors. Ultimately there will be eight final weighted stacks: four each (P-P, P-S, S-P, S-S modes) for the right and left sides of the borehole.

P17M Report: 2-D fault method

A preliminary draft of this work has been written and is under review. Estimated completion is August, 1992.

3GUP047B Prepare ICN for cross-hole tomographic surveys

Need for ICN no longer exists.

Quality Assurance

3GUP030B Develop/write VSP technical procedure: data acquisition

A draft of this procedure is approximately 50 percent complete.

Planning and Operations

Variances

3GUP025B VSP prototype field test and data analysis

Data acquisition will not be completed until approximately mid-August. Data analysis will be finished by approximately November. The following unavoidable delays were experienced: 1) equipment failure made it necessary to rent/borrow a new field system; 2) there were difficulties and delays in obtaining permission to drill boreholes at Bergen Park; 3) delays were encountered when getting a road made to the site and arranging for the drilling of the holes; 4) borehole will not hold water, so borehole liners are being procured. If this doesn't work, an attempt will be made to condition the hole with gel and bran. This delay will not affect the NTS schedule in any way.

3GUP019B Continue VSP lab/physical and computer simulation: 2-D method

The data processing and analysis of the Yucca Mountain Model will be finished by October or November. Complexity of the data has required extra time for processing parameter selection and processing sequence determination. This delay will not affect the NTS field schedule.

P25M Report: prototype testing, Bergen Park

This report will be made upon completion of 3GUP025B (see above). No effect on NTS schedule.

P17M Report: 2-D fault method

Draft in progress. Complete August 1992.

SCP 8.3.1.2.2.3.2c Integrated Data Acquisition System 0G331242
Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP013C Development and module testing of software-2

A preliminary HRF integration test using the HRF boreholes was conducted in late May; several critical bugs and about 20 minor bugs were discovered. As a result of these findings, design review meetings with all IDAS staff were held in Denver on June 1 - 4, and at the NTS on June 23-25, to determine what design modifications are needed to resolve noted deficiencies. It was decided that a major redesign effort with system maintenance was desirable but not possible within the time frame required for Release 1.0 of the IDAS software. Redesign of the system maintenance will be deferred until after the first hydro instrumented UZ borehole is on-line. It was also decided at these meetings to undertake a restart of the HRF test during the first 2 weeks of September; to redefine the scope of this activity by limiting it to only those modifications needed to allow IDAS to perform in a minimally configured data gathering mode. With the exception of interactive specification design, coding, and unit testing, other components within the description of this activity will be rescheduled as separate activities to begin early in FY93 (i.e. design/coding/testing of system manager, PI review, and domain control). Since the HRF test in May, the majority of the minor bugs have been corrected. Hotwiring of IDAS access control, and modifications to the sensor operation software are currently being implemented to meet minimum configuration requirements for a HRF restart in September.

3GUP049C Write, review revise IDAS computer procedures

HP-147 and HP-155 were consolidated under HP-149. HP-145 and HP-146 were consolidated under HP-148. After review of the content and scope of these HPs. which deal with IDAS computer operations, it was determined that consolidation would greatly simplify and expedite preparation of these HPs. Therefore, activity has been terminated for FY92 and has been rescheduled as a series of subactivites in FY93 to more accurately reflect requirements and to coincide with the start of the formal integration-testing-program scheduled for March and April 1993.

3GUP060C Write, revise, revise IDAS instrument procedures

Work on HP-153, HP-154, and HP-157 are temporarily suspended pending possible inclusion of these procedures in an HP for borehole stemming and instrumentation that is being developed under SA 8.3.1.2.2.3.2.a (Surface based-site vertical boreholes).

3GUP062C Revise IDAS facility procedures, QA reviews

HP-134 and HP-132 have been written and submitted for QA review as preliminary procedures pending construction of the IDAS archiving facility (which is complete) and the pre-production insulated instrument shelter (now under construction). These preliminary (to final version) procedures will not be required under the graded QA program.

Technical Activities (Continued)

3GUP063C Write/review/revise, IDAS maintenance procedures

The completion date of these procedures has been extended to February 15, 1993. This change reflects delays in the delivery of the Insulated Instrument Shelter and in the 932 Mhz replacement hardware for obsolete GEMLink microwave transmitters.

3GUP067C Revise IDAS software procedures

This activity has been closed out for the remainder of FY92, and will restart the first week in December 1993, following submission of the integrated test plan to QA. Drafts of both procedures, HP-151 and HP-135, for this activity have been written, but cannot be finalized until the QA office has had time to review and rule on the integrated test plan, which is scheduled for November 1992.

3GUP035C Procure/deliver microwave datacom

932 Mhz replacement hardware will be leased and tested by REECo, but IMM (the manufacturer and vendor) may not be able to deliver sample hardware for this band until early August. The FCC had not granted our channels and waiver as of June 22, 1992, but NTS frequency coordinator has approved non-interfering tests, hopes for word from FCC by end of first week in July. G. Gusthorpe of REECo can provide engineering for communications and testing, will coordinate with C. Brown of EG&G Special Projects, who has been assisting us.

3GUP020C Development and module testing software-3

This activity needs to be rescheduled in FY 1993. Coding and testing of the O & A systems cannot commence until after the insulated instrument shelter (and its internal utility systems) have been delivered and tested. This activity has been closed out for the remainder of FY92.

3GUP051C Evaluate IDAS prototype-2, data from HRF-boreholes

Activity was started on May 17, 1992 with startup of the preliminary integration test using HRF boreholes. Bug fixes are under way; a restart is scheduled for the first two weeks of September 1992.

3GUP080C Revise IDAS user and General operating procedure

Start of this activity has been rescheduled for November 1, 1992 following HRF restart activities in September 1992.

3GUP061C Review QA, rewrite IDAS instrument procedures

See 3GUP060C; procedures under this activity will be integrated into SA 8.3.1.2.2.3.2a as a part of the "Borehole stemming and instrumentation" procedure. Activity is closed out.

3GUP066C Review QA, rewrite IDAS maintenance procedures

Activity follows 3GUP063C, and is rescheduled to start following completion of that activity.

3GUB058C Review QA, rewrite IDAS computer procedures

Activity follows 3GUP049C, and is rescheduled to start following completion of that activity on February 1, 1993.

Technical Activities (Continued)

3GUP026C Integration and test review for software

Activity follows completion of test plan design. Start of this activity has slipped approximately two months, and is scheduled to begin following the HRF restart.

Quality Assurance

Planning and Operations

3GUP032C Construct prototype IDAS instrument shelter (IIS)

R/P International Technologies, Cincinnati, Ohio, continues with manufacturing of the first insulated instrument shelter. Progress inspection on May 27: Interior structure, castered floor panels, wall penetrations, EMI barrier, undercarriage and track were not ready for inspection. External doorway and internal partition were mislocated. Contractor's representatives asked to use reinforced C-section stock in lieu of tubular box-section studs. Progress inspection on June 16: Interior structure complete except for door frames. Castered floor panels complete except for lock-down bolts and tabs. EMI barrier complete; tracks and undercarriage complete. Quality welding throughout, except for EMI barrier, which was adequate. Penetrations for entry boxes not complete, but seem to be accurately located with respect to track. UPS units on hand, but not tested; batteries not delivered. Completion and delivery of the shelter to NTS on August 31, 1992 appears to be on schedule.

3GUP046C Procure/delivery optical disk drive

Disk drives delivered to Denver June 2, 1992, and have been shipped to the NTS/HRF. Activity is complete.

Variances

3GUP013C Development and module testing software-2

Completion date slipped by approximately three months to correct bugs encountered during preliminary, HRF borehole, IDAS integration testing. HRF restart is scheduled for first two weeks in September. Major revisions made to overall schedule as direct outcome of problems encountered during the May testing of IDAS.

3GUP025C Integration and test design for software

Activity slipped by approximately two months to allow for IDAS bug fixing. See 3GUP013C.

3GUP063C Write/review/revise, IDAS maintenance procedures

Major revision to planned finish date for this activity - reflects latest thinking on how best to meet IDAS startup date for first hydrologically instrumented UZ borehole in FY93. Decision to restructure schedule based on post mortem meeting following IDAS integration test in May.

3GUP035C Procure/deliver microwave datacom

The planned finish date for this activity has been delayed to November 1, 1992 to accommodate possible delays in processing the 932 Mhz-system license by the FCC and to allow equipment, that is being borrowed from the manufacturer, to be tested by REECo at the NTS. This delay will not impact instrumentation of the first UZ boreholes because the existing GEMLink system can accomodate a very limited configuration of IDAS sites.

SCP 8.3.1.2.2.3.2d Air-permeability and gaseous-tracer testing 0G331252
Summary Account Manager - G. LeCain

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP003 Complete construction of first support trailer

The USBR, after dealing with some staff shortage problems, is proceeding full speed with construction of the support trailer. The boom design has been finalized and the tube winding system for assembling the downhole tube bundle has been constructed. The USBR has provided the USGS with a work schedule showing completion of the support trailer at the end of FY92 (September 30, 1992).

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

All parts required for the first 12-inch packer system have been purchased and received. The subs and interval pipes have been manufactured and anodized. The system is presently being assembled and the electrical work is under way. The USBR has provided a work schedule showing completion of the packer system at the end of FY92 (September 30, 1992).

3GUP014D Expand hydrologic research facility calibration lab

The HRF calibration lab has been expanded to calibrate the air-k thermistors. Expansion of the facilities for calibration of the air-k pressure transducers is presently under way. Expansion of the pressure transducer calibration system will require installation of a DPI 510 into the hardware and modification of the software to handle the increased range. The new range will allow calibration of pressure transducers of up to 100 psi.

3GUP015D Technical procedure/pressure transducer calibration

Expansion of the HRF pressure transducer calibration facility to calibrate the high range transducers for air-k testing is well under way. Additional weights to expand the range of the dead weight tester have been purchased. The DPI 510 for calibration of transducers up to 100 psi has been tested. Modification of the computer code to accommodate the new transducers is under way.

Quality Assurance

3GUP023 Graded QA and other QA requirements

Because all planned Yucca Mountain air permeability testing field work has been organized as QA Level 1 activities, the newly implemented graded QA program required no changes in the program's QA requirements.

3GUP004 Complete QA for 8-inch, and 12-inch packers and trailers

The USBR has completed the 12-inch packer assembly QA drawings and is proceeding with the trailer drawings. The technical procedures for assembling the packer assembly, integrity testing, and field operation of the support trailer are expected to be completed by September 30, 1992.

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

The USBR has completed the 12-inch packer assembly engineering drawings and is proceeding with the trailer drawings. The assembly and testing of the packer assembly is expected to be completed by September 30, 1992.

Quality Assurance (Continued)

3GUP016D Technical procedure for thermistors

The TP for calibration of the air-k thermistors has been submitted to QA for technical review.

3GUP012D Technical procedure for air-k testing

The scientific notebook plan for air-k testing has been through its first technical review. The plan and the authors responses to the reviewers comments has been returned to QA.

Planning and Operations

3GUP001 Purchase mass-flow control calibration system

The Sierra Instruments Cal-Bench mass flow calibration unit has been purchased and is scheduled to be delivered to the HRF in early July. Purchase of two bell provers, for expansion of the Cal-Bench range, is presently awaiting the inclusion of the Sierra Instruments bell provers on the Sierra Instruments GSA contract. The papers for purchase of the bell provers have been completed and are in Central Region Purchasing.

3GUP022D Bring on staff and train

The positions for one Hydrologist and one Hydrologic Technician were advertised. However, due to decreased funding in FY92/93 filling of these positions has been postponed.

3GUP020 Purchase all measurement and DAS equipment

The two DAS field computers were received. All monitoring instruments, power sources and DAS equipment planned for this purchasing period have been purchased and received with the exception of four mass flow controllers which are presently out for bid.

3GUP021D Set up instrument storage and repair area at NTS

A 40 ft trailer located near the HRF has been converted to a storage and repair facility for the air-k testing program. The facility has been outfitted with numerous storage cabinets, large work table, and a large selection of tools which includes tools for electrical repair. The trailer can be secured against unauthorized use and equipment borrowing.

Planning and Operations

3GUP008D Purchase parts and 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. The USBR will purchase all additional items in FY93.

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 because the suggested supplier is in the process of listing the bell provers on GSA contract. All purchasing paper work and QA requirements have been completed.

Variances (Continued)

3GUP003 Complete construction of first support trailer

Construction of the first support trailer has been delayed by a lack of staff at the USBR. This problem has been dealt with and meetings between the USBR and USGS have resulted in a schedule with completion of the first trailer by the end of FY92 (September 30, 1992).

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

Completion of the first 12-inch packer assembly has been delayed by a lack of staff at the USBR. This problem has been dealt with and meetings between the USBR and USGS have resulted in a schedule with completion of the first 12-inch packer assembly by the end of FY92 (September 30, 1992).

3GUP024D Test instrument packers and trailers

All testing requires completion of the packer assemblies, 8-inch and 12-inch, and completion of the support trailer. The testing will be conducted soon after the completion of all equipment construction which is scheduled for September 30, 1992.

3GUP018D Field test 8-inch packer system

Although the 8-inch packer system has been constructed, it cannot be field tested until after completion of the support trailer which has been rescheduled to September 30, 1992.

3GUP0008D Purchase parts and assembly of support trailer #2

The USBR is behind schedule due to a lack of staff during FY92. Consequently the construction of the second support trailer has been pushed back by delays in completion of the first trailer. The new completion date for the second trailer is March 30, 1993.

Work Performed but not in Direct Support of the Scheduled Tasks

G. LeCain took part in the DOE Fast Pathways Conference. (24 hours)

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

3GUS023J Journal paper, moire bench-mark and calibration

The paper titled, "Implementation and use of an automated projection moire experimental set-up" was published in the Proceedings of the 1991 International Symposium on Optical Applied Science and Engineering. This was released in late 1991 (November/December). A TDIF per AP 5.1Q was submitted to the USGS-HIP reports section.

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.

G. Severson met with Dr. Cardenas May 26-28. Most of the time was spent in his laboratory discussing four computer programs used to collect and process the digital topographical data. These programs need additional documentation to allow persons unfamiliar with the techniques to use these programs. The program currently called FASTEST is being documented in greater detail. Another program used as a high frequency filter for noise will require some additional documentation. Documentation of a "splicing and rotational" program has not been started.

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 cannot begin until the first week of August 1992.

3GUS012J Complete journal paper-moire automation

The author has addressed the technical review comments and the draft titled, "Projection moire as a tool for the automated determinations of surface topography" has been sent to the HIP Reports Section. The review comments were incorporated into the draft and submitted to Applied Optics for review. This draft has been returned to Dr. Cardenas. Changes are required in the format of the paper before submittal for publication.

3GUS014A Complete design fabricate low-pressure vessel

Little progress was made on this activity during June. Estimates from possible vendors/machine shops will be evaluated in June 1992 and the vessel fabricated during July 1992.

3GUS008J Prepare axial core/vessel; air permeabilities

Little progress in June. Notes regarding the core samples collected were re-organized in June. Potential cores for testing will be unsealed and samples chosen for sample preparation in July.

Quality Assurance

3GUS004J Document computer software; moire QA

Software currently being used to collect topographical data was reviewed with Dr. Cardenas in May 1992. G. Severson is documenting the programs used for this technique in greater detail see description under activity 3GUS006A.

Planning and Operations

Variances

3GUS007A Write technical procedure; moire calibration

Additional work was done on this procedure during June even though this procedure will not be used with the cosine transform technique. The methods developed since this activity was placed in the FY91/92 PACS no longer require the use of a calibrated ruler. A precisely-machined object is currently used for calibrations but, it is not NIST-traceable. Standard reference materials identified so far are too expensive to be purchased. Machined-objects that can be measured with NIST-traceable instruments offer the most affordable option.

3GUS016J Complete design, radial fracture test vessel

This activity has not been started. This activity will be started when more details of the low-pressure vessel are complete.

3GUS001A Select analog site for fracture sampling

This activity will not be started in FY92.

3GUS010A Continued development; axial fracture

This activity will not be started in FY92.

3GUS002J Prepare budget-work plans-PACS

Considerable amount of time was spent with the PACS-related budget. This included work to assess funds for the FY93 budget, capital equipment expenditures through FY96, and problems with current staff contracts. As part of the Mission 2001, the PACS for FY93/94 were reviewed and submitted to HIP management. In addition, the "outyear" PACS for the fiscal years FY95 through FY00 were also reviewed.

Work Performed but not in Direct Support of the Scheduled Tasks

Technical review of USGS-QMP-3.04, R4 and comment resolution; and informal review, flowchart for QMP-3.03, R4. (8 hours)

Meeting with J. Woolverton et al to discuss DOE Parameter Dictionary. (2 hours)

Attended HIP meeting: QMP-3.15, R0 Question and Answer session. (2 hours)

Updated Bldg 20 Chemical Inventory for GSA, submitted it on May 13, 1992. (2 hours)

Preventive maintenance on Satec load frame in Bldg 20 lab including purchase of oil filter and hydraulic fluid, disposal of waste fluid (45 gal), replacement of leaking o rings (4) on hydraulic system, and bringing system back on-line. (26 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. (4 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (Continued)
Problem regarding the improper disposal of methyl isobutyl ketone (MIBK) by the Geologic Division labs in Bldg 20 occurred again on May 28, 1992. Affected personnel were interviewed; accident reports filed; the Branch of Geochemistry Safety Officer was notified and subsequent meetings held; and, meetings were held with the Geologic Division's Regional Safety Officer. In addition, the USGS Space & Facilities Office, the Water Resources Division's Safety Officer, and the HIP Chemical Hygiene Officer were notified. Laboratory procedures have been changed by the Geologic Division to avoid any further problems with MIBK in their labs in Bldg 20. (10 hours)

Prepared requisition request for personal computers for data acquisition in Bldg 20 lab. (4 hours)

HIP meeting for summary account managers. (6 hours)

Attended Data General training at USGS National Training Center in Denver, May 19-22. (40 hours)

Hardware, system parameters, operating system, and user files installed on Data General workstation by M. Brodie in June. The printer has been installed but, a considerable amount of software and the network installation still have to be completed. (40 hours)

Meetings with GSA staff, contractors, and lab personnel concerning installation of uninterruptible power supply (UPS) to emergency power generators at Bldg 20 in June. (3 hours)

Attended DOE "Fast Pathways" meetings in Denver, June 10 and 11. (8.5 hours)

SCP 8.3.1.2.2.4.2a 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
Experiments on four samples were started on May 20, 1992. On one sample the experiment was repeated twice in two different directions. This was done to detect any directional variations in the sample properties. The other samples were tested to detect any variations along fracture surfaces.

3GUS002B Conduct ponding test on large block first stage
This stage, which was started on October 28, 1991, ended on May 11, 1992. The water front moved about 40 to 45 cm in the fractures and 5 to 10 cm in the matrix surrounding the fracture. The water movement in the fractures was not as fast as originally expected. Eight out of the 18 thermocouple psychrometers showed an increase in water potential (and saturation). Except for two psychrometers, the potential level was still detectable.

Technical Activities (Continued)

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.

3GUS007B Conduct ponding test on large block, second stage

This stage was bypassed because the first stage (3GUS002B) took longer than expected, and the water potential did not go beyond the measurable limit of the psychrometers. This activity is considered complete.

3GUS014B Conduct ponding test on large block, final stage

Activity started on May 11, 1992. A positive water pressure of around 5.5 cm of water was applied to the top of the block. The flow rate has been around 25 cubic cm of water per day in the rock matrix and fracture. Visual observations and psychrometric measurements indicate that most of the water is being imbibed by the fracture surfaces and not the cut faces which indicate that the properties of finished rock surfaces get altered after cutting the rock. This may cause incorrect measurements of rock matrix permeabilities. This matter will be looked into in more detail next month.

3GUS003B Write fracture air permeability technical procedure

The technical procedure was written and completed. It will be sent for QA review during this month. This procedure describes detecting and measuring fracture permeability in rock.

3GUS004B Write psychrometry technical procedure

Work on this procedure started. It describes a method for measuring water potential in fractured welded tuff rock using thermocouple psychrometers.

Quality Assurance

Planning and Operations

Variances

3GUS029B Prepare data report of imbibition experiments

This activity has not been completed because of a previous delay in data collection of activity 3GUS101B. This variance will not cause a delay in the overall schedule because the information from this activity is required before starting the percolation test report (activity 3GUS027B) which has been delayed because activity 3GUS002B took longer than expected.

3GUS101B Conduct imbibition experiments on small samples

This activity has not been completed because of a previous delay that was caused by a malfunction in the data logger used in this experiment. This variance will not cause a delay in the overall schedule for the same reasons given above in activity 3GUS029B.

S29M Data report: imbibition experiments

This milestone has not been met for the same reasons given above in 3GUS101B.

Variances (Continued)

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 were busy conducting other similar tests. This delay will not affect the final finish date since the completion of this activity is linked with the large block ponding experiment which is taking longer than expected as described in activity 3GUS002B.

3GUS034BP 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.

S35M Report: hydrologic properties

This milestone has not been met for the same reasons given above in 3GUS034B.

3GUS028B Prepare analytical report on imbibition experiments

This activity is scheduled to start after finishing activities 3GUS029B and 3GUS101B. Since these two activities have not been finished for the reasons given above, this activity is not expected to start until October 1, 1992. This variation is expected to cause a delay of about two months in the overall schedule.

SCP 8.3.1.2.2.4.3a Prototype bulk-permeability testing 0G3312P2

Summary Account Manager - E. Kwicklis

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

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.

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

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 allow 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

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. If a decision is made to qualify all or some of the existing data, a plan of action to qualify the data will be formulated.

3GGP13A Complete activities for readiness review

This activity has been cancelled because no meeting with DOE or NTS contractors is required at this time. No scheduled activities involving NTS contractors are planned. When the need for the collection of additional UZ borehole data is ascertained, the readiness review activities will be evaluated.

Quality Assurance

3GGP15A Prepare work order

This activity has been cancelled. The plan described in 3GGP13A will determine the need for the preparation of a work order.

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.

3GGP04A Chemical analysis of gas samples

No gas samples collected.

Cause: suspension of data collection activities as a result of YMP-USGS-CAR-92-04.

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

Corrective Action: the items identified in the CAR are being resolved. Resolution of those items will allow data collection activities to resume.

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 UZ-16 multi packer string (USBR)

Tests were performed on the ability of heat tape to prevent condensation. The outcome of the heat-tape testing must be determined before fabrication of the packer end caps.

Compiled the paperwork package for ordering the winch.

Technical Activities (Continued)

Finished banding all bladders to PVC pipe, and performed leak tests. All went well.

Packer bodies have been grooved and packer elements are connected.

Preliminary design for the Boom has been completed.

3GUH012 Perform leak and pressure tests on UZ 16 packers

Performed heating tests by wrapping heat tape around the gas-sampling tube bundles. Heat will prevent condensation in the gas sampling tubes.

Pressure tests on bladder seals have been completed on half of the packer units.

Leak tests on packer elements are being conducted. Bladders are inflated to check the integrity of the banded ends. Preliminary results indicate no leaking.

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

Obtained information on Nevada glass blowers and glassware availability for degassing rack construction.

Discussed the possibility of building degassing racks in Denver and shipping them to NTS. Options include using jointed glassware to provide flexibility, or mounting the degassing racks on a board for shipment.

The gas chromatograph and data acquisition system, when delivered, will be set up and tested prior to being outfitted for the mobile lab.

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

The field data for original borehole gas composition analyses from 1985 was located, and compiled into Open-File Report format.

Data from field gas chromatograph analyses of CO2, CH4, SF6 was compiled.

Progress of the narrative section continues; the description of the borehole was drafted.

3GUH067B Analyze UZ1 gas samples 1992

C-14 analytical results are entered in summary sheets.

C-14 gas storage cylinders were leak tested, repaired, and cleaned out for future use.

Fifteen water vapor samples collected at borehole UZ-1 in January 1992 were analyzed on the in-house Quantullus Low Level Liquid Scintillation Counter for tritium concentration. Samples were also sent to Reston Isotope Laboratory for a cross-check.

3GUH068B Tabulate data for UZ1 gas samples

Database data tabulation started for UZ1 samples and analyses.

Quality Assurance

3GUH019B Develop technical procedures, portable GC, SF6 meter

The technical procedure covering the portable GC, HP-240 "Method of analysis of CO_2 gas samples using a summit interests SIP-1000 gas chromatograph", prepared by J. Ferarese, is currently in QA Review.

The technical procedure covering the SF_6 meter, HP-242 "Method of analyzing the concentration of halocarbon gasses with an ITI Leakmeter 120", prepared by G. Rattray, is fully approved. Effective date is May 27, 1992.

Planning and Operations

3GUH010 Fabricate UZ-16 multi packer string (USBR)

Additional banding equipment is on order.

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

Procured degassing rack elements, and sent to NTS.

3GUH070B Procure lab chemicals, labware, and field apparatus

Procured gasses for field gas chromatograph for use during tracer injection monitoring at UZ16. Gasses include: nitrogen, oxygen, compressed air, argon.

Procured lab torch and supplies for minor glassware repair. Glassware is repaired by USGS personnel at the NTS where no glass blowing vendor is accessible.

Two high pressure stainless steel diaphragm regulators, and copper tubing have been procured. High quality stainless steel diaphragm regulators are necessary to provide high purity carrier gas to the new gas chromatograph system. Various perishable items such as filters, alcohol, and gloves have been procured.

A 2 ppm SF_6 (Sulphur hexafluoride) gas standard has been ordered from a QA qualified vendor. Gas standards are necessary for calibrating the gas chromatograph.

3GUH037B Procure GC and DAS

The Chrompac Model CP-9000 gas chromatograph and data acquisition system to include thermal conductivity detector, flame ionization detector and electron capture detector are on order through REECo. The instrument is expected to be received at the Denver UZ hydrochemistry laboratory by the second or third week in July, 1992. It will then be set up and tested prior to being outfitted into the mobile sampling laboratory.

3GUH036B Procure 10 kw generator for gas sampling support

The generator was requested for purchase through USGS Purchasing department instead of REECo. The contract for procurement was awarded to T & J Manufacturing, Inc., on June 9, 1992. The generator should be delivered to USGS in Denver, Colorado no later than September 11, 1992.

Variances

3GUH010 Fabricate UZ-16 multi-packer string (USBR)

Cause: design changes to the packer system and schedule changes for completion of UZ-16 have slowed down progress.
Impact: none. The packer will be completed by the time the UZ-16 borehole is completed. Corrective action: none required.

3GUH012 Perform leak and pressure tests

Cause: bladder pressure tests are not complete due to a back order for bladder strapping which has delayed packer completion.
Impact: none. Packers are not needed until near the end of 1992.
Corrective Action: none required.

3GUH025B Outfit Mobile Lab with GC, IC, degassing rack

Cause: the mobile lab purchase by REECo won't be completed until September. The mobile lab will be outfitted at that time.
Impact: none. The mobile lab will not be needed until completion of the borehole UZ-16 drilling.
Corrective Action: none required.

3GUH037B Procure GC and DAS

Cause: the purchasing agent is REECo. No control of this.
Impact: minimal. these will be delivered in July, 1992.
Corrective Action: none required.

3GUH036B Procure 10 KW generator for gas sampling support.

Cause: delay was caused by switching procurement agency from REECo to USGS.
Impact: none. UZ-16 borehole gas sampling will not be started until November, 1992.
Corrective Action: none required.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Ferarese, chemical safety officer, conducted annual chemical inventories of HIP laboratories and forwarded necessary information to the Regional Safety Office. The DOE will be conducting a safety and health compliance appraisal of the YMP laboratories at the NTS. The possibility of Ferarese being appointed the USGS appraisal team member assisting the Safety and Health Compliance Department was discussed with the YMP Branch Safety Officer. (6 hours)

J. Ferarese conducted a technical review of MP 242 - "Method for analyzing the concentration of halocarbon gasses with an ITI Leakmeter 120". (4 hours)

GSA is in the process of renovating Denver Federal Center Building 56. The UZ hydrochemistry laboratory is housed in this building. Discussions and meetings are ongoing between J. Ferarese and GSA concerning the consequences to the laboratory and equipment as a result of the renovation which will require complete surrender of the laboratory/operations for an undetermined period of time during the construction. (10 hours)

J. Ferarese has had several discussions and meetings with QA specialists in response to NCR-91-31 and NCR-92-25. (10 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (Continued)
J. Ferarese completed a communications training class. (16 hours)

P. Striffler began tracer injection at UZ-16. Striffler set up the gas chromatograph and injection equipment in the van at UZ-16 drilling site, assured equipment was monitoring accurately, and began injection and monitoring. (264 hours)

P. Striffler began tracer injection at NRG-1. The tracer injection equipment was set up and the monitoring ports were installed. (24 hours)

Personnel were trained on the procedure to inject and monitor tracer gas. (20 hours)

Drove shuttle for UZN-55 core. Twenty-one pieces of core were received as of June 29, 1992. (96 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 and water, UZ4, 5, 6s boreholes

Distillation of twelve core samples from UZ5 was performed. These core samples were broken pieces, and were not used for compression.

Distilled water from two adjacent core intervals at different temperatures was used to determine the temperature effect on oxygen isotope ratios. Oxygen atoms in the moisture and silicate of the matrix can exchange at high temperatures, resulting in different isotope ratios. Samples have not yet been analyzed.

Began the distillation of UZN-55 cores for tritium-concentration check. Eight cores were distilled for tritium, 18/16O and D/H. Analyses of tuff cuttings for chlorine-36 by LANL indicated possible contamination by underground nuclear tests.

The low level liquid scintillation counter was used to assess tritium concentration in distilled pore water from rock core samples. In-house measurements include: fourteen samples from UZ-4 cores, four samples from UZ-5 cores, and four samples from UZ6s cores.

The gas chromatograph was used to determine the percent (%) of CO_2 concentration, parts per million (ppm) CH_4 (Methane) and parts per million (ppm) SF_6 (Sulfur hexafluoride) of pore gas from squeezed samples. In-house gas-sample analyses include seven samples from UZP5 cores.

3GUH012A Prepare OFR-sp, dtps, prototype and site UZ hydrochemisty

J. Ferarese has completed the first draft of the OFR. The OFR includes: the introduction, purpose and scope, general site description, rationale for the hydrochemical study, interpretation of hydrochemical tests, hydrochemistry tests in the UZ, objectives of the study, descriptions of gaseous/aqueous phase investigations, exploratory shaft studies, and description of prototype testing. The OFR draft is with a senior member of the project for input and critique.

Technical Activities (Continued)

3GUH14AA Collect core from UZN-27 borehole

Borehole drilling and core packaging was completed on May 10, 1992.

The cores are currently stored at the Sample Management Facility (SMF).

The SMF disapproved a request from A. Yang for UZN-27 cores, because the cores are considered to belong to A. Flint.

3GUH17A Train staff on analysis technical procedures

J. Ferarese trained all members of the UZ Hydrochemistry Project (P. Burger, M. Beasley, K. Scofield, and C. Peters) on field operations of the gas chromatograph. This training prepares them for work at UZ-16.

P. Striffler completed reading assignments for HP-223, HP-126, HP-237T, HP-07, HP-238T, and HP-242.

3GUH001A Test H_2O collection method from fractures

There is no progress to report at this time because the "Seamist" is not available at present.

3GUH13A:A Extract/analyze core and water, UZN-27 borehole

No work has been started for this activity, awaiting core transfer from the SMF through A. Flint. UZN-55 cores are being used instead.

3GUH01AA Compile raw data UZ 4, 5, 6S and UZP thru May 1991

Raw data compiled into database. Activity through May 1991 is complete.

3GUH02AA Compile reduced data UZ4, 5, 6s, and UZP thru May 1991

The majority of reduced data has been compiled; we are currently checking accuracy of data entry and record keeping.

3GUH002A Submit TDIF for UZ4, 5, 6s and UZP reduced data

Compiling the reduced data.

Quality Assurance

3GUH00A Submit TDIF UZ4, UZ5, UZ6s, and UZP raw data to the LRC

Submitted TDIF May 20, 1992 for UZ4 raw data, UZ5, UZ6s, and UZP5 raw data. Raw data from core packaging materials sealing test, including samples from UZP5, UZ4, and G-Tunnel was also submitted. This activity is complete.

Planning and Operations

3GUH07AA Procure lab chemicals, labware and field apparatus

Received dry ice for core distillations.

One high pressure regulator was procured for use with the new ion chromatograph.

3GUH015A Procure "Seamist" fracture-water collector

Obtained initial cost estimates for research, development and testing of the Seamist systems. Cost estimates are higher than the funds available for FY92. Suggest a roll-over of FY92 allocated funds to FY93 to accommodate this. We are meeting with the manufacturers' representatives in July to determine how to proceed.

Planning and Operations (Continued)

3GUH018A Procure ion chromatograph and DAS

Procurement processing is now at REECo.

The Dionex Model DX-100 ion chromatograph and data acquisition system, to include anion and select cation analysis capabilities, are on order through REECo. The instrument is expected to arrive at the Denver UZ hydrochemistry laboratory by the second or third week of July. It will be set up and tested prior to being outfitted into the mobile sampling laboratory.

Variances

3GUHO18A Procure GC and DAS

Cause: REECo Purchasing has a slight delay in procurement. (Will deliver in July, 1992).
Impact: none. The mobile lab to be used for installation has not yet arrived.
Corrective action: none required.

3GUH009A Extract/analyze core and water, UZ4, 5, 6s boreholes

Cause: two of our personnel were sent to monitor the neutron-access-well drilling by the UZ section chief in March and April of 1992 (400 hours). The purpose was to help out Alan Flint's work.
Impact: none.
Corrective Action: none required. We are getting caught up on the work.

3GUH13AA Extract/analyze core and waters, UZN-27 borehole

Cause: the Sample Overview Committee disapproved A. Yang's request for the cores because A. Flint requested all cores.
Impact: none.
Corrective Action: none required. We are working on UZN-55 cores.

3GUH001A Test H2O collection method from fracture

Cause: insufficient capital equipment funds for "Seamist" in the FY92 allocation.
Impact: a delay in fracture water collection.
Corrective Action: hopefully additional funds will be available from DOE to procure the required "Seamist".

Work Performed but not in Direct Support of the Scheduled Tasks

Core collection and sealing at UZ-16. Advised Sample Management Facility personnel on core sealing techniques. (16 hours)

Assured core sealing equipment and policies are congruent with QA guidelines. (16 hours)

J. Ferarese added QA review comments of the revised version of HP-194 "Approximation of relative humidity using a silica-gel tower within unsaturated-zone test holes as an aid in determining pumping efficiency." (4 hours)

J. Ferarese tested the feasibility of using a bromide electrode to analyze for Br- in ground water samples. The bromide probe works fine and yields good precision. However, the method devised requires a minimum of 100 ml of water. The bromide probe will work for analysis of relatively large volumes of water but would not suffice to replace the ion chromatographic analysis of Br- in squeezed water samples. (24 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (Continued)
J. Ferarese conducted an experiment which examined the use of teflon vials for liquid scintillation counting of Carbon-14 samples in our Quantulus LKB Liquid Scintillation Counter. Counting performance was determined and will be reported via formal publication. Various references and literature have been compiled in preparation of the report. (12 hours)

A. Yang and C. Peters prepared the PACS input. J. Higgins and G. Rattray each assisted on the pore water and tracer test portions of the PACS. (192 hours)

A. Yang worked on the employees' performance appraisals and the new work plan. He also wrote the new employee work plan for P. Striffler who was converted from Foothills Engineering to USGS employee status. (40 hours)

A. Yang and C. Peters attended the Hydrology/Geochemistry Integration Meeting (sponsored by DOE/Las Vegas) in Denver, Colorado, June 9-11, 1992. (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 FY92
As described in the April PACS report, fracture network simulations were completed that examined the variability in pressure head and flux distribution in a network of variably saturated fractures as a function of the boundary pressure head. During May/June, a report describing this work entitled "Numerical investigation of steady liquid water flow in a variably saturated fracture network", was written by E. Kwicklis and R. Healy and submitted for technical review (see unscheduled work).

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 attended a workshop on the implementation of this 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, although this could not be verified with complete certainty at the time this report was prepared.

Variances

3GUF0021 Revise scoping calculations of percolation test

This activity is behind schedule because revisions are incorporating new work that represents a far more sophisticated understanding and modeling approach than was described in the original report. The revisions thus attempt to reflect advances that have been made in modeling since the report was first submitted for review. No work took place on this activity during the report period because of the higher priority given the unscheduled report on the fracture network simulations.

3GUF0001 Develop graded QA package

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

3GUF015 Document variable aperture model VSFRAC

No work took place on this activity during the report period because of the higher priority given the unscheduled report on the fracture network simulations.

Work Performed but not in Direct Support of the Scheduled Tasks

Much of May-June was spent analyzing the fracture network simulations and summarizing the work and results in a draft report "Numerical investigation of steady liquid water flow in a variably saturated fracture network," co-authored by E. Kwicklis and R. Healy. This report, to be submitted to WRR, was not planned at the beginning of the year, but the work and results were thought to be significant enough to take precedence over other planned activities. The report was submitted for technical review to G. Bodvarsson and K. Karasaki at LBL. View graphs were prepared for presentation of the work by Kwicklis at the Performance Assessment Flow and Transport Modeling Workshop in Las Vegas on May 5-6.

A presentation entitled "Numerical investigations and physical experiments of flow in unsaturated, fractured rock" was made to the joint Geochemistry Integration Team/Hydrology Integration Task Force workshop on "Preferential Pathways--Definition and Detection" held in Denver on June 9-11. The presentation by E. Kwicklis included a summary of recent modeling work conducted as part of this activity as well as experimental work conducted as part of the Percolation Test Activity. An abstract of the same name, co-authored by E. Kwicklis, F. Thamir and R. Healy, was written and approved for inclusion in the workshop summary.

PACS schedules for FY93/94 were revised by L. Anna and E. Kwicklis as required by the Mission 2001 planning exercise.

L. Anna and E. Kwicklis attended the workshop held on QMP-3.15 "Application of graded QA packages".

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

A subroutine in which fracture/matrix flow is computed has been revised so that the calculation is performed implicitly (in terms of "new" values of capillary pressure), which should allow taking larger time steps, without causing numerical instability.

3GUF08L Sorptivity/character curve analysis

R. Zimmerman received additional data on hydraulic properties of Yucca Mountain tuffs from A. Flint (USGS), for use in testing the sorptivity-inversion model. The inversion procedure seems to yield reasonable estimates of capillary pressure data.

A method for finding capillary pressure curves from sorptivity and permeability measurements has been extended to utilize permeability curves other than those of the power-law type. This completes the task.

3GUF010L Initiate verification of fracture permeability models

R. Zimmerman began assembling fracture permeability and roughness data from P. Persoff (LBL), as well as from published sources. The data will be used in testing the fracture permeability of models developed by Zimmerman, S. Kumar, and G. Bodvarson.

3GUF003L Prepare semi-analytical methods report

R. Zimmerman has begun writing the report/user's guide for the dual porosity code.

3GUF218L Prepare budget and work plans for FY93

Detailed PACS were prepared for FY93/94.

Quality Assurance

3GUF007L Continue software QA and all other QA requirements

Reading assignments were completed by various staff members.

Various updates to the QMP and QAP were incorporated.

Planning and Operations

Variances

3GUF218L Prepare budget and work plan for FY93

Preparation of work plans for FY93/94 started early in June rather than in August.

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 a 2-dimensional cross-section 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, met to discuss possible responses to study plan review comments. The topics discussed included possible use of data from other sites to help assess model applicability, importance of developing a credible model of the natural hydrologic system in order to provide initial and boundary conditions and model parameters for performance assessment, and the current subdivision of stratigraphic units into hydrogeologic units based on the degree of welding.

Quality Assurance

Planning and Operations

Variances

3GUM05A Construct a 2-dimensional cross-sectional model using TOUGH, 3GUM06A Study plan revision and resolution of comments, and 3GUM013A Sensitivity analysis using a 2-dimensional cross-sectional model

These activities are behind schedule because the level of effort required to resolve the study plan review comments was much larger than originally anticipated.

3GUM06A Study plan revision and resolution of comments

This activity is behind schedule because the level of effort to resolve the study plan.

Work Performed but not in Direct Support of the Scheduled Tasks

E. Kwicklis developed a revised PACS schedule for FY93/94 as required by the Mission 2001 planning exercise.

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

3GUM17A Develop alternative conceptual models of UZ

This task is complete.

3GUM14A Study plan revision and resolution of comments

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

Quality Assurance

3GUM18A Grading of QA and other QA requirements

Reading assignments were completed by various staff members.

Various updates to the QMP and QAP were installed.

Planning and Operations

Variances

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 motion-flow model

Simulations were performed using homogenous rock properties and various boundary conditions (no-flow, constant infiltration rate) at the surface to check the grid geometry, and especially the effect of the double number of grid blocks in the fault elements. The fault is characterized by small grid block volumes and numerous side-connections to the neighboring nodes, which are a potential source of geometric errors and numerical problems. Various programs were developed to adapt the input and output of TOUGH2, to the format used by the plotting program TECPLOT. This allows one to check the numerical results and helps in visualizing inaccuracies in the grid geometry.

3GUM03B Perform preliminary simulation with motion-flow model (Continued)

Preliminary simulations with variable rock properties were performed with the same 2-dimensional cross section. The input data for the rock properties is based on previously published data by Rulon et al. (1986), for relative permeability and capillary function curves, and on data from Flint and Flint (1991), and Nelson et al. (1991), for density, permeability, and porosity data. Due to strong contrasts of permeabilities at the boundaries between hydrogeological units, steady state flow was not achieved because of numerical instability. Similar difficulties have already been reported in the literature by Tsang and Pruess (1991). Steps are currently being taken to modify the computer code TOUGH2, to avoid these kinds of numerical problems.

Technical Activities (Continued)

3GUM07B Evaluate model grid effects.

The results of 2-dimensional numerical simulations showed numerical problems at the grid blocks located just above the groundwater level. The grid is composed of 18 vertical layers, six of them used to represent the Calico Hills unit. It was slightly changed by removing the thin layer of grid blocks close to the water table. The TOUGH2 subroutine , using the Van Genuchten equation to input the characteristic curves for matrix potential versus liquid saturation was also modified. This was done in order to avoid the occurrence of poorly defined derivatives when the liquid saturation is equal to the satiated saturation. A function was developed to fit the characteristic curve at liquid saturation close to the satiated saturation, and to smoothly reach 100 % saturation.

A map of the thickness of the Calico Hill hydrogeological unit was developed using the previously digitized data and the graphic package TECPLOT. The subdivision of this unit for the 3-dimensional grid was reviewed.

Quality Assurance

3GUM14B Graded QA and other QA requirements

Reading assignments were completed by various staff members.

Various updates to the QMP and the QAP were installed.

B12M - LBL Report: WMNFC Paper

This task is complete.

Planning and Operations

3GUM13B Study plan comment and revision

The review of the study plan and responses to the DOE comments are continuing.

Variances

3GUM03B Perform preliminary simulation with moisture-flow model

Due to the complexity of the 3-dimensional grid and the size of the input disk for the computer simulations, the run time needed to reach steady state conditions for the moisture flow is longer than had been anticipated. Completion of this task is now planned for July 31, 1992.

3GUM07B Evaluate model grid effects

Due to the delay in task 3GUM03B and much extra work with response to the study plan comments, the planned finish of this task is September 30, 1992.

3GUM13B Study plan comments and revision

Due to much extra work with the responses to the study plan comments, the planned finish for this task is July 31, 1992.

3GUM05B Prepare report on preliminary moisture-flow model

Due to the delay in task 3GUM03B and much extra work with responses to study plan comments, the planned start for this task is July 1, 1992, and the planned finish date is November 30, 1992.

Variances (Continued)

3GUM16B Evaluate gas-effects using sub-models, FY92 and 3GUM10B Prepare report on grid-effects

The start of this task has been delayed to FY93.

3GUM06B Evaluate gas flow data

Due to the delay in the tasks dealing with the moisture-flow model (3GUM03B, 3GUM05B), the start of this task has been delayed to FY93.

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 0G3312I2

Summary Account Manager - G. LeCain

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT005C Prepare ALTS data report on testing and methods

Preparation of a report covering the single hole and cross hole air-k testing conducted at ALTS near Superior, Arizona, has begun. A general outline (table of contents) has been prepared and the analysis methods section was started.

3GUT004C Consult with USBR on equipment DWGS, assembly procedures, etc.

A meeting between the USBR and the activity PI was held to discuss the ALTS prototype equipment. The overall conclusion was that the data measurement and storage equipment worked well but the packer system itself had numerous problems. Future meetings will deal with possible design changes as they might apply to the ESF testing.

3GUT006C Prepare TP for air-permeability

The scientific notebook plan for air-k testing has been through its first technical review. The plan and the author's response to reviewer's comments has been returned to QA.

Quality Assurance

3GUT007C PC software and data analysis QA documentation

All software that controls, reads, reduces or stores data generated during air-k testing will be off-the-shelf software. Software presently under consideration for use in air-k testing are: WordPerfect, Quattro Pro, and PC208.

Planning and Operations

Variances

Prototype Tracer Testing 0G3312J2
Summary Account Manager - I. Yang

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.

3GUT13DD Conduct tracer gas sorption test on stem materials

The design of a solenoid pump, which would be internal to the manifold-column system and presumably vacuum-tight, was completed. Due to the expense of building such a pump, other alternatives for circulating gas in the system are being investigated.

A glass manifold and column were tested for their ability to maintain a vacuum and stable concentration (1.0 ppm) of SF_6. A vacuum was maintained for a period of 24 hours; SF_6 concentration remained stable during a 17-hour test.

Connection of the manifold-column system to norprene tubing, to be used with a peristaltic pump to circulate gas in the system, caused a loss of pressure equal to about 1 torr/hour. Further testing is needed to find an inexpensive method of circulating gas in a vacuum-tight system.

3GUT01DD Conduct tracer gas sorption tests on tuffs

See 3GUT13DD "Conduct tracer gas sorption test on stem materials" above.

3GUT012D Test on-line gas tracer monitoring equipment

An automated tracer injection system was ordered from Caltrol, Inc. by REECo. The system may be on-line by the end of August.

An interim tracer injection system was designed, necessary parts were purchased, and the system was installed on-line at UZ-16 and NRG-1. The injection of the tracer gas was controlled with a mass flow controller, and the concentration of the gas was maintained betweeen 0.8-2.0 ppm. Samples of the traced drilling air were collected from the drilling air pipeline and analyzed on a gas chromatograph.

Design and testing of sample chambers to be used in conjunction with the ITI Leakmeter 120 is continuing. Two different sample chambers have been designed, manufactured, and tested with unsatisfactory results.

3GUT020D Prepare report on gaseous tracer test

This activity has not started as yet because the experiments are still in progress.

3GUT133D Develop technical procedures for monitoring gas tracer

Two technical procedures in support of this activity, entitled, "Injection of a tracer gas used for determining atmospheric contamination in a dry-drilled borehole" and "Method for analyzing the concentration of halocarbon bases with an ITI Leakmeter 120" were reviewed and approved. However, the automated monitoring system is in procurement.

Quality Assurance

Planning and Operations

Variances

3GUT13DD Conduct tracer gas sorption test on stem materials

Cause: tracer gas testing cannot proceed until a leak-tight system is obtained. An air-circulating pump that will not leak is needed in the system.

Impact: none, since the tests will be completed before the stemming material is used in the boreholes.

Corrective Action: none. Testing will proceed in July and be completed months before the stemming material is used in the boreholes.

3GUT01DD Conduct tracer gas sorption test on tuffs

Cause: tracer gas testing cannot proceed until a leak-tight system is obtained. An air-circulating pump that will not leak is needed in the system.

Impact: we will have to assume that the tracer gas behaves conservatively when pumping drilling air out of UZ-16 at the conclusion of drilling.

Corrective Action: acquire a suitable leak-tight, air-circulating pump.

3GUT03DD Prepare WRI report on aqueous tracer tests

Cause: slow response by author, A. Lewis-Russ, to reviews.

Impact: none.

Corrective Action: contacted the author, who left the project two years ago.

3GUT020D Prepare report on gaseous tracer test

Cause: see 3GUT13DD and 3GUT01DD above.

Impact: minimal. The tracer gas used (SF_6) is known to be conservative. However, for the record, we have to prove it by experiment because none of the data was published for tuff materials.

Corrective Action: acquire a suitable leak-tight, air-circulating pump to complete the experiment, so that report can be written.

Work Performed but not in Direct Support of the Scheduled Tasks

Prepared figures for UZ-1 data (1984-1991) which will be published by A. Yang and others. (16 hours)

Prototype Dry Coring of Rubble 0G3312L2

Summary Account Manager - C. Peters

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT03FF Complete preparation of report on G-Tunnel work

This report will be combined with 3GUT14FF (Prepare WRI report: "Effects of coring on chemistry").

3GUT01EE Complete testing effects of core sealing method

Seventy-five cores were sealed using eight different sealing methods, and weighed.

Five cores were removed from their packaging, weighed, and the moisture content determined.

Technical Activities (Continued)

3GUT01EE Complete testing effects of core sealing method (Continued)

Additional wax, Saran wrap, Lexan, and control tests are ongoing. Testing is expected to be complete by the end of July, 1992.

3GUT13FF Complete reduction of data effect of core sealing

The tables containing all the weight data and graphs of weight loss and gain are up to date and the statistical analyses of weight data was continued.

3GUT004F Develop technical procedures on core sealing

A scientific notebook plan was written and is being implemented at UZ-16. The procedure will be written as an extension of the scientific notebook plan after completion of laboratory testing and after several months of field implementation at UZ-16.

3GUT016F Conduct technical procedures training on core sealing

Use of the scientific notebook plan at UZ-16, and working with the SMF at UZ-16 is the first phase of training.

3GUT14FF Prepare WRI report: "Effects of coring on chemistry"

This report is being combined with the G-Tunnel report (3GUT03FF); the outline has been upgraded to include the G-Tunnel report.

3GUT07FF Develop technical procedure on rubble coring

This procedure is not presently needed.

Quality Assurance

Planning and Operations

Variances

3GUT01EE Complete core sealing testing

Cause: this activity was not completed, due to diversion of personnel to UZ-16 drilling and trace gas injection work at the NTS.

Impact: the sealing tests will be completed during July, 1992. They will not impact other activities.

Corrective Action: work will be completed in July, 1992.

3GUG03FF G-Tunnel report

Cause: report writing was delayed due to time diverted to UZ-16 drilling support. We have noted a plan to combine this report with 3GUT14FF.

Impact: none. The combined report will be completed on schedule.

Corrective Action: combine this report with 3GUT14FF, and complete by September 30, 1992.

Prototype Pore-Water Extraction 0G3312M2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT018G Procure/develop data acquisition software

All software has been installed on the data acquisition computer. The data acquisition board needs to be acquired, installed and programmed before the system is operational. This task has been delayed due to the expiration of a temporary appointment of a student with the USBR in April 1992, the difficulty with the reinstatement of that position, and the lack of time that the employee is now assigned by USBR to this project.

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

Milling of the cell is complete as of May 29, 1992. A meeting was held with the contract machine shop on June 1 to check milling work before the cell was sent out for heat treatment on June 2. After heat treatment, all of the cell components will undergo final grinding and then assembly.

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

Pore water chemical data collected to date by compression was examined by using two statistical "filters" and breaking the data into pressure levels from first water. The data was graphed and discussed in a meeting of project personnel. It is thought that general trends in the data are better defined using this method. Several additional data reduction methods were suggested at the staff meeting and will be accomplished in the near future.

The computerized record of all the mechanical data for pore-water extraction was brought up to date in May.

Four partially welded cores were hand cut in preparation for testing and all were compressed by the one-dimensional compression method. The saturations ranged from 46.9 to 61.1 percent with successes from 9.5 to 18.2 percent. Only 2 to 4 ml of water were expressed after nitrogen injection.

The load frame in the USBR Vibration Lab was set up for core compression with the intent of having two load frames for testing. One shakedown test of a previously compacted core was run to determine if further modifications to the load frame were required and to train the operator. The system performed satisfactorily.

Fifty pore-water samples that were extracted from welded and nonwelded tuff cores, using one-dimensional compression methods, were tested for dissolved carbon dioxide concentration and retested for Ph in USGS labs. The results of these tests will be compared to the water chemistry data provided by Huffman Laboratories for the same pore-water samples.

Calibration tests for the MI-442 potassium microelectrode and the MI-4 reference probe were performed. These tests are being performed as preparation for evaluating concentrations of °cations and ions dissolved in pore water in USGS labs, and as a check on contract lab results.

Technical Activities (Continued)

Calibration tests for the M1-720 Carbon Dioxide Microelectrode were performed using known standards. Tested a pore-water sample extracted by one-dimensional compression using the M1-720 Dissolved Carbon Dioxide Microelectrode and the M1-442 Potassium Microelectrode. These tests were performed on a pore-water sample immediately after being extracted from a partially welded tuff core sample (UZP5-135.3-135.6/UP-1). These results will be compared to contract lab results.

Chemical analyses of extracted pore-water were received from the contract laboratory and were added to the computer database. The new data was graphed for analyses.

The computer database was reformatted so that chemical and mechanical data could be accessed at the same time to allow for easier comparison of the two.

3GUT006G Modify high-press cell technical procedure

A draft of the step-by-step test procedure was prepared, and is presently undergoing final editing. The HP will be submitted for review in early July.

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

The WRIR titled "Pore-water extraction from unsaturated tuff by triaxial and one-dimensional compression methods, Nevada Test Site" is presently in review.

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

The paper was revised and submitted in camera-ready copy in March 1992. The paper is in press and is scheduled for publication in July 1992. Six hours were spent on organization and preparation of a poster presentation for the July 1992 conference. The poster will be completed in early July.

Quality Assurance

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

A scientific notebook plan was completed for pore-water extraction of welded and nonwelded tuff chips and core fragments using one-dimensional compression methods.

Planning and Operations

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

Ordered lab supplies for compression tests and load frame (core wrap and sealing materials) O-rings, etc.

Variances

3GUT018G Procure/develop data acquisition software

Delayed one month.

Cause: this task has been significantly affected by the expiration of the appointment of a USBR employee that was working full-time on this project, and the time delay in reinstating that employee. The present status of this employee is that he is assigned to this project approximately 50 percent versus his original assignment of 100 percent (which was the basis of setting the original task time schedule). The loss of full-time services of this individual has significantly affected the progress and delayed the completion of this task. To complete this task, we require additional computer expertise from USBR for a short period of time. We are having difficulty arranging this help due to existing work schedules.

Impact: an additional one month delay in completion of an operational data acquisition system.

Corrective Action: none.

3GUT020G Procure and construct additional high pressure 1-D cell

Cause: heat treating of material and delays by contract machine shop. The contract machine shop has made much slower progress than originally planned, reportedly due to personnel shortages.

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.

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

3GUT006G Modify high-press cell technical procedure

Cause: this task was scheduled to be completed by May 28, 1992. It is expected to be completed in early July. The delay was caused by a lapse in an IPA contract with the Colorado School of Mines on September 30, 1991, for Dr. Higgins. A new contract was not in effect until the last week in February 1992. Dr. Higgins is the primary author of the technical procedure.

Impact: possibly none. There is enough time scheduled for review and revision that the technical procedure may be in place as scheduled in T17M.

Corrective Action: none.

Work Performed but not in Direct Support of the Scheduled Tasks

A hydrogen filter and oil for the SATEC load frame were requisitioned to correct a leak and pressure problem. (2 hours)

All of the core cutting/preparation equipment was moved into the USBR Vibration Lab due to construction work in the core prep area. (4 hours)

Catalog searches, ordering procedures for new parts required to make rock saw operational in USBR Vibration Lab. (3 hours)

Read required laboratory safety practice plans for Buildings 20 and 56. (2 hours)

Repair of hydraulic system for SATEC load frame (hydraulic fluid change, replace O-rings, replace oil filter, and bleed hydraulic lines). (12 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (Continued)
Conduct tour and demonstration of compression test lab/equipment to visiting scientists. (2 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (Continued)
Read required QA assignments. (14 hours)

Detailed work plans for FY92/93/94 were examined for the Prototype Pore-Water Extraction project and a revised draft of the PACS was prepared for FY93/94. (24 hours)

Installed new computer software, hardware (scanner), and studied manuals for the use of each. These were additions to personal computers used for data storage, analyses, and report preparation. (4 hours)

Drove van to/from NTS to obtain core for pore-water extraction. (60 hours)

Monthly report preparation. (10 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)

SCP 8.3.1.2.3.1.2 Site potentiometric-level evaluation 0G3313E2
Summary Account Manager - P. Tucci

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF005A Begin 1992 water-level data collection

Three wells are being monitored on a quarterly basis; fifteen zones in fifteen wells are being monitored on a monthly basis; twenty-one zones in thirteen wells are being monitored on an hourly basis; continuous analog data is being obtained on four zones of two wells (included in count on hourly sites); real-time data is being obtained on nine zones in six wells using satellite data-collection platforms (included in count of hourly sites); the status of the network is being evaluated at the end of each month and recommendations are being made for instruments that should be watched, calibrated, or replaced; and real-time data is being monitored on a daily basis looking for water-level excursions.

Replaced and calibrated transducers at the following wells: USW H-6, WT-13.

3GWF005A Begin 1992 water-level data collection (Continued)

Calibrated transducers at the following wells: USW H-1 tubes 1-4, USW H-4, USW H-6, WT-3, WT-11, UE-25p#1.

All four zones in well USW H-1 were converted to real-time systems.

HP-60, R2 "Method for monitoring water-level changes using pressure transducers ", was approved by the QA Office in April and became effective on May 20.

Transducers and a data logger were installed in wells UE-29a #1, UE-29a #2 (part of quarterly network) and UE-29 UZN #91 to look for possible effects of rainfall and runoff events in the Fortymile Wash area.

Water levels for the first 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.

The effects of the April 22 and April 25 earthquakes in southern California on the water levels in well USW H-5 were investigated.

Water-levels in 4 zones in 2 wells continued to be monitored for responses to earthquakes.

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

The investigation of the water-level and fluid-pressure responses in wells at Yucca Mountain to two major earthquakes in California on June 28 and an earthquake near Yucca Mountain, Nevada on June 29 was begun. Preliminary analysis of records from USW H-5 indicates responses in excess of 1.7 ft. Within a couple of hours after the Nevada earthquake, fluid pressure in the well returned to within one inch of its pre-earthquake level. Analysis of responses in other wells was begun and is continuing.

Technical Activities (Continued)

3GWF41AA Continue preparing 1989 water-level data report

The report on "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.

3GWF20AA Continue analysis of water-level trends

G. O'Brien continues to spend time looking at barometric earth-tides, and seismically induced water-level fluctuations. He continues to confer with D. Galloway (USGS, California District) on the methodology.

E. Ervin and D. Burkhardt continued investigation of long-term water-level trends. If this analysis does not warrant a report of its own, the results will be reported in the revised potentiometric-surface map.

3GWF20AA Continue analysis of water-level trends (Continued)

Note: Because the original intent of this activity was to analyze long-term and seasonal trends, the activity is considered complete. Future work on barometric earth-tides, and seismically induced water-level changes will be reported under activity 3GWF005A. Future work on long-term and seasonal trends will be reported under 3GWF004A. (D. Gillies, 6-29-92)

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 S. 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. The document is being revised and review comments are being addressed.

3GWF024A Reduce 1991 periodic water-level measurements

Manual measurements were worked up for all of the wells, completing this activity as of June 2.

3GWF42AA Complete 1990 water-level data report

Regression analyses were done for all transducer calibrations for 1990 and results were complied 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.

3GWF006 Convert six sites to DCPs

All zones in well USW H-1 were converted to a data collection platform system, and went on-line this month. This completes this activity as of June 5, 1992.

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.

Technical Activities (Continued)

3GWF026 Reduce 1991 transducer calibrations

Transducer calibrations were worked up for all of the calibrations done during 1991, completing this activity as of June 5.

3GWF116A Replace current software with NWIS

All continuous water-level monitoring sites were converted to data collection platforms (DCPs) on June 5. This conversion will make use of National Water Information System (NWIS) software easier. NWIS software is currently being used to edit data coming from DCP sites. Testing of the NWIS system is completed and successful; thus this activity is closed.

3GWF004A Prepare report on water-level fluctuations at Yucca Mountain

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

3GWF129A Develop software QA for data reduction

Technical contact for this software retired in September. G. O'Brien designated as new technical contact for this software, but was instructed not to spend time on this activity until the outcome of 3GWF037, Research NWIS Software, is known. It is strongly suspected that this task can be better accomplished in the future using NWIS software.

Planning and Operations

3GWF005A Begin 1992 water-level data collection

The new PI for this activity has continued to become familiar with the project, has visited the site, and continued working on required training.

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 training a new PI, completing employee performance appraisals, and reviewing PACS schedules and work scope for Mission 2001. 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

The report will be ready for transmittal to YMP Branch Office by June 30. 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. No impact as nothing in foreseeable future depends on this study.

3GWF20AA Continue analysis water-level trends

Completion of this activity was delayed because of the reconfiguration of instruments in four zones of two wells to better record the effects of earthquakes, and because of the analysis of the April 22 and April 25 California quakes.

Work Performed but not in Direct Support of the Scheduled Tasks

S. Boucher gave QA support to various activities evaluating QA and organizing QA support for other groups of activities. She issued, worked on, closed, or helped verify a number of NCRs for other projects. (48 hours)

Several project personnel attended a class on Unix in May, to be able to utilize the next generation of USGS computers. (80 hours)

S. Boucher attended a 3-day conference in Boulder, CO, on Western Water Law to obtain a better understanding of the legal aspects of pumping of ground water in the Yucca Mountain area. (24 hours)

Replacement of a GSA vehicle through Denver GSA. (48 hours)

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

G. O'Brien assisted with sampling for the analog recharge project. (40 hours)

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 and stress test report

During March and April, G. Patterson's time was dedicated, almost 100%, to the task of completing the draft of the report. In May and June, however, Patterson's help on other aspects of the project was needed, and he was diverted to these activities.

3GWF002D Reanalyze past c-hole aquifer tests with advanced techniques

Appropriate data were selected from previously-conducted c-hole aquifer tests and analyzed with dual-porosity aquifer analysis techniques. A. Geldon will write a USGS Open File report summarizing the results. This activity now is considered 100% complete.

3GWF006D Analyze strain-related pressure response in cased holes

G. O'Brien had travelled to Sacramento, California, in April to meet with D. Galloway and review the techniques needed to analyze the strain-related hydraulic response data that are being collected from cased holes (h-holes). During May and June, O'Brien worked on analyzing the strain-related hydraulic response data from wells H-5 and H-6. On June 28, 1992, a magnitude 7.4 earthquake epicentered in Joshua Tree, California, and another smaller earthquake epicentered in Big Bear Lake, California, caused more than 1.7 ft of total transient displacement in the free water level in well H-5. On June 29, 1992, a magnitude 5.6 earthquake epicentered near Lathrop Wells, Nevada, also caused transient water level and confined-pressure displacement in wells H-5 and H-6. O'Brien will now analyze the pressure and water level response data from these major seismic events.

Technical Activities (Continued)

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

G. O'Brien discussed the issue of analyzing strain-related hydraulic response data from uncased holes (WT holes) with D. Galloway during their meeting in Sacramento in April. Work continued on investigating approaches for this kind of analysis.

Quality Assurance

3GWF012D Continue development of software QA for activity 8.3.1.2.3.1.3 programs

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. It was determined that G. LeCain of the HIP is also using the program and will be the person primarily responsible for entering it into the software QA system. The saturated zone fractured rock hydrology project will coordinate with LeCain in this effort. Discussions continued with G. O'Brien on what needs to be done regarding software QA for programs used to perform the strain-related hydraulic response analysis (atmospheric loading, earth tides, and seismic stress).

Planning and Operations

Variances

3GWF001D Finish intraborehole flow and stress test report

In May, G. Patterson was involved in meeting with vendors for data acquisition systems (he was also on annual leave for two weeks). In June, Patterson supervised the television logging at the UE25-c holes. He also went on a trip to the NTS to observe the cross-hole seismic tomography being conducted at the c-holes by LBL. Patterson was also involved in project meetings to work out details for various project procurements. In addition to this diversion of effort, Patterson reported difficulties in physically locating the original data (rather than the later digital data available to him in PC ASCI files) used as input for the report. This difficulty arises from the fact that the data pertains to tests that were performed a long time ago, when no organized data acquisition and retrieval system was in place.

Work Performed but not in Direct Support of the Scheduled 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). Gary Patterson represented the PI at the well site.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0G3313G2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF021F Oversee field simulation of cross-hole tests

This activity encompasses all work related to the U.S. site (Raymond Quarry, near Oakhurst, California) 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.

Technical Activities (Continued)

During the first two weeks of May, six new wells were drilled at the Raymond site. The final well configuration is that of a triangle, with an apex well, and four wells each along the two sides of the triangle running southeast and southwest from the apex well. Present during the drilling from the USGS were M. Umari and J. Gemmell. Drilling was done by Bannon Drilling of Oakhurst, California.

All 12 packers needed for the prototype testing of c-hole-bound equipment in Raymond were completely wired, tested, and are ready to go to the field.

This activity will continue through activity 3GWF022F, "Continue oversight of field simulation of cross-hole tests". The present activity, 3GWF021F, is considered 100% complete as of June 2, 1992.

3GWF024F Develop scientific notebook for cross-hole tests with prototype string
Preparations for the development of the scientific notebook plan continued.

This activity is continued through activity 3GWF025F, "Continue development of scientific notebook for cross-hole tests with prototype string". The present activity, 3GWF024F, is considered 100% complete as of June 2, 1992.

3GWF004F Complete (procurements for and) construction of third 3-zone packer string
A prototype motor-driven ball valve was built in April for use in the transducer reference line. (This valve was developed because the solenoid valves had failed the functional tests, as was explained in previous reports. The solenoid valves that are part of the two previously constructed 3-zone packer strings will be replaced with motor-driven ball valves). The motor-driven ball valves were tested in May, and it was found that the motors have too much torque, and the shafts from the motors were damaged. They have been returned to the manufacturer for the installation of hardened steel shafts which should correct the problem.

The bid proposals, in response to the RFP for construction of the additional packers needed to complete the third 3-zone packer string (and to convert the three 3-zone packer system to a three 5-zone packer system), were received and reviewed. The technical review committee determined that the bid from Tam Inc. was fully acceptable, the bid from Baker was marginally acceptable pending further negotiations, and the bid from Baski was unacceptable. Letters notifying each company of its status were mailed on May 27, 1992.

J. Gemmell met in April with Colorado Molded Products to finalize the design for the molded rubber hose clamps. (These will be used to clamp all the hoses, tubing, and electrical wires to the 2-7/8" production pipe to both support and separate them. Enough clamps will be made to accommodate both the third packer string, currently being constructed, and the two previously constructed strings). In May, we received the prototype version of the rubber clamps. Initial testing indicated that they will work well for the purpose they were designed for. An order was made for 100 of these rubber clamps, and the clamps were received in June. Also purchased was banding equipment to secure these rubber clamps around the central 2-7/8" production steel pipe (around which the packer string is built).

Technical Activities (Continued)

3GWF013F Develop techniques to analyze cross-hole test results and 3GWF028F Continue preliminary numerical/analytical modeling to assist in cross-hole test design

Discussions were held with K. Kipp of the USGS/WRD National Research Program to have him be a consultant to our project on developing a 3-dimensional porous-medium-equivalent model of the c-hole complex, using Kipp's 3-D flow and solute transport code. Arrangements were made to have M. Umari and G. Patterson meet with Kipp the first week of July to commence this effort. The model can be used for cross-hole test design, in addition to analysis of the eventual cross-hole test results.

Plans have been firmed to have A. Geldon and/or E. Ervin 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.

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, California) 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 was reported under section III (work at the site has been going on since December 1991).

During the weekend of June 6-7, 1992, K. Karasaki (LBL) accompanied a representative of a Japanese borehole logging company to the Raymond site to try a new optical borehole televiewer technique. The results are very promising, and further use of the new optical televiewer technique for borehole fracture mapping is planned.

3GWF025F Continue development of scientific notebook for cross-hole tests with prototype string

Preparations for the development of the scientific notebook plan continued.

3GWF019F Oversee LBL (develop and) analyze seismic profile for c-holes

During the period from June 15 to June 30, the cross-hole seismic tomography group from LBL, under the direction of E. Majer, set up their logging equipment and commenced data gathering activities at the c-holes. During the week of June 22, M. Umari, G. Patterson, and J. Gemmell visited the NTS to observe the cross-hole tomography and discuss the work with the technicians and scientists performing the work.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

M. Umari, G. Patterson, and J. Gemmell met with representatives from the Fluke and National Instruments companies to see if they had a data acquisition system that would meet our anticipated needs during the upcoming hydraulic and tracer tests at the c-holes. Our requirement for very frequent and accurate sampling early in the tests is the most difficult for any vendor to meet. It appears at this time that the system available from National Instruments may be satisfactory.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0B3313G2

Summary Account Manager - E. Majer

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF02C Prepare for cross-hole seismic work

Final testing and checkout of the tomography (high voltage) system was completed in May. A full scale test simulating actual field conditions also was conducted at the Richmond field station.

3GWF03C Develop cross-hole seismic profile

Field work began on June 15, 1992. All training, field mobilization and field set up have been accomplished. Initial cross-hole seismic results indicate that high frequency cross-hole seismic imaging will be very useful for imaging fracture properties. The frequency center across the c-well complex is greater than 5000 Hz. This is better than expected, and resolution better than 25 cm in absolute space will be possible. The data collection at this frequency is in the Bullfrog formation. below the 2100 ft level. Between the 1320 and 2100 ft levels the spacing will be 2 meters, rather than 1 meter. Both sweep and pulse surveys are being performed. Due to time constraints, the higher frequency pulse will be used roughly.

Quality Assurance

Planning and Operations

Variances

3GWF02C Prepare for cross-hole seismic work

The start of field work was delayed by T.V. logging performed in the c-holes prior to this work. Work started according to the revised plan in June.

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, California (location of the U.S. site for the USDOE/AECL International project), Stetsenbach will commence the training there.

3GWF167A Continue preliminary modeling for tracer tests and 3GWF168A Develop techniques for analysis of tracer test results

Discussions were held with K. Kipp of the USGS/WRD National Research Program to acquire him as a consultant to our project on developing a 3-dimensional porous-medium-equivalent model of the c-hole complex, using Kipp's 3-D flow and solute transport code. Arrangements were made to have M. Umari and G. Patterson meet with Kipp the first week of July to commence this effort. The model can be used for cross-hole tracer test design in addition to analysis of the eventual cross-hole tracer test results.

Plans have been firmed to have A. Geldon and/or E. Ervin use the software package FracMan to develop a 3-dimensional fracture-network, flow and solute transport, 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.

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

3GWH004 Assess data (extant), phase 1

W. Steinkampf presented and discussed the results of a preliminary examination of published site hydrochemical data, relative to its utility, at the joint meeting of the Project Geochemistry Integration Team and Hydrology Integration Task Force (9-11 June, Denver). This activity is now complete.

Technical Activities (Continued)

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

A re-examination and re-evaluation of planning goals and methodology by the principal investigator and line supervisors is underway. Compilation of published water-chemistry data and extant hard-file data is continuing.

Quality Assurance

3GWH001 Grade QA for SZ hydrochemical study

PI participated in a question/answer workshop on USGS QA grading procedure. The planned meeting with QA office to begin preparation of grading package has not yet occurred.

Planning and Operations

3GWH004 Assess data (extant), phase 1

A summer student was hired via the paleohydrology study to address joint data compilation needs. Her task will be to compile published water-chemistry data and extant hard-file data that has not been entered by USGS Weapons Program staff in Las Vegas. Discussions were held with paleohydrology investigators and HIP data management staff to ensure that all requisite information would be entered.

3GWH024A Develop ion chromatograph methods

W. Steinkampf was notified by J. Henderson (USGS/YMP) that the support position identified for this study has been classified as Chemist-11, and that the vacancy is being prepared for announcement. Steinkampf met with Henderson to ensure that the requirements satisfactorily identified the requisite qualifications. Henderson requested that Steinkampf supply the list of selective factors to be used in the screening process by the OPM. Steinkampf will meet with OPM staff to formulate this list in early July.

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

W. Steinkampf met with LANL and USGS investigators to discuss methods to be used in collection of spring and shallow ground-water samples. Discussions focussed on ensuring that collection methods would provide requisite sample volumes and would yield samples appropriate to the analyses planned.

Quality Assurance

Planning and Operations

3GWH015A Develop downhole data-collection and sample equipment

This activity is complete. Because of the deferral of capital funding to FY94, a new activity, that incorporates the objectives of this activity, will be started in FY93 to ensure that planned equipment reflects, to the extent possible, the most recent and feasible technical developments applicable to hydrochemical characterization.

Planning and Operations (Continued)

3GWH008B Examine hydrochemical tool test (lab)

This activity has been cancelled. Testing has not taken place due to protracted purchasing requirements for the hydrochemical tool. Because test results will not be available until mid or late FY93, this activity is has been replanned for FY93.

3GWH009B Examine hydrochemical tool test (field)

This activity has been cancelled. Testing has not taken place due to protracted purchasing requirements for the hydrochemical tool by the testing study until sometime in FY93. Because test results will not be available until mid or late FY93, this activity is replanned for FY93.

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 110 hours were spent on the following:
W. Steinkampf attended a HIP/saturated-zone section meeting, during which E. Ervin presented analyses of fractures in the Crater Flat Tuff. R. Luckey provided specific budget information to principal investigators and presented an overview of funding projections.

W. Steinkampf provided technical review of a draft technical procedure for ion chromatographic determinations of aqueous concentrations of selected anions and cations.

W. Steinkampf compiled survey information regarding investigator and management perceptions of the USGS/YMP QA program during FY91. Prepared an analysis of the information for use in the FY91 QA management assessment report.

W. Steinkampf maintained contact with HIP QA regarding pre-requisite review/readiness review requirements in anticipation of study plan approval by the NRC in late summer. Received a copy of a checklist used in 1989 to re-start 8.3.1.5.2.1.3 and 8.3.1.3.2.1.3.

W. Steinkampf participated in the May QIG meeting for another review of the OCRWM Quality Assurance Requirements and Description and subsequent compilation of group comments. Steinkampf also participated in the June meeting of the group with D. Horton and R. Clark (OCRWM), W. Booths (Weston), R. Spence (YMP) to draft a section of the document intended to control scientific work done in site characterization.

W. Steinkampf participated in the monthly teleconference of the YMP Geochemistry Integrations Team.

W. Steinkampf attended the joint meeting of the YMP Geochemistry Integration Team and the YMP Hydrology Integration Task Force in Denver. He presented the results of preliminary examinations of site hydrochemical data and led work group discussions of potential fast paths within the saturated zone. He prepared the work group report which will be integrated into a final report destined for YMP management.

W. Steinkampf attended a HIP staff/investigator meeting convened by the TPO to discuss budget forecasts for the YMP.

W. Steinkampf received UNIX training at the USGS National Training Center in Lakewood, Colorado.

Work Performed but not in Direct Support of the Scheduled Tasks (Continued)
W. Steinkampf participated in the Mission 2001 effort by preparing revised forecasts of study activities for FY93/94.

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
W. Steinkampf, W. Werrell (U.S. National Park Service/Ft. Collins, Co.) and K. Ludwig (USGS) reconnoitered 19 sites within the Death Valley National Monument (DVNM) that are candidates for sample and data collection. NPS interest in improving their information base. relative to the quantity and quality of waters within the DVNM, provides an opportunity to establish a base of hydrochemical data, some within areas generally inaccessible, that will be used to refine conceptual models of the regional geohydrologic system, to aid in describing regional hydrochemical variations, and to investigate the reactions influencing ground-water chemistry within the region. During the trip, the reconnaissance team met with E. Rothfuss, J. Ardahl; and M. Essington (NPS/DVNM) to inform DVNM staff of YMP interests and objectives, and to preliminarily describe foreseen sampling logistics, based on field observations to that time. Monument staff were generally receptive to plans presented and greatly assisted the investigators in their efforts.

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. E. Ervin discussed the revised study plan with five of the reviewers, obtained their informal, verbal concurrence and is awaiting contact from the other two reviewers or their representatives.

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 comprising television and acoustic televiewer 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.

3GWM06AA Prepare report on potentiometric map

E. Ervin and R. Luckey have finalized the preliminary potentiometric map of 1988 average water levels for the vicinity of Yucca Mountain (scale 1:24,000). The altitude of the water table is contoured on a .25 meter interval. This map is an update of Robison's (1984) potentiometric-surface map and represents increased accuracy in the water-level measurements and the investigators' conceptual ideas about the flow system near Yucca Mountain. Text for the accompanying report is currently being written.

Quality Assurance

Planning and Operations

Variances

3GWM003A Review (DOE final) study plan 8.3.1.2.3.3

Some delay is anticipated because one of the reviewers is no longer with the project and the contract for another reviewer has lapsed. 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.

Variances (Continued)

3GWM06AA Prepare report on potentiometric map

Delayed two months because of prolonged illness of principal investigator and unexpected difficulty in interpreting corrected water levels. Will delay milestone 3GW06M by at least two months, possibly more as review process of that milestone will be more difficult than originally anticipated.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 56 hours were spent on the following:

E. Ervin attended a 3-day joint meeting of the Hydrologic Integration Task Force and Geochemical Integration Task Force hosted by DOE.

E. Ervin assisted in the public tours of Yucca Mountain in May and June by presenting an overview of studies underway in the saturated-zone section at the USGS's Hydrologic Research Facility.

E. Ervin spent a total of two days preparing and reviewing PACS input data for Mission 2001.

SCP 8.3.1.2.3.2 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

E. Ervin and M. Chornack began mapping in the basal unit of the Prow Pass Member at Raven Canyon. In addition, the Magellan Global Positioning Satellite locator system was used in differential mode to locate fracture mapping sites east of Little Skull Mountain. The method was of limited success because of difficulty obtaining accurate altitude measurements. The fracture mapping sites may need to be surveyed in at a later point.

3GWM017B Continue to assist LBL add outcrop data to model

Colleague review comments on the paper entitled "Fracture flow model in the saturated zone at Yucca Mountain", by K. Karasaki, LBL, and E. Ervin have been addressed and it is now in USGS management review. The paper 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.

Quality Assurance

3GWM015B Revise fracture mapping technical procedure

E. Ervin and M. Chornack documented a 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 Ervin and Chornack. At present, the hydrologic procedure is in technical review with E. Verbeek, USGS.

Planning and Operations

3GWM008B Coordinate LBL fracture-network modeling phase 2

Ongoing discussions by E. Ervin with M. Umari, and A. Geldon about work occurring at the UE-25 c-hole complex continued. E. Ervin visited the c-hole complex while the LBL geophysical crew was performing the cross-hole tomography from UE-25 c #2 to UE-25 c #3.

Variances

3GWM015B Revise fracture mapping technical procedure

Delayed two months because of prolonged illness of principal investigator and coordination efforts between HIP, GSP and USBR.

Work Performed but not in Direct Support of the Scheduled Tasks

E. Ervin spent one day preparing and reviewing PACS input data for this summary account for Mission 2001. (8 hours)

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 radioactive waste conference journal article

The USGS review of the paper titled "Fracture flow modeling of the saturated zone at Yucca Mountain", by K.Karasaki and E. Ervin has been completed.

3GWM009C Assist USGS with multiple well test design Phase 1

K. Karasaki discussed with USGS scientists the possible use of the borehole scanner at c-holes.

3GWM02CA Write report on borehole fracture data bias

A draft report on the borehole bias study has been completed and is now undergoing colleague review.

3GWM004C Write draft TRINET users manual

Work continued on writing the user's manual for TRINET. The input/output section was completed.

3GWM03CA Study hydrological/seismic data correlations

K. Karasaki attended the Geochemistry and Hydrology Integration Workshop, June 9-11, 1992.

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 24 hours were spent working on the PACS for FY93/94.

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 and evaluate FY91 flood data

Work is continuing, but was largely preempted by the high-priority to complete the FY93/94 PACS planning, revisions, and budgetary summaries for the Mission 2001 exercise.

3GFR002 Collect, analyze, evaluate FY92 flood data

Monitoring of weather in southern Nevada is continuing. The atmosphere was unusually moist in May and June, particularly during the latter half of May. No storms were severe enough, however, to cause runoff in the vicinity of Yucca Mountain, even though thunderstorms were reported throughout the region for several weeks. A severe thunderstorm and flash flood did occur, however, on June 24th south of Carson City, Nevada. The area of the storm was investigated and peak streamflow data was collected. This storm occurred in the same area that was affected by severe storms in 1991; a fact that poses an interesting question about the recurrence interval of severe storms at any one location in Nevada. Although humid, unstable atmospheric conditions prevailed across much of Nevada during May and June, no other severe storms or floods occurred.

3GFR018 Reconnoiter Yucca Mountain to assess debris hazards

Some map analysis was accomplished. Glancy worked on preparing sections of an interpretive report on the 1984 debris flows at Jake's Point near Yucca Mountain. Other field reconnaissance work was preempted, however, by the high-priority to complete the FY93/94 PACS planning, revisions, and budgetary summaries for the Mission 2001 exercise. A shortage of project funds also precluded travel.

3GFR004 Map PMF flood-inundation zones at Yucca Mountain

U.S. Bureau of Reclamation staff completed maps and reports on PMF flood-inundation zones at Yucca Mountain. These materials have been printed and copies are being distributed for USGS and DOE review.

Technical Activities (Continued)

3GFR006 Prepare administrative report: FY90/91 flooding

Data compilation and analysis has been started, but other work for this activity was derailed due to the length of time required to complete the FY93/94 PACS planning, revisions, and budget summaries for the Mission 2001 exercise.

Quality Assurance

3GFR019 Regrade (QA) for site flood and debris hazards

QA consultants with HIP in Denver have been contacted in regard to regrading for this study. P. Glancy and D. Grasso are currently reviewing the Quality Assurance Grading Report (QAGR) for this study (dated January 17, 1991) and information pertaining to QMP-3.15. Specific criteria of the existing QAGR and need for regrading are being addressed.

Planning and Operations

Variances

3GFR016 Analyze and evaluate FY91 flood data

Short-term impact caused by high-priority requirement to complete FY93/94 PACS planning, revision, and budget summaries for the Mission 2001 exercise.

Work Performed but not in Direct Support of the Scheduled Tasks

D. Grasso and P. Glancy spent a considerable amount of time working on FY93/94 PACS planning, revisions, and budget summaries for the Mission 2001 exercise. (80 hours)

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

Quality Assurance

Planning and Operations

Variances

Work Performed but not in Direct Support of the Scheduled Tasks

Five electronic and mechanical weighing scales used for YMP quality-affecting work by IGG and MOA staff (K. Futa, J. Paces, B. Zartman, K. Ludwig) were cleaned and calibrated by Certified Balance Service. All scales were certified, and calibration status reports were submitted to the QA manager.

J. Paces continued calibration of mixed U-Th spike as per GCP-22 using HU-2 and OCB-66-15 standards.

B. Marshall completed two QA reading assignments.

B. Marshall upgraded the YMP Sr database system to a new package capable of operating on a PC platform. This also involved purchasing new hardware and software so that the recently acquired PC, which will be devoted to the geochemical and isotopic database, can be networked to the existing computing facilities this fall when software becomes available for Windows operating environment. In addition, a new grid system for south-central Nevada was implemented within the YMP Sr database in order to facilitate locating points on maps and plotting geographic information system (GIS) data.

K. Futa calibrated cation exchange columns for Sr in order to check for possible changes in the elution position. Results indicate a slight up-field shift, and columns should now yield higher Sr recoveries with less interference from other cations.

J. Paces began planning and ordering materials and supplies to expand present YMP clean lab space to facilitate U-series analysis by mass spectrometry. This technique is much more sensitive to environmental blank levels than the alpha-counting technique and must be done under highly controlled laboratory conditions.

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

3GCL004B Sample outcrop sites

K. Futa analyzed two ostrocode samples for Sr concentration and isotopic composition. These samples, from the WIPP site in New Mexico, are part of a feasibility study to determine if ostrocode valves might be used to record Sr isotopic ratios in equilibrium with the waters in which the organisms lived, or if the valves are subject to low-T Sr exchange during subsequent diagenetic processes. Results from the first two samples indicate that ostrocode valves contain high Sr (~2000 ppm) which should allow future analysis of very small sample sizes.

3GCL004B Sample outcrop sites (Continued)

B. Marshall wrote software code for generic (rather than element specific) exponential mass discrimination and spike subtraction corrections for isotopic data obtained by solid-source mass spectrometry. This code was written for implementation on the new Finnigan MAT 262. Code was tested on neodymium, strontium and calcium mass spectrometer data and found to work correctly for all cases sampled. In addition, a new procedure for naming files in the new mass spec was implemented, and a method of accessing previously run data was established.

B. Marshall also studied the Finnigan MAT 262 operating software in order to implement the exponential mass discrimination and spike subtraction corrections for isotopic analyses. These codes will be written soon and tested this summer.

Quality Assurance

Planning and Operations

Variances

3GCL002B Conduct reconnaissance - Las Vegas Valley and 3GCL001B hire and train staff

Reconnaissance and mapping of the Las Vegas Valley deposits has not started, so is behind schedule. Our 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. At that time we hope to have J. Quade on contract. Quade has mapped these deposits for the State so will be able to use his map and add to it to meet our needs bringing us back on schedule quickly.

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

Quality Assurance

Planning and Operations

Variances

3GCL104 Hire and train staff

Initiation of packrat midden studies and of microfossils from the Pahranogat Marshes has been shifted to FY93 when we anticipate 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 8.3.1.5.1.4.2 Surficial deposits mapping of Yucca Mountain area 0G3621I2
Summary Account Manager - E. Taylor

ACTIVITIES AND ACCOMPLI HMENTS

Technical Activities

3GCH012A Conduct field reconnaissance of stratigraphic relationships

This task was completed on June 15, 1992, with a brief field trip in early June in which new trench and pit exposures in Midway Valley were examined. These exposures, which are being described in detail by Geomatrix personnel, illustrate the nature of alluvial and colluvial stratigraphic units and buried soils.

3GCH011A Create a map of surface deposits - north third of Yucca Mountain

Intermittently during June, S. Lundstrom did preliminary mapping of surficial geology on air-photo overlays for portions of the northeast surficial deposits map area. The contact prints and orthophoto quadrangles that will be needed to produce the surficial geologic map of the entire map area were ordered. After consultation with E. Swibas, WRD publications section, mylar overlays for the set of 15 orthophoto quadrangles which cover the surficial map area were prepared and punch registered. A light table was procured through GSA surplus to be shipped to the Las Vegas office. Air-photo interpretation of surficial units is continuing while using some of J. Whitney's airphotos and orthophoto quadrangles.

Technical Activities (Continued)

3GCH010A Field check work; collect mat isotope analyses

During June 1-2, 1992 (and July 2, 1992), contacts of surficial deposits that were made on preliminary air-photo overlays were field checked and verified, as were the unit assignments that were based on the informal working stratigraphy of Taylor and others. Samples for isotope analyses have not yet been collected because more of the area needs to be examined in order to determine the best and most critical sites, although potential sampling sites of natural exposures were noted during field checking.

Quality Assurance

Planning and Operations

Variances

3GCH004A Conduct isotope analyses in sediment rock

Isotope analyses will not begin until samples of surficial materials have been collected specifically for this activity during 3GCH0010A.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 30 hours were spent performing the following:
Initial reading and familiarization with four additional assigned QMP documents and revisions as part of QA training.

S. Lundstrom did official technical reviews of two abstracts to be submitted by other USGS personnel to the upcoming Geological Society of America meeting. The abstracts concerned YMP research in tectonics and erosion, respectively.

B. Parks and S. Lundstrom worked together, with the guidance of J. Stuckless and J. Whitney to complete a work plan for Lundstrom, hired by the USGS on May 17, 1992.

Assistance to J. Whitney in writing and revising PACS for FY93/94 and beyond.

S. Lundstrom wrote statement of need for requisition for computers to be ordered for Lundstrom and C. Menges.

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 isotopes

K. Futa analyzed five playa samples from the Yucca Mountain vicinity for Sr isotopic compositions and trace element contents. The purpose of this work is to evaluate possible contributions of finely-dispersed playa-derived components in Yucca Mountain soil carbonates. Both 1.0 N hydrochloric acid and 10% acetic acid leaches were analyzed to determine readily soluble Sr resulting in $^{87}Sr/^{86}Sr$ compositions between 0.71022 to 0.71493. Residues from leached samples were also analyzed for Sr isotopic compositions and yielded $^{87}Sr/^{86}Sr$ values from 0.70865 to 0.71396. In general, residues have slightly higher $^{87}Sr/^{86}Sr$ than their corresponding leachates.

Technical Activities (Continued)

B. Zartman and L. Kwak continued to analyze Pb, U and Th isotopes in materials from Yucca Mountain and surrounding vicinity. Soluble fractions of some Trench 14 and Busted Butte pedogenic carbonates previously have been reported to have high $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$ ratios which cannot be derived from any of the Tertiary volcanic units. As a means of tracing these unique components within surficial deposits, Pb isotopes are being studied from known eolian-derived dust samples, and from some of Paleozoic units in surrounding uplift blocks (Black Marble Mountain, Tarantula Canyon, Carrara Canyon, Striped Hills). Preliminary results indicate that unaltered Paleozoic carbonates have low Pb concentrations (<1 ppm), but high radiogenic Pb isotopic signatures similar to the Trench 14 leachates. These and additional results, combined with Sr isotopic and trace element geochemical data, will be used to model various constituents and calculate mass balance mixtures to better-define the origins of Yucca Mountain surficial deposits.

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 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 continued to test two methods for preparing quality geomorphometric data from large-scale topographic maps. The preparation of two digital data sets is currently underway. When complete, the data sets will be numerically compared to determine which of the methods is the best.

Technical Activities (Continued)

D. Grasso and P. Glancy discussed the use of various methods for dating late-Quaternary debris flows with others involved in paleoflood research. The techniques that show the most promise for the YMP work use both sedimentary and dendrochronological dating techniques. These procedures may be useful for ascertaining the age and recurrence intervals of paleoflood events in southern Nevada.

3GQH008A Geomorphometric analysis of Yucca Mountain and vicinity

P. Glancy studied Landsat TM satellite imagery of the Fortymile Wash area, provided to him by EG&G, to assess the likelihood of whether this major drainage has flowed to the Amargosa River during historic times. The most likely and recent event for such a flow would have been in January and February, 1969, during which time major floods occurred in nearby areas. These data will then be compared with evidence of paleofloods in the area. Additional data (e.g., high-resolution aerial photographs and digital elevation models) are needed for this study. D. Grasso and Glancy have not yet been able to locate these needed materials.

3GQH008A Geomorphometric analysis of Yucca Mountain and vicinity (Continued)

D. Grasso began the 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. Currently, work is in progress on delineating the Amargosa River basin in its entirety and all of the largest tributary basins within it. This project will allow us to numerically model streamflow and runoff due to paleoflooding, and to compare these events with those that occur today.

D. Grasso continued to search for readily-available digital terrain data, Landsat TM imagery, and/or aerial photographs to be used in the geomorphometric analysis activity. Three Landsat TM scenes (12 digital tapes) have been received, and two additional scenes (6 digital tapes) are on order. Other high-resolution digital data (e.g., digital elevation data at 1:24,000 or 1:100,000-scale) also are needed for various sites in the vicinity of Yucca Mountain.

D. Grasso attempted to find someone that will help in the preparation of Landsat TM image data. Because we do not have a 9-track tape drive, the Landsat TM scene on digital tape (18 tapes in all) will have to be downloaded elsewhere.

Technical Activities (Continued)

3GQH003A Reconnaissance of Yucca Mountain and vicinity for paleoflood evidence

P. Glancy and D. Grasso joined forces with other Yucca Mountain investigators on May 4-6, 1992, to examine the geomorphic history of the White River drainage east of the NTS. The purpose of the trip was to seek evidence of intense paleo-streamflow. Although the White River is an ephemeral stream today, we believe that this system was considerably more active in middle- to late-Quaternary time. The Holocene flood history of the drainage, in particular, needs to be addressed by the Regional paleoflood evaluation because of its close proximity to Yucca Mountain and the Nevada Test Site, and the likelihood that this area will provide additional evidence about regional paleo-climatic change. During this reconnaissance, our attention was focused on several areas where crucial paleoflood evidence may be procured. These, and other target sites of severe runoff, will need to be revisited during subsequent field investigations. One such site area lies along the flanks of truncated alluvial fans south of the Narrows. Here, fresh fluvial deposits suggest that intense storms may have generated large, high-magnitude streamflows in late-Holocene or possibly historic times.

P. Glancy investigated the Copper Canyon mudflow site near Walker Lake in late June, 1992. The work disclosed further evidence of extensive paleoflooding. Additional sites of exposed tephra, which will help to date paleofloods at this location, were located. In the area, most debris flows appear to be Holocene in age. The area therefore offers the potential for producing an abundance of evidence about the timing, magnitude, and frequency of late-Quaternary floods, as well as evidence of the influences of climatic change.

3GQH003A Reconnaissance of Yucca Mountain and vicinity for paleoflood evidence (Continued)

D. Grasso and P. Glancy attended the ALPHA Paleoflood Hydrology Workshop/Field Trip sponsored by the Geoscience Department, University of Arizona; a leading center of international paleoflood studies. The workshop and field trip were attended by professionals involved in paleoflood and climate change research from around the world. The joint session allowed a broad spectrum of paleoflood investigators to share their knowledge of investigative techniques, to discuss utilities and applications of various lines of paleoflood evidence, and to explore inter-relations between paleoflood and modern (historic) flood data. The sessions addressed many of the major objectives of the Yucca Mountain Project Regional Paleoflood Evaluation. Thus, the benefits of this meeting were (a) exposure to state-of-the-art investigative techniques and strategies, (b) a broadening of acquaintanceship and work relations with leading paleoflood investigators, and (c) up-to-date information on technical conclusions of regional paleoflood studies recently conducted in the vicinity of Yucca Mountain. On the basis of regional-paleoflood investigations presented, it can be generally concluded that many of the largest Holocene floods occurred in clusters, and that these temporal clusters were continuous across a large geographic area. If this was indeed the case, this temporal clustering may have been caused by regional climatic change. Such evidence of region-wide Holocene climatic change is important to site-characterization studies at Yucca Mountain.

Quality Assurance

Planning and Operations

3GQH004A Final DOE review and approval of study plan:

S. Keller transmitted the study plan for this activity to the Project Office for DOE review and approval on March 31, 1992. To date (June 30, 1992), DOE has not notified us as to the status of this activity.

Variances

3GQH004A Final DOE review and approval of study plan:

Short-term impact. DOE has not notified us as to the status of this activity or the cause of the delay.

3GQH014A NRC reviews study plan

Short-term impact. This activity will not start until DOE verification and approval of activity 3GQH004A is complete. NRC then will have 90 days to review the study plan.

Work Performed but not in Direct Support of the Scheduled Tasks

D. Grasso and P. Glancy spent a considerable amount of time working on FY93/94 PACS planning, revisions, and budgetary summaries for the Mission 2001 exercise. (88 hours)

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

Spring and well samples collected in March 1992 field trip have been completed for strontium by Mahan, (GSP). Sample of particular interest include two analyses from wells at Amargosa Valley (RV Park and Cowboy Joe's) which gave identical delta Sr^{87} values of 3.54. These values are similar to those for wells in Forty Mile Wash (J-12, J-13, and JF-3). One sample supplied by J. Czarnecki gives a delta Sr^{87} value of 4.85 which is within the range of the main springs at the Ash Meadows discharge area. Located between Franklin Playa and the Ash Meadows Spring line, King Springs yields a delta Sr^{87} value of 5.03 which is also consistent with Ash Meadows system ground water.

Z. Peterman, (GSP), analyzed additional samples, and reports that samples taken from VH-2 in Crater Flat are of particular interest. Three samples collected over a one year period gave Strontium ratios of 5.37, 5.34, and 5.32 which are considerably higher than any other ground-water samples thus far analyzed from the Tertiary aquifer in the vicinity of Yucca Mountain (mean delta $Sr^{87} = 2.13$). The higher delta Sr^{87} for Crater Flat is similar to the three spring deposits on the south end of Crater Flat.

3GQH028 Analyze Faunal Samples Modern Springs FY92

Samples collected in March 1992 have been processed in R. Forester's laboratory and ostracodes have been found in the following spring/flowing well localities: King Springs, Grapevines Springs, Carson Slough flowing well, and East Spring-Carson Slough. Playa samples from Red Lake, AZ, Jean Lake, and Roach Lake, NV, and Mesquite Lakes CA, were devoid of ostracodes indicating that the surficial deposits represent a dry playa.

Technical Activities (Continued)

3GQH004 Study/Analyze results from Wet/Dry playas

K. Conrad, (GSP), Paleontology Lab analyzed playa samples from Jean, Roach, and Mesquite Lakes. All three sites were barren of ostracodes and these sites can be considered dry playas without a ground water discharge component.

3GQH007 Vegetation Mapping Phase 1

This activity was restricted due to a lack of funds to purchase Landsat data. At present two TM data tapes have still not arrived from the Federally Owned Landsat Data (FOLD) library. F. D'Agnese reports that there has been some difficulty with loading data because they have been delivered in various file formats from different agencies across the country. Much time has been spent by D'Agnese trying to reformat these data so that they may be paneled together in the Intergraph digital image processing software.

During the month of June, F. D'Agnese completed FOLD data acquisition, compiled data in Intergraph Imager software, and paneled all required images into one data set. The preliminary vegetation study began with spectral analyses using, normalized difference indices, transformed vegetation indices, and perpendicular vegetation indices.

3GQH005 Conduct Field Trips Modern Discharge Springs FY92

There were no trips planned in May or June to collect modern Springs. The next trip planned will be in September 1992.

3GQH008 Collect Faunal Samples from Past Discharge Sites

In addition to faunal samples, rock and sediment samples were collected at five-spring sites in the south end of Crater Flat. These sites (reported by Z. Peterman) are isotopically similar to the delta Sr^{87} for ground-water beneath Crater Flat. Peterman also reports four samples from a deposit at the southern outlets of Crater Flat to the Amargosa Valley averages 5.19, and five samples from the nearby white bed (horsetooth site) average 5.28. Four samples of calcite at Site 199 have an average delta Sr^{87} of 5.28. These deposits have been thought to be very old but recent U-series work suggests strontium isotopic data are permissive with a past water table of 80 to 90 meters above the present water table, perhaps only a few tens of thousands of years ago.

3GQH002 Vegetation Distribution Mapping Amargosa Desert

K. Turner and C. Faunt continued work on vegetation analysis in the Amargosa desert which is being conducted in conjunction with Past Discharge (to complete work begun by L. DeMarco). Both Turner and Faunt have developed a series of vegetation maps in IDRISI that adequately describe vegetation in the Amargosa desert. As a result of field checking, it was determined that additional stations would need to be digitized before final maps were produced. From this preliminary work, future additional correlation analyses between vegetation, soils, geomorphic deposits and climate will need to be conducted. The accompanying report is approximately 98% complete.

3GQH009 Prepare Faunal Samples for Analysis

R. Forester, (GSP) is in charge of this analysis activity. Forester reports that it is proceeding according to his planned scheduling.

Technical Activities (Continued)

3GQH011 Prepare report on Methods of Channel Geometry

W. Ostercamp sent a draft report to E. Gutentag in early June concerning channel geometry. Gutentag made recommended revisions for the paper. Because of a heavy work load in the NRP, Ostercamp will deliver a paper for colleague review on or about September 9, 1992.

3GQH300, 3GQH305, 3GQH306 Collect/Sample Ostracodes - Playas New Mexico/Texas

Due to the effects of El Nino, the playas are full of water and C. Reaves (Texas Tech University) reports that it may be October or November when normal conditions in the area will allow collection to resume.

3GQH000 Conduct Chemical Analysis Soil Samples

Some clay minerals analyses have been received from the Geologic Division Branch of Geochemistry (A-Labs), but the lab is late with chemical analyses of samples supplied in October. This tardiness affects other activities (i.e. 3GQH003), because the remote-sensing analyses need to be tied to this data. B. Arbogast,(Geologic Division Branch of Geochemistry-QA), will try to rectify the problem.

Quality Assurance

Planning and Operations

Variances

3GQH007 Vegetation map phase 1 to PDA

Because of the cost increase due to privatization of Landsat data, images have to be borrowed from other federal agencies; thus the map has not been completed. According to F. D'Agnese, the map may be completed by Octoer 1992.

3GQH002 Vegetation map Amargosa Desert

This activity will be completed by August 1992. The report is almost completed and is undergoing final GSIS evaluation and reformatting.

3GQH011 Prepare report of channel geometry

The report is due after summer field work by W. Osterkamp on or about September 9, 1992.

3GQH300,305,306 Collect ostracodes from New Mexico/Texas

This activity has had to be postponed due to extremely wet climatic conditions in the field area.

3GQH000 Chemical analysis soil samples

Geologic Division Branch of Geochemistry has a large back-log of data, so analyses are late this fiscal year.

Work Performed but not in Direct Support of the Scheduled Tasks

E. Gutentag presented a talk on the "Fundamental ground-water hydrology and well hydraulics" to the meeting "Uncovering the Hidden Resource: Ground-water Law, Hydrology, and Policy in the 1990's" sponsored by the Natural Resource Law Center, University of Colorado Law School.

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

J. Watson researched the status of five Scientific Notebooks:

1) SN-0008, HP2O5T, RI
2) SN-0010, HP-206T, RO
3) SN-0011, GCP-24T, RO
4) SNOOI2, HP-208T, RO
5) SN-0028, HP-234T, RO

J. Watson submitted copies of entries from certain notebooks to the QA office.

J. Watson attempted contact with W. Osterkamp on the status of his "Channel geometry notebook".

J. Watson and E. Gutentag responded to DOE CAR Y M-92-028 concerning the lack of identification and traceability of equipment used in the field.

J. Watson and E. Gutentag began work on converting HP-199T into a technical procedure. The first draft was submitted to H. Karrington for official formatting after Gutentag's review. Technical and QA reviews as well as formal approval is still required.

E. Gutentag and J. Watson discussed the need for developing a technical procedure for aquifer testing using an ASTM procedure. The aquifer test is scheduled to be run on July 30 during a pumping session for QW samples and collection of aquatic micro-organisms.

J. Watson performed other QA activities as required for this activity.

SCP 8.3.1.5.2.1.4a Analog recharge sites 0G3622C2

Summary Account Manager - T. Oliver/R. Lichty

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH012C Collect/reduce hydrologic data from remote sites FY92

The week of June 8th was devoted to the summer field trip. The weather and surface water records were pulled, water samples were collected, and maintenance was performed on the equipment by T. Oliver and G. O'Brien. P. McKinley discussed the field trip with T. Oliver and G. O'Brien and reviewed the data recovered during the trip. Oliver entered the data from the field trip into the NWIS database.

On a daily basis, 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. Lichty retrieved and reviewed surface water and weather data to be used as input to the PRMS model calibration for Kawich basin.

B. Lichty discussed with L. Stannard, (USGS), the data input format requirements for using the latest version of PRMS on the Data General system.

Technical Activities (Continued)

3GQH018C Prepare data report on Kawich: FY91

The missing period weather data was estimated using regressions to other local weather stations in Nevada. The regressions were performed by T. Oliver using Minitab and reviewed by P. McKinley.

T. Oliver finished the statistical summaries for the solar radiation data.

3GQH019C Prepare data report on Stewart: FY91

T. Oliver finished the statistical summaries for the solar radiation data.

3GQH020C Begin the report on PRMS

This activity was not started.

3GQH026D Evaluate ET methods and model:

P. McKinley calculated potential evapotranspiration for Kawich for the week of June 9, 1992 using the Jensen-Haise equations.

The contract with John Emerick of the Colorado School of Mines was not renewed at this time so this activity was closed.

3GQH13CA Conduct chloride leaching test FY92

T. Oliver performed preparation of equipment for IC analysis of chloride and analyzed some of the chloride leaching samples by IC as a QA check of the outside laboratory analysis.

3GQH15CA Complete the data reports for Kawich FY85-90 and 3GQH16CA Complete the data reports for Stewart FY85-90:

Analysis of the data for the Bird Clear Sky model was completed by E. Maxwell, NREL (formerly SERI) and new data for Ely was given to P. McKinley.

P. McKinley and E. Weeks, NRP, discussed estimating solar radiation data from the analog sites. Data will be estimated using past year solar radiation data collected at the analog sites instead of the Bird Clear Sky model.

T. Oliver estimated the solar radiation data for the analog sites and P. McKinley reviewed the data prior to entry into the NWIS database.

T. Oliver finished the statistical summaries for the solar radiation data.

Missing periods of weather data were estimated using regressions to other local weather stations in Nevada. Regressions were performed by T. Oliver using Minitab, and reviewed by P. McKinley.

Quality Assurance

3GQH15CA Complete the data reports for Kawich FY85-90 and 3GQH15CA Complete the data reports for Stewart FY85-90

Configuration control committee finished the processing of Minitab for software QA.

Planning and Operations

3GQH24CA Analysis methods for ET and 3GQH026C Reduction of ET data

The contract with John Emerick of the Colorado School of Mines was not renewed at this time so this activity was closed.

Variances

3GQH026C, The reduction of ET data, 3GQH026CA, The analysis of methods for ET, and 3GQH026D The evaluation of the ET methods and model:

The ET work was scoping in nature with the purpose of improving the current PRMS calculations. Further work in this area is not required for the successful operation and completion of the PRMS model.

Work Performed but not in Direct Support of the Scheduled Tasks

Approximately 64 hours in May were charged to training. On May 19 through May 22, 1992, P. McKinley and T. Oliver attended a training course on Unix and X-Windows.

P. McKinley spent 4 hours working on the PACS schedules for FY93/94 work.

There were 32 hours of annual and sick leave taken.

SCP 8.3.1.5.2.1.4b Geochemistry of arid-zone infiltration 0G3622E2

Summary Account Manager - A. Riggs

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH003C Soil & moisture chemical sampling

Several samples were collected at various depths and surface sites.

At surface 3; eleven samples of a soil profile (to 40-inch depth) were collected and one sample was collected from the surface of surface 3.

At surface 5; seven samples (to 46-inch depth) were collected from a boulder profile, two bulk samples were collected, eleven samples were collected (to depths of 40 inches) from a soil profile, five boulder samples were collected from the head of a channel on surface 5, and two samples were collected from large-surface-area boulders near the head of a channel on surface 5.

One sample of Ajo Mountain front rock was collected.

3GQH006D Install long-term meteorological monitoring instrumentation

The CR-21X data logger program needed for data collection has been written and most of the hardware needed for installation has been purchased. Final assembly is nearly complete.

3GQH010D Analyze/interpret ^{36}Cl data by NMIMT

Fifteen boulder samples were crushed, leached, ground into powder and extracted for ^{36}Cl.

Water was extracted from twenty-four soil samples and analyzed for deuterium and ^{18}O content.

Technical Activities (Continued)

3GQH010D Analyze/interpret ^{36}Cl data by NMIMT (Continued)

^{36}Cl ages were measured in eight boulder samples.

3GQH022D Ion chromatograph technical procedure preparation 2

This procedure will not have to be prepared, as the HP-202, R0 ("Analysis of water samples for anion and cation concentrations by ion chromatography") has been approved. The HP-202, R0, is a suitable procedure under which this activity will be performed.

Quality Assurance

3GQH004D Install watershed monitoring instrumentation

Instrumentation was submitted for calibration.

3GQH006D Install long-term meteorological monitoring instrumentation

All the instrumentation has been returned from calibration.

Planning and Operations

Variances

3GQH020D Detail mapping of micro watershed

Preparation of detailed topographic maps of micro-watersheds has not begun because not all of the watersheds have been selected nor has any procurement been initiated. Delay in this activity will not impact watershed instrumentation or hydrologic data collection; instrumentation and long-term monitoring have been delayed already because of problems with instrument calibration. Detailed maps are not needed until interpretation of hydrologic data begins.

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

3GQH801A Hiring and training of geologists

R. Moscati received training in examination of geologic materials with cold cathodoluminescent microscopy; preparation of polished surfaces for petrographic study; and extraction of carbon dioxide from carbonate for mass spectrometry.

3GQH813A Evaluate total carbonate system Yucca Mountain area

R. Moscati completed the photodocumentation for tracking of sample handling, and the documentation of petrographic description for future sampling of approximately two hundred core samples containing secondary calcite fracture-coatings or veins from drill holes UE25-BH1, -A4, -A5, -A6, -A7, -RF3, and -RF9.

Technical Activities (Continued)

3GQH813A Evaluate total carbonate system Yucca Mountain area (Continued)

J. Whelan completed the reconnaissance study of 24 polished thick sections from USW G-1 and G-2 for reconstruction of cathodoluminescence (CL) stratigraphy of fracture coating calcite from the unsaturated zone of Yucca Mountain. This reconnaissance strongly suggests that CL stratigraphy should permit definition of a time sequence of calcite deposition within the mountain, that will allow cross correlation between and within drill holes of stable isotope and other geochemical information of secondary calcite samples from within the unsaturated zone.

J. Whelan and R. Moscati sampled and purified 17 samples of opal from pedogenic and secondary fracture mineralization settings for determination of the $d^{18}O$ values of the opal by Arizona State University.

Z. Peterman and J. Whelan attended the DOE Geochemistry/Hydrology Integration workshop in Denver, June 9-11, 1992, and gave presentations on "Strontium isotope systematics in calcite fracture fillings in the rock mass at Yucca Mountain" and "Paleohydrologic implications of the stable isotopic composition of secondary calcite from Yucca Mountain", respectively.

J. Whelan met with E. Ervin and M. Chornack (HIP) and arranged to perform stable isotope studies of fracture-hosted secondary calcite from the Crater Flat tuffs in the Raven Canyon study area. These samples should test preliminary models for the deposition of secondary calcite within the Yucca Mountain UZ and SZ in that the Crater Flat tuffs of Raven Canyon have remained above the water table, in contrast to the existing drill hole data.

K. Futa analyzed a suite of calcite vein samples from G-1 drill core for Sm-Nd isotopic ratios to compare Nd isotopic signatures between deep and surficial carbonates. Previously-reported Nd isotopic ratios from Trench 14 and vicinity carbonates have a restricted range of $^{143}Nd/^{144}Nd$ values whereas present data indicate that $^{143}Nd/^{144}Nd$ values from subsurface, vadose vein carbonates are generally lower, but inclusive of, surficial values. Based on very limited data, samples above the water table have vein carbonates with Nd isotopic values similar to the host Tertiary volcanics, while below the water table, Nd isotopic values span the entire range of the database.

Z. Peterman, J. Paces and Evernden spent 2+ days on site investigating calcite silica issues. In particular, sites critical to the upwelling water hypothesis were visited. Combined opinions concluded that the upwelling proponents have grossly misinterpreted primary physical volcanology of Tertiary tuffs, and Quaternary geological processes. The minority group then uses these misinterpretations to promote hydrothermal alteration, which is clearly and demonstrably absent, and a calcite-silica depositional hypothesis which is based neither on supportable nor defensible evidence. Evernden is preparing an open-file report which will detail these arguments.

Technical Activities (Continued)

3GQH813A Evaluate total carbonate system Yucca Mountain area (Continued)

R. Zartman and L. Kwak continued to analyze Pb, U and Th isotopes in materials from Yucca Mountain and the surrounding vicinity. Soluble fractions of some Trench 14 and Busted Butte pedogenic carbonates have previously been reported to have high $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$ ratios which cannot be derived from any of the Tertiary volcanic units. As a means of tracing these unique components within surficial deposits, Pb isotopes are being studied from known eolian-derived dust samples, and from some of the Paleozoic units in surrounding uplift blocks (Black Marble Mountain, Tarantula Canyon, Carrara Canyon, Striped Hills). Preliminary results indicate that unaltered Paleozoic carbonates have low Pb concentrations (<1 ppm) but high radiogenic Pb isotopic signatures similar to the Trench 14 leachates. These and additional results, combined with Sr isotopic and trace element geochemical data, will be used to model various constituents and calculate mass balance mixtures to better-define the origins of Yucca Mountain surficial deposits.

3GQH802A Install/calibrate new mass spectrometers

B. Marshall wrote software code for generic (rather than element specific) exponential mass discrimination and spike subtraction corrections for isotopic data obtained by solid-source mass spectrometry. This code was written in preparation for implementation on the new Finnigan MAT 262. Code was tested on neodymium, strontium and calcium mass spectrometer data and found to work correctly for all cases sampled. In addition, a new procedure for naming files in the new mass spectrometer was implemented, and a method of accessing previous run data was established.

B. Marshall also studied the Finnigan MAT 262 operating software in order to implement the exponential mass discrimination and spike subtraction corrections for isotopic analyses. These codes will be written soon and tested this summer.

3GQH803A Analyze isotopes/fossils Canyon and Windy Wash

J. Whelan and R. Moscati began collection of stable isotope data from samples collected from the Solitario Canyon and Windy Wash areas, including samples from sites 199 and 106. This work is being done in the QA qualified laboratory of the Branch of Petroleum Geology.

J. Paces continued studies of Site 199 (Crater Flat) pluvial discharge deposits. Alpha spectrometry results from two separate root cast residues, when combined with previously-analyzed leachates, yield analytically-identical ^{232}Th-corrected isochron ages of 18.7 ± 1.6 and 17.4 ± 1.4 Ka. The combined isochron age for all four analyses results in an age of 18.3 ± 0.9 Ka. This age is more than 20 Ka younger than the previously reported age of 42 Ka for paludal material collected from the same site. Additional samples are being prepared to assess the duration and episodicity of ground water discharge at this site.

Technical Activities (Continued)

3GQH803A Analyze isotopes/fossils Canyon and Windy Wash (Continued)

J. Paces completed the second set of leaches from pedogenic calcretes at Site 106 (Stagecoach road). Results are similar to the first set of leaches. Only two of six leach analyses allow calculation of uncorrected $^{230}Th/^{234}U$ ages; both are approximately 260 Ka. All six leaches contain high $^{230}Th/^{232}Th$ ratios (7 to 11) relative to most dirty carbonates; however, the two residues analyzed previously have similarly high $^{230}Th/^{232}Th$ (more-typically values less than 1 to 2 are observed in detrital residues). This suggests that large corrections must be made to account for detrital ^{230}Th. Indeed, one sample consisting of two leaches and one residue allows regression to obtain a $^{230}Th/^{234}U$ age of about 40 Ka. However, previously-analyzed residues yielded poor analytical results, so residues from the most recent leaches have been run through chemistry and are currently being counted. Preliminary results indicate similarly high $^{230}Th/^{232}Th$ ratios.

3GQH806A Analyze isotopes/fossils - deps known origin

J. Whelan and R. Moscati began collection of stable isotope data from samples collected from possible analogs of the Trench 14 setting, including the Nevares and Grapevine spring deposits and lake/marsh deposits from Ash Meadows. This work is being done in the QA qualified laboratory of the Branch of Petroleum Geology.

3GQH810A Analyze samples - deepened Trench 14

J. Whelan and R. Moscati began collection of stable isotope data from samples collected from the deepening of Trench 14. This work is being done in the QA qualified laboratory of the Branch of Petroleum Geology.

Quality Assurance

3GQH813A Evaluate total carbonate system Yucca Mountain area

J. Whelan revised GCP-27, "Determination of temperature and salinity from mineral-hosted fluid inclusions", based on technical and QA reviewer comments and submitted it for final approval and signatures.

Five electronic and mechanical weighing scales used for YMP quality-affecting work by IGG and MOA staff (K. Futa, J. Paces, R. Zartman, K. Ludwig) were cleaned and calibrated by Certified Balance Service. All scales were certified, and calibration status reports were submitted to the QA Manager.

J. Paces continued calibration of mixed U-Th spike as per GCP-22 using HU-2 and OCB-66-15 standards.

B. Marshall completed two QA reading assignments.

J. Whelan began 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".

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. Damage in shipping resulted in the MAT 252 being shipped back to Germany for repairs. Failure of electronic components caused delays in the retooling of the MAT 251 and installation of the automated extraction instrument.

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. Damage in shipping resulted in the MAT 252 being shipped back to Germany for repairs. Failure of electronic components caused delays in the retooling of the MAT 251 and installation of the automated extraction instrument.

Work Performed but not in Direct Support of the Scheduled Tasks

B. Marshall upgraded the YMP Sr database system to a new package capable of operating on a PC platform. This also involved purchasing new hardware and software so that the recently acquired PC, which will be devoted to the geochemical and isotopic database, can be networked to the existing computing facilities this fall when software becomes available for Windows operating environment. In addition, a new grid system for south-central Nevada was implemented within the YMP Sr database in order to facilitate locating points on maps and plotting geographic information system (GIS) data.

K. Futa calibrated cation exchange columns for Sr in order to check for possible changes in the elution position. Results indicate a slight up-field shift, and columns should now yield higher Sr recoveries with less interference from other cations.

J. Paces began planning and ordering materials and supplies to expand present YMP clean lab space to facilitate U-series analysis by mass spectrometry. This technique is much more sensitive to environmental blank levels than the alpha-counting technique and must be done under highly controlled laboratory conditions.

WBS 1.2.3.6.2.2.2 Future Regional Hydrology due to Climate Changes

Principal Investigator - R. Luckey

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

3GFH200A Obtain/install micro computer system

All of the hardware and software (operating system and most of the applications software) needed for the micro computer modeling system, except for the printer and printer software modules, has been received.

Quality Assurance

3GFH200A Obtain/install micro computer system

D. Grasso installed and thoroughly tested the system and its operations during late-May and early-June. Hardware and/or software problems identified by these tests have been corrected.

Planning and Operations

3GFH100A DOE approval of study plan

S. Keller transmitted the study plan for this activity to the Project Office for verification and approval by DOE on April 30, 1992. To date (June 30, 1992), DOE has not notified us as to the status of this activity.

3GFH021C Construct 3-D hydrogeologic framework model

C. Faunt worked with CPS-3 and CPS-3's Full Fault Modelling system using stress data and structural zone boundaries as "faults". Faunt and J. Downey talked with T. Ripley, Radian, (CPS-3) about some problems with the software.

Variances

3GFH200A Obtain/install micro computer system and 3GFH202A Evaluate surface water models - arid environment

A short-term delay in the completion of these activities (June 2 to June 28, 1992 and June 2 to July 13, 1992 respectively) occurred due to the unusual length of time required to complete the FY 93/94 PACS planning, revisions, and budget summaries for the Mission 2001 exercise.

3GFH100A DOE approval of study plan

Short-term impact. DOE has not notified us as to the status of this activity or the cause of the delay.

3GFH206A NRC review of study plan

Short-term impact. This activity will not start until DOE verification and approval of activity 3GFH100A is complete. NRC will then have 90 days to review the study plan.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 24 hours were spent on the following:
D. Grasso and D. Beck worked on FY 93/94 PACS planning, revisions, and budget summaries for the Mission 2001 exercise.

D. Grasso prepared field equipment, maps, and research materials for the ALPHA paleoflood workshop and field trip that took place during the last week of May. The trip entailed an evaluation of the late-Quaternary sediments, stratigraphy, and geomorphology of the Colorado River and its tributaries. Procedures for dating and modeling flood events, and correlating historic, large-magnitude streamflow and precipitation events were also presented and discussed.

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 GSIS and future/quaternary ground water

C. Faunt continued literature search and review including: Bedinger and others, (1989), and gathered geochemical data reports.

J. Downey continued literature review of many publications concerning the southern Nevada area along with publications involving hydrologic modeling, computer applications, data reduction and programming.

F. D'Agnese continued literature search and review including: Denburgh and Rush, (1974), Rush (1970), and Hollett and others, (1991).

3GFH023C Develop Recharge/Discharge Estimates

F. D'Agnese contacted J. Hevesi, NTS, to acquire climate data for recharge modelling. Hevesi delivered three data sets of average annual precipitation for the regional study area. As a result, D'Agnese began reformatting and modelling in CPS-3.

F. D'Agnese contacted K. Paris, SCS, to acquire soils survey data for state of California. (Since SCS is behind schedule on database development of soil survey data, recharge and discharge calculations are delayed.)

Two TM data tapes still have not arrived from the Federally Owned Landsat Data (FOLD) library. Also, there has been some difficulty with loading data because tapes have been delivered in various file formats from different agencies across the country. An undetermined amount of time has been spent trying to reformat these data so that they may be paneled together in the Intergraph digital image processing software.

During the month of June, F. D'Agnese completed FOLD data acquisition, compiled data in Intergraph Imager software, and paneled all required images into one data set. The preliminary vegetation study began with spectral analyses using, normalized difference indices, transformed vegetation indices, and perpendicular vegetation indices.

F. D'Agnese, C. Faunt, Kolm and J. Downey have continued meetings to develop methods for surface characterization (including recharge, discharge, geomorphic analysis, pedogenic analysis, and hydrologic data analysis). Recharge/discharge modelling will commence once data has been completely formatted and attributed on Intergraph workstation. This is due to begin as early as July 1 depending upon work load.

Technical Activities (Continued)

3GFH023C Develop Recharge/Discharge Estimates (Continued)

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 desert which is being conducted in conjunction with Past Discharge (to complete work begun by DeMarco). Both Turner and Faunt have developed a series of vegetation maps in IDRISI that adequately describe vegetation in the Amargosa desert. As a result of field checking, it was determined that additional stations would need to be digitized before final maps were produced. In the future, additional correlation analyses between vegetation, soils, geomorphic deposits and climate will need to be conducted. The accompanying report is approximately 98% complete.

3GFH025C Establish Data Documentation Procedures for GSIS

C. Faunt, F. D'Agnese, C. Turner and J. Downey completed development of methods that will be used for documenting, archiving, and releasing data. Several reports were begun which document data capture and conversion.

Open-file reports describing GSIS data and formats are being reviewed by J. Downey and E. Gutentag and will be submitted for peer review in July.

3GFH021C Construct 3-D hydrogeologic framework model

C. Faunt finished "lumping" geologic units on the regional cross-sections into hydrogeologic units.

C. Faunt "rubber-sheeted" 3-degree geology map. This process involves re-registration of geographic points to bring geology layers (fault and geology map) into geographic (positional) agreement.

C. Faunt began correlating faults on 2D cross-sections so that correct attribution may be assigned in the computer.

3GFH005C Analyze hydrogeologic framework

The paper on structural analysis is completed, and final maps and figures were begun. A rough draft is being reviewed by K. Kolm and F. D'Agnese.

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 can now be plotted with colors representing strike for a quality control exercise.

3GFH030C Construct schema for GSIS

C. Faunt continued compiling a water chemistry coverage of the regional area from existing USGS files and reports.

Technical Activities (Continued)

3GFH030C Construct schema for GSIS (Continued)

C. Faunt showed D. Perfect where the geochemical data was located, the status of the data, and the methods and format for data input.

D. Perfect began acquainting herself with Lotus 123, formats of geochemical data, general ground-water chemistry, and the Yucca Mountain modeling problem in general. Perfect began entering water chemistry data into computer files at an efficient speed and has been able to complete a fair amount of the data entry to date.

C. Faunt and D. Perfect met with Database Unit (Stuthman and others) concerning the reformatting and entry of the water chemistry data into an NWIS format.

At the ESF Conference, K. Turner, F. D'Agnese, and C. Faunt met with I. Nixon and discussed possible cooperation with Intergraph to develop code that would translate ARC/INFO files into Intergraph MGE/ERMA files. This critical step in characterizing the regional system with GSIS will be time and code intensive. Without a translation, the study will not be able to progress in an efficient manner. There may be significant delays!

C. Faunt, K. Turner, F. D'Agnese, and J. Downey began correspondence with I. Nixon, J. Larson and M. Pearson, (Intergraph), to set up a contractual agreement to write code for ARC/INFO to MGE/ERMA translator. Specifics, including scheduling, costing, and requisitioning, will continue into July.

F. D'Agnese constructed database directories for digital elevation models within ERMA and began preliminary terrain analysis for surface characterization (recharge, discharge, geomorphic, pedogenic, and hydrologic analysis).

F. D'Agnese constructed database directory for Landsat thematic mapper images within ERMA and began preliminary contrast enhancement of image.

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 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.

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.

3GFH030C Construct schema for GSIS

C. Faunt continued acquainting J. Watson with Lotus 123 file format so that he may begin entering data into database. Faunt also worked with Watson on transferring township/range data to latitudes/longitudes.

Technical Activities (Continued)

3GFH030C Construct schema for GSIS (Continued)

J. Downey and E. Gutentag hired Diana Perfect (summer aid program) for help with geochemical, water well, and lithologic log database construction.

Variances

3GFH026C Software QA Documentation

Documentation was not started during the month of June. This activity is highly dependent on the YMP QA Office. It has been brought to our attention that potential changes may be written into current QA procedures that will impact both commercial and modelling software. As a result, this activity will be delayed until a decision is made in the QA Office on how this software is to be handled.

3GFH021C Construct 3-D hydrogeologic framework model

Construction was not completed during the month of June. Completion of this activity is delayed because of the extended period of time required by Intergraph to develop a user defined software code.

3GFH005C Analyze hydrologic framework

Analysis was not completed during the month of June as investigators were diverted to other project tasks.

3GFH022C Modify 3-D hydrologic framework

Modification was not started during the month of June and will not begin until completion of 3GFH021C.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 274 hours were spent on the following:

C. Faunt and J. Downey attended UNIX and X-Windows training course from May 19-22. This training is of value for general computer operations (64hrs).

C. Faunt and F. D'Agnese spent considerable time working on installation of ARC/INFO Version 6.0 and X-Windows. This software will be necessary to work with large grids of data (20hrs).

J. Downey reformulated the software code for program SNODIF to accommodate the internal permeability of a snow pack with better accuracy.

SNODIF is a computer program (written to operate on large, fast PC's) that calculates the changes in isotopic composition of a snow pack on an evergreen branch resulting from evaporation. The program deals mainly with changes over time for the isotopes O16, O18 and Deuterium that are a part of the snow pack. This work will have a significant impact on YMP Climate Program because it may allow the re-evaluation of many past interpretations of paleo-climates that were based on isotopic composition of water from wells south of Yucca Mountain.

The journal paper by H. Claassen and J. Downey has been submitted for final typing and editing for Director's approval (40 hrs).

Revisions to the paper on "Hydrology of structural discontinuities in Southern Nevada" by K. Kolm and J. Downey are being made by Downey. The paper should be ready in early July (40 hrs).

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

J. Downey performed maintenance, installation and up-dating of project computer software and hardware in order to bring the 486 machine on-line and update the 386 being used for SPANS and IDRISI. (This PC has had some hardware problems with the hard disk drives because of the use of a older version of the DOS operating system) (30 hrs).

Meetings and the writing of short reports and administrative memos/letters consumed considerable project personnel time that was unscheduled (80 hrs).

Project staff developed a number of slides and overheads, using both project and personal computer software, for use at various future meetings (30 hrs).

F. D'Agnese spent time with B. Sockriter developing procedures for data transfer and archiving.

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

The Study Plan was reviewed by outside DOE reviewers and comments were resolved by J. Downey. The Study Plan was returned to DOE for further processing and DOE approval.

WBS 1.2.5.2.2 Site Characterization Program

Principal Investigator - W. Dudley, Jr.

OBJECTIVE

To support the DOE in the completion of the Site Characterization Plan; to provide ongoing technical planning and support of site characterization activities; and to integrate results into site characterization activities and programs as appropriate, monitor each site program, and serve as the interface between the principal investigator and the DOE/HQ.

ACTIVITIES AND ACCOMPLISHMENTS

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

Approximately 10 hours was spent on comment resolution on Study Plan 8.3.1.2.3.3, Site saturated-zone hydrologic system synthesis and modeling.

P. Glancy spent two days resolving NRC comments to the study plan for SCP 8.3.1.16.1.1.1.

D. Ambos served as the technical reviewer of the T&MSS Study Plan 8.3.1.12.2.1, R1, Meterological data collection at the Yucca Mountain site. Approximately two days were spent in this review.

WBS 1.2.5.2.6 Semi-Annual Progress Reports

Principal Investigator - L. Hayes

OBJECTIVE

To provide support to DOE/HQ for the development and preparation of the Site Characterization Semiannual Progress Reports.

ACTIVITIES AND ACCOMPLISHMENTS

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

3GWR011 Survey monitoring sites

Land surveys of reference points at two monitoring sites were conducted in May to permit the calculation of water-surface altitudes. Surveys have now been conducted for all of the twenty-four sites at which the need for surveys have been identified.

3GWR0001 Ground-water level/springflow monitoring FY-92

Ground-water levels were measured at twenty-five sites. Water-level data were checked and filed, and data entry into computerized USGS databases was initiated.

3GWR010 Aquifer Pump Test JF-3

Checking, reviewing, and entering of data into computerized USGS databases continued. 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.

3GWR015 Calibrate water level equipment

Two electric tapes, including one that was damaged and repaired, were calibrated against the YMP 2800 ft reference tape at well J-12 and well JF-3. Correction factors were computed for electric tape measurements based on calibration results.

3GWR014 Capital equipment procurement

Preliminary specifications and costs for a hoist system (cable, reel, and crane) for installation, calibration, and removal of water-level equipment were determined. Remaining components of a data acquisition system (personal computer and printer) for retrieval and processing of electronically collected water-level data were selected and requisitioned. Based on equipment specifications, selections, and purchasing requirements, a request for modification of capital equipment procurement was submitted to HIP.

3GWR013 Instrument JF-3

An equipment shelter was built at well JF-3 and initial installation of water-level monitoring equipment began on May 14, 1992. Final installation of the equipment occurred on May 28, 1992 and continuous water-level data collection was initiated.

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.

Technical Activities (Continued)

3GWR017 Water-level monitoring network revision

DOE is considering USGS recommendations to improve data-collection capabilities at several network sites. Revision is not warranted at this time.

3GWR018 Consult of revision to EFAP

USGS consultation will begin upon initiation of revisions by SAIC, and is not warranted at this time.

3GWR019 Compile regional water resource 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.

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 was begun.

3GWR020 Compile water-use data FY91

The Nevada State Engineer's office was contacted regarding the availability of water-use data for the Amargosa Desert area. The data will be obtained when available.

Quality Assurance

Planning and Operations

3GWR001 Ground-water level/springflow monitoring FY92

Measure ground-water levels at all accessible sites in the monitoring network, and check and file the data collected.

3GWR010 Aquifer pump test JF-3

Continue checking and reviewing data collected. Begin processing data into USGS computerized database.

3GWR014 Capital equipment procurement

Pending approval, hoist system and computer equipment will be procured.

3GWR019 Compile regional water resources data

Continue to compile data from publications and other sources. Enter data into USGS computerized databases. Prepare data for inclusion in annual report.

3GWR007 Ground water monitoring report third quarter - FY92

Data will be compiled and reviewed, and report preparation will continue.

3GWR020 Compile water-use data FY91

Compile, review and file available data.

Variances

3GWR001 Ground-water level/springflow monitoring FY92

Water-level data were not collected at MV-1, AD-6, and 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 were 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. AD-11 was not measured due to a piston pump being temporarily installed in the well, which prohibits a water-level measurement.

3GWR010 Aquifer pump test JF-3

The actual pump-testing of well JF-3 is complete. This activity, however, will not be listed as complete until water-level and well-discharge data have been checked, reviewed, and processed into computerized USGS databases. Completion of data processing is planned in July.

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. Computer equipment (for programming and accessing water-level monitoring equipment, viewing, plotting, and analyzing data, making hard copies of plots and files, and on line communication with other computers) cannot be obtained from a single vendor and as a result does not satisfy criteria for qualifying as capital equipment.

Work Performed but not in Direct Support of the Scheduled Tasks

Project chief prepared FY93/94 and outyear PACS schedule and work scope as per DOE/YMP requirements.

Responded to comments on technical procedure HP-54.

Reviewed HIP data report -- Groundwater-level data for Inyo County, CA and Nye County, NV.

Two water-resources monitoring personnel attended YMP General Employee Training.

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 1.2.9.1.1 Management

Principal Investigator - L. Hayes

OBJECTIVE

To provide overall management of the Yucca Mountain Project including budgeting and financial analysis, progress reporting, support to HQ management activities, training, and overall Project integration.

ACTIVITIES AND ACCOMPLISHMENTS

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

A Modification to QMP-6.01, R5, Document Control, was prepared in response to YM-CAR-92-030.

The Project Office will be requiring several reference numbers to be included on all records submitted to the Central Records Facility (CRF). The implementation date has been changed from "immediately" to a tentative effective date of September 1, 1992.

The Records Coordinator's workshop provided information on procedures for the records inventory of YMP records. Inventory and the resultant Records Inventory and Distribution Schedule (RIDS) input is to begin by July 1, 1992 and to be completed by December 15, 1992. A work schedule is complete. Preliminary contacts and other work have begun.

Two hundred forty criteria-related "stand-alone" documents and 44 packages were received into the Local Records Center (LRC) and date stamped. The quality of the stand-alone records was verified. Sixteen packages were verified, of which three packages received a "correction request."

Six criteria-related packages were transmitted to the CRF. The packages contained 380 records comprised of 2,071 pages. Two Cited Reference packages containing 12 references and a total page count of 505 pages were also transmitted.

The Records Management database and software have been transferred to the HIP file server. Significant support has been required and continues to be provided to assist LRC staff members in accommodating the change in configuration. An evaluation is underway to assess the impact of this change.

ACTIVITIES AND ACCOMPLISHMENTS

The following Technical Procedures have been distributed:

GCP-27, R0 Determination of Temperature and Salinity from Mineral-Hosted Fluid Inclusions
GCP-28, R0 Uranium Isotope Geochemistry
HP-117, R1 Installation, Examination, and Maintenance of Scour Chains at Streamflow Gaging Sites
HP-126, R1 Extraction of Residual Water from Tuff Samples by Vacuum Distillation
HP-202, R0 Analysis of Water Samples for Anion and Cation Concentrations by Ion Chromatography
HP-223, R0 Method for Pore-Water Extraction Using One-Dimensional Compression
HP-229, R1 Determination of Water Content and Physical Properties for Laboratory Rock Samples

The following Quality Management Procedures (QMP) Modifications were distributed:

QMP-5.01,R4-M2 Preparation of Technical Procedures
QMP-5.05,R2-M2 Scientific Notebook System

Controlled documents were transferred from P. Karnoski to U. Umbenhover, SAIC/T&MSS; and from M. Lange to D. Appel, USGS. A new set of YMP-USGS Technical Procedures was sent to C. Rautman, Sandia National Laboratories.

New USBR Technical Procedure Manuals were sent to B. Kunzer and M. McKeown, USBR.

Numerous routine document control functions were performed, including issuing procedures to new copy holders; distributing replacement documents; sending out follow-up DTNs; sending information copies to various persons/agencies; 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; providing TPO QA Advisor, GSP Implementation Specialist, QA Office Representative, HIP Training Representative, and USBR QA Officer with information regarding the status of participants' instruction assignment completions; distributing first and second reminder notices of overdue reading assignments to participants and to their appropriate managers; and submitting record packages to the LRC.

Reading assignments were issued for the following procedures:

QMP-5.01,R4-M2 Preparation of Technical Procedures
QMP-5.05,R2-M2 Scientific Notebook System
QMP-6.01,R5-M1 Document Control

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

AP-1.10Q,R5, ICN-1	Preparation, Review, and Approval of SCP Study Plans
AP-6.17Q, R1	Determination of the Importance of Items and Activities
HP-117, R1	Installation, Examination, and Maintenance of Scour Chains at Streamflow Gaging Sites
HP-126, R1	Extraction of Residual Water from Tuff Samples by Vacuum Distillation
HP-223, R0	Method for Pore-Water Extraction Using One-Dimensional Compression

Provided support to QMP-3.15, R0, Application of Graded Quality Assurance, instructors (A. Handy, USGS, and D. Porter, SAIC) and scheduled participants for the June 25, 1992 Question and Answer Session in Las Vegas and at the NTS. Also scheduled A. Handy to provide AP-5.1Q, R2, Briefing to NTS personnel. Scheduled Denver area participants for July 1, 1992 QMP-3.15 Question and Answer Makeup Session. Distributed copies of initial QMP-3.15, R0, Question and Answer Session videotape to out-of-town participants.

Represented YMP-USGS at American Society of Training and Development (ASTD) National Conference. Attended the DOE training representatives meeting, which included a June 18, 1992 tour of NTS.

Provided YMP-USGS orientation for new personnel from Las Vegas and NTS. Scheduled General Employee Training for July 14, 1992 in Menlo Park.

Coordination efforts continue to ensure that DOE/YMPO (T&MSS or the M&O contractor) provide formal instruction on configuration management requirements for key YMP-USGS personnel. The QA Implementation Advisor and the Training Coordinator will continue to follow this issue until resolved.

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

The number one priority during June was revising the USGS work scopes, schedules and budgets to comply with FY93 budget targets and Mission 2001 requirements. Planning tasks included formatting revised scopes, modifying logic in the network, reviewing descriptions of the scheduled activities on the summary account planning sheets and ensuring they matched the network, entering budget by cost element for each month for FY93/94, and entering FY93/94 codes for all summary accounts.

The Mission 2001 planning data were transmitted to the PACS via the participant work station. This required close coordination with the SAIC-Las Vegas staff to correct several "bugs" in the work station prior to submitting the data.

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

In support of the Mission 2001 planning effort, the schedulers reconfigured most of the USGS networks. New logic was incorporated into the network based on input from the Principal Investigators. There are approximately 174 individual networks that are merged into one network consisting of 3,200 activities. The large network was transmitted to Las Vegas on June 22. The remaining week in June was devoted to minor corrections (e.g., closing open ends, correcting activity titles and matching activities against scope). All 174 schedules will be plotted for a final review by the responsible Principal Investigator.

A weekly status of the Mission 2001 planning was sent to the M&O. This status, by summary account, identified scope, budget and schedule data input for FY93/94, and the outyear planning packages.

The USGS actual costs and schedule status for May were uploaded to the project level PACS via the work station. PACS calculates performance in terms of dollars that can be reviewed prior to submitting it to Las Vegas.

The USGS cost report for May was compiled. Also, the USGS Monthly Highlights and Status Report was compiled and edited.

A special file was created for a Project Office Division Director detailing water usage and surface water monitoring activities from FY1993 to FY2001. This network supports work in PWBS 1.2.5.4.8 and consists of about 150 activities. The Lawrence Berkeley Laboratory (LBL) network also had to be created separately from the USGS network due to a work station constraint. The LBL network consists of approximately 450 activities.

A review of miscellaneous performance data also occurred during June. Data reviewed included (1) items comprising unscheduled work, (2) budgeted cost of work performed dollarized values, (3) formal responsibility assignments (DOE manager, USGS PI, P&S account manager and summary account managers), and (4) variance explanations prepared by responsible managers.

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 QMP modifications were approved:

QMP-5.01, R4-M2 Preparation of Technical Procedures
QMP-5.05, R2-M1 Scientific Notebook System

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

The following draft 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-4.01,	R4	Procurement Document Control
QMP-6.01,	R5-M1	Document Control
QMP-7.01,	R5	Control of Purchased Items and Services
QMP-7.04,	R0	Vendor Evaluation
QMP-16.03,	R3	Trend Analysis

The QMP Master List was updated and forwarded to the YMP-USGS QA Office.

Draft 0B of the OCRWM Quality Assurance Requirements and Description (QARD) was reviewed for USGS input and consolidated comments were submitted to DOE.

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 surveillance of Project activities.

ACTIVITIES AND ACCOMPLISHMENTS

Planning and preparation for upcoming audits and surveillances included planning for the annual internal QA Program audit, an audit of SCP Activity 8.3.1.5.2.1.4b, and a field surveillance of trench work in Midway Valley being performed by a vendor - Geomatrix. Planning, preparation, and the start of the annual requalification audit of the USBR were conducted.

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.

Audit Plan 92-06, John Fluke Manufacturing, Inc., was submitted, the audit performed, and a report submitted recommending deletion from the Approved Vendors List (AVL). John Fluke will cease operations in Aurora, CO, in August 1992. They have been removed from the AVL.

Prepared Audit Checklist and planning/collection of pertinent documents and information for upcoming Audit USGS-92-05 participation June 29-July 07, 1992.

Vendor Evaluations of the USGS-Branch of Quality Assurance (92-E17) and Ball Corporation (92-E18) were conducted. Both vendors were added or retained on the YMP-USGS AVL. A Nonconformance Report USGS-NCR-92-29 was written on the USGS-BQA failure to comply with all requirements of the Management Agreement. Vendor Evaluations of Eppley and Radiation and Energy Balance Systems, Inc. were also started; reports are in process.

Surveillance Plan 92-S11, Certified Balance Services, Inc., was submitted, the surveillance performed, and a report submitted recommending their retention on the AVL.

Surveillance Report USGS-92-S09, Security Archives, Inc., was submitted recommending inclusion on the AVL.

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

Vendor Evaluation 92-E11, Reynolds Electrical and Engineering Co. (REECo) was prepared and submitted, recommending their retention on the AVL.

Vendor Evaluation 92-E14, Brunson Instruments, Inc., was prepared and submitted recommending their deletion from the AVL. A need for their optical calibration services is not anticipated at this time.

Vendor Evaluation 92-E15, IFR Systems, Inc. was performed and a report submitted recommending inclusion on the AVL.

Coordination efforts continue with Li-Cor, Inc., to obtain acceptable calibration certificates.

The following deficiency documents were verified: NCR-91-21, NCR-91-37, NCR-91-38, NCR-92-04, NCR-92-12, NCR-92-15, NCR-92-16, and NCR-92-21.

Verification of AFR-9110-02 and NCR-91-37 was started but some corrective action details were not thoroughly addressed; therefore, the verification process was temporarily stopped.

The quarterly issue of the AVL and a subsequent update were prepared and submitted, and the investigative reviews for verification of completed actions were completed for NCR-92-20.

Transmitted record packages for NCRs -91-14, -37, -38, -92-10, -11, and -17; CAR-92-01 and -08, and Vendor Evaluation 92-E10, and Surveillance 92-S07 to the LRC for further processing.

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 members of the Open Items Committee continued to provide weekly updates to the Quality Assurance Office (QAO) Open Items Coordinator. The Open Items Committee met once during June to discuss the status of various open items and to prepare the final input for the June trend analysis report. The QA Implementation Advisor worked with the following open items 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), and YM-92-030 (document control).

ACTIVITIES AND ACCOMPLISHMENTS (Continued)

Internal Item(s): AUDITS: 9110-02 (YMP-USGS qualification records), 9112-02 (management agreements), and 9203-04 (TDIF submittals per PACS schedules); CARS: 91-01 (graded QA transition), 91-03 (unapproved vendors), 91-06 (management assessments), 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); NCRs: 90-37 (calibration standards), 91-31 (QA Balance calibrations), 91-37 and 91-38 (report processing), 92-02 (SGBSN management agreement), 92-05 (USBR Earth Manual procedures), 92-06 (seismic publications), 92-08 (report processing), 92-13 and 92-14 (report processing), and 92-19 (change requests).

Other miscellaneous actions involved coordinating Lessons Learned from DOE/YMQAD Audit 92-013; monitoring the status of open and/or overdue training assignments and document transmittal notices; and continuing to update the Tracking Logs for statusing GSP Technical Activities and TPO Action Items.

Criteria Letter 33121G-01-C1 R1 was completed.

A matrix depicting the status of QA Grading Reports for the YMP-USGS was completed. An effort continues to determine if funded FY92 activities without completed grading reports should be covered under existing YMP-USGS Corrective Action Reports 91-01 or 91-11.

The YMPB Data Manager was assisted in resolving data submittal/schedule issues identified by AFR 9203-04.

Approximately 30 software documents have been received, reviewed, and/or processed by the 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.

An agenda and minutes were prepared for the CCC meeting held on June 4, 1992. CCC Review documentation was completed for each of the CCC reviews conducted at this meeting. A proposed agenda has been prepared and distributed for the CCC meeting to be held on July 2, 1992.

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 actions associated with this CAR.

Assisted with input to the YMP Software Advisory Group regarding software validation, software verification, and model validation. Formal comments were provided regarding the May 8, 1992, draft of the 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 May Open Items and Trend Analysis Report was written and issued.

Prepared daily and weekly Status of Open Items and input to Open Items database for trending.

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

WBS 1.2.9.1
QA N/A

Gertz (2)
See Distribution
Tost (YMP)
Lorii w/o
Grodsky
Jones S
Johnson - wk

August 18, 1992

TWS-EES-13-08-92-043

Mr. Carl P. Gertz, Project Manager
Yucca Mountain Site Characterization Project Office
US Department of Energy
P.O. Box 98608
Las Vegas, NV 89193-8608

Dear Mr. Gertz:

SUBJECT: LOS ALAMOS MONTHLY ACTIVITY REPORT—JULY 1992 8/31/92

Attached is the Los Alamos Monthly Activity Report for July 1992. This internal document describes our technical work in detail; however, the report has not received formal technical or policy review by Los Alamos or the Yucca Mountain Site Characterization Project. Data presented in this document represent work progress, are not referenceable, and are not intended for release from the US Department of Energy. If you have changes to our distribution list, please call me at (505) 667-0916.

Sincerely,

Susan H. Klein
Susan H. Klein

SHK/elm

Attachment: a/s

Cy w/att:
M. B. Blanchard, YMPO, Las Vegas, NV
T. E. Blejwas, SNL, Albuquerque, NM
R. L. Bullock, RSN, Las Vegas, NV
V. J. Cassella, HQ/Washington, DC
U. S. Clanton, YMPO, Las Vegas, NV
W. L. Clarke, LLNL, Livermore, CA
P. L. Cloke, SAIC, Las Vegas, NV
J. L. Cooper, YMPO, Las Vegas, NV
J. Docka, Weston, Washington, DC
J. R. Dyer, YMPO, Las Vegas, NV
L. D. Foust, CRWMS, M&O/TRW, Las Vegas, NV
L. R. Hayes, USGS, Denver, CO
C. Johnson, M&O/WCC, Las Vegas, NV
N. Jones, M&O/TRW, Las Vegas, NV
K. Krupka, PNL, Richland, WA
M. Martin, M&O/TRW, Las Vegas, NV
C. W. Myers, EES-DO, MS D446
C. M. Newbury, YMPO, Las Vegas, NV
P. T. Prestholt, NRC, Las Vegas, NV
R. F. Pritchett, REECo, Las Vegas, NV
R. L. Robertson, CRWMS, M&O, Fairfax, VA
W. B. Simecka, YMPO, Las Vegas, NV
A. M. Simmons, YMPO, Las Vegas, NV
R. K. St. Clair, M&O/TRW, Las Vegas, NV
M. Voegele, SAIC, Las Vegas, NV
RPC File (2), MS M321
TWS-EES-13-File, MS J521

Cy w/o att.:
J. A. Canepa, EES-13, MS J521
S. H. Klein, IS-11, MS J521
CRM-4, MS A150

Encl 2