



Department of Energy

Washington, DC 20585

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Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Holonich:

The enclosed Yucca Mountain Site Characterization Project participant monthly status reports are forwarded for your information. If you have any questions on the enclosed reports, please contact Priscilla Bunton at (202) 586-8365.

Linda J. Desell, Chief
Regulatory Integration Branch
Office of Civilian Radioactive
Waste Management

Enclosures:

- (1) Reynolds Electrical & Engineering Co., Inc. Monthly Status Report, January 1992
- (2) U.S. Geological Survey Monthly Status Report, October and November 1991

see enclosure sheet

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PDR WASTE
WM-11 PDR

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N403*

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REYNOLDS ELECTRICAL & ENGINEERING CO., INC.
(REECo)

*Received with
letter dated 2/24/92*

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP)

JANUARY 1992 - STATUS REPORT

SITE (1.2.3)

WBS 1.2.3.5

Task: LM-300 Drill Rig and Pipe Handling System

The pipe handler arm for the LM-300 drill rig was installed by Lang Exploratory Drilling personnel on January 16 and 17, 1992. The mast was raised and secured, and all systems were checked out and operational. The rig is tentatively scheduled to be put into operation on the UZ-16 drillhole in early April 1992.

Task: Capital Equipment to support Drilling Programs

Delivery of the air processing and metering system awarded to Perry Equipment Corporation (PEC) is expected in March 1992. Technical Review Committee reviewed and discussed PEC drawings.

Received Yucca Mountain Site Characterization Project Office (YMPO) authorization to procure a CME-850 drill rig or equivalent; preparing purchase requisition.

Task: USGS Hydrological Research Facility (HRF) Holes (Job Package 91-6)

All work in support of HRF holes has been completed with the exception of instrumenting and stemming of UZP-3a, to be scheduled at a later date.

Task: Neutron Access Holes (Job Package 91-9)

Resumed operations in support of Neutron Access Hole UZ-N37 on January 6, 1992. A total depth of 270 feet was reached on January 30, 1992. Preparations are underway to move the CME-550 drill rig and equipment to UZ-N11.

Task: JF-3 Water Monitoring Well (Job Package 92-1)

Resumed work on January 6, 1992. The 12-1/4 inch hole was drilled to 1298 feet and the 8-5/8 inch casing string was installed. The BIR-800 drill rig has been rigged down and will be returned to Field Operations Department-Drilling in Area 1 of the Nevada Test Site. The Joy 1 rig is rigged up on the well in preparation to stem and plugback the hole to 1140 feet, and to perform the remaining work required to complete the well.

Task: Reclamation Trial Sites

Commenced preparation (ripping) of two trial sites in Area 25.

1028

ENCLOSURE 1

EXPLORATORY STUDIES (1.2.6)

WBS 1.2.6.1

Task: Exploratory Studies Facility (ESF) Alternatives Study

Continued to provide constructability support to activities to begin Tunnel Boring Machine operations and ESF Title II design. Issued Request for Subcontract and preliminary draft of Request for Proposal for Underground Excavation Subcontractor. Participated in Raytheon Services Nevada management and technical review for north portal drill pad, NRG-1.

FIELD OPERATIONS (1.2.7.4)

Task: Administrative & Maintenance Support

Continued support to W. A. Wilson, Yucca Mountain Site Manager to include: process purchase requisitions for Field Operations Center (FOC) Site Office requirements; provide support services to participants and maintenance to YMP utilized facilities, equipment, and roads in Area 25; and provide logistical and support services to management contractor. Performed annual inspection of 900HP mine hoist. Coordinated contractor repair of roof for Building 4015, FOC.

Provided support for the Yucca Mountain Site Office open house and public tours. Eight tours were held during this period with 415 people attending. Support included but was not limited to; arrangements for buses, coordination of lunches/beverages, medical service, furniture, mechanical service, and grading of access road. Continued preparations for upcoming tours.

Task: Reactivate Well VH-1

Continued use and maintenance of Well VH-1. Additional funding has been requested to provide water haulage through March 1992. During January, 426,309 gallons of water were pumped and 405,000 gallons were used for dust control, road maintenance, and drilling support of JF-3 monitoring hole. Utilizing REECo Matrix Department support; discontinued subcontract for water haulage from VH-1 to H-Road Baker tanks.

Task: Class III Sanitary Landfill

Budget estimates and Title I review was completed and transmitted to the YMPO in November. Began preparation of Title II design upon receipt of notice to proceed from the YMPO.

PROJECT MANAGEMENT (1.2.9)

WBS 1.2.9.1

Task: Site Characterization Plan (SCP) Distribution

Distributed eight SCP sets and four #4 Progress Reports during January.

Task: Long Range Planning (LRP)

Continued support of LRP, Planning and Control System (PACS), and Performance Measurement Baseline activities to include: completion and submittal of revisions to PACS reflecting fiscal year 1992 unfunded priorities budget and scope of work changes; completed and submitted actual cost information for December; reviewed Job Package 92-5, and developed and transmitted a list of required equipment; development of activity estimates and schedules; and completion of cost estimates as requested for continued operation of Well VH-1, road repairs from VH-1 to VH-2, ten soil pits for rock and soil property testing near North Ramp, UZ-16 drill hole, Shoshone Mountain Seismic Station, and environmental reclamation plots.

WBS 1.2.9.3

Task: Quality Assurance (QA)

Continued review, comment, and approval of various REECO implementing procedures, standard operating procedures, quality procedures (QPs), and purchase requisitions.

Continued work revising existing QPs and replacing documents with management control (MC) procedures. Continued distribution of weekly matrix report to REECO/YMP departments for input on status of new procedures. Conducted three orientation sessions for newly issued MC procedures.

Closed Corrective Action Response to CAR-91-001 from internal surveillance SR-REECO-022 of the Local Records Center. Verified and closed AFR#2 from internal audit REECO-006-91.

Issued the 1991 fourth quarter Trend Evaluation Report and worked on database for trend analysis reporting.

Scheduled internal audits REECO-001-92 and REECO-002-92 for Drilling and Construction Departments to be conducted in February.

General

REECO has no reportable Level I or Level II milestone activities at this time.

Department of the Interior
United States Geological Survey
YUCCA MOUNTAIN PROJECT
Monthly Highlights and Status Report
October and November 1991

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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ENCLOSURE 2

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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
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
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
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
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
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	Eurocan Association of Exploration Geophysicists
EBS	engineered barrier system
ECR	Engineering Change Report
EDBH	engineered design borehole
EDF	Environmental Defense Fund
EDM	Equivalent Discontinuum Model
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 Shaft 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
FP	final procedures
FPC	final procurement and construction
FQI	Federal Quality Institute
FR	Federal Register
FRD	Functional Requirement Document
FRHP	Fractured Rock Hydrology Program
FSN	Fenix and Scisson, Nevada
FSU	Florida State University
FTE	full-time equivalent
FWP	field work proposal
FY	fiscal year
G&A	Goodson and Associates
GAO	Government Accounting Office
GAP	Geostatistical Analysis Package
GC	gas chromatograph
GCM	Global Climate Model
GCP	Geochronological Procedure
GD	Geologic Division
GEOEAS	Geostatistical Environmental Software
GET	General Employee Training
GETT	grants equal to taxes
GID	Ground Water Site Investigation
GIS	Geologic Information System
GIS	Graphic Information System
GOCO	government-owned contractor-operated
GOES	Geostatistical Environmental Operational Satellite
GP	Geologic Procedure
GPO	Government Printing Office

GPP	Geophysical Procedure
GPR	ground-penetrating radar
GPS	global positioning satellite
GOA	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	<i>Journal of Geologic Research</i>
LA	license application
LACT	laser alignment and centering target
LAN	local area network
LANL	Los Alamos National Laboratory
LBL	Lawrence Berkeley Laboratories
LCS	Liquid Scintillation Counter
LDRP	litigation discovery request procedure
LDS	lightning detection system
LLNL	Lawrence Livermore National Laboratory
LLP	Lightning Location & Protection, Inc.
LLW	low-level waste
LOE	level of effort
LPRS	large plot rainfall simulator
LRC	Local Records Center
LRE	latest revised estimate
LRGS	Local Read-Out Ground Station
LRP	long-range planning
LRP/IPS	Long Range Plan/Integrated Project Schedule
LRS	Litton Resource System
LSC	liquid scintillation counter
LSP	laser safety plan
LSS	Licensing Support System
LWS	Lathrop Wells aeromagnetic survey
LV	Las Vegas
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
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
MT	magneto-telluric
M&TE	measuring and test equipment
MTU	metric tons of uranium
MW	mixed waste

NARUC	National Association of Regulatory Utility Commissioners
NBS	National Bureau of Standards (now NIST)
NCAR	National Center for Atmospheric Research
NCR	Nonconformance Report
NEA	Nuclear Energy Agency
NEPA	National Environmental Policy Act
NFS	Nuclear Fuel Services
NGS	National Geodetic Survey
NHP	Nuclear Hydrology Program (now HIP)
NIST	National Institute of Standards and Technology
NMD	National Mapping Division
NMIMT	New Mexico Institute of Mining and Technology
NNWSI	Nevada Nuclear Waste Storage Investigation
NOAA	National Oceanic and Atmospheric Administration
NOO	Nevada Operations Office
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRP	National Research Program
NSTF	near-surface test facility
NTC	National Training Center
NTS	Nevada Test Site
NTSO	Nevada Test Site Office
NVO	Nevada Operations Office
NWF	Nuclear Waste Fund
NWIS	Nevada Water Information System
NWIS	National Water Information System
NWM	Nuclear Waste Management
NWN	<i>Nuclear Waste News</i>
NWPA	Nuclear Waste Policy Act
NWPO	Nuclear Waste Projects Office
NWQL	National Water Quality Laboratory
NWTRB	Nuclear Waste Technical Review Board
OBS	organization breakdown structure
OCRWM	Office of Civilian Radioactive Waste Management
OF	Open file
OFR	open-file report
OGR	Office of Geologic Repositories
OMB	Office of Management and Budget
OMR	Office of Mineral Resources
OPCNM	Organ Pipe Cactus National Monument
OPFM	Office of Project and Facilities Management
OPIO	Office of Policy, Integration, and Outreach
ORM	Office of Resource Management
ORNL	Oak Ridge National Laboratory
OSTS	Office of Storage and Transportation Systems
OWQSU	Ocala Water Quality Services Unit
P&S	planning and scheduling
PA	performance assessment
PAC	planning and control
PACE	Performance Assessment Calculation Exercise
PACS	Planning and Control System
PAGEOPH	<i>Pure and Applied Geophysics</i>

PAGIS	Performance Assessment of Geological Isolation Systems
PAL	Project Acronym List
PAMP	Performance Assessment Management Plan
PAP	Performance Assessment Plan
PASP	Performance Assessment Strategy Plan
PBEI	prototype blast effects on instrumentation
PBO&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
FMR	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
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
REEC _o	Reynolds Engineering and Electrical Company
RFP	Request for Proposal
RIB	Reference Information Base
RIDS	Record and Information Disposition Schedule
RIS	Records Information System
RMF	Records Management Facility
RMNMD	Rocky Mountain National Mapping Division
RMP	Records Management Plan
RMS	Records Management System
ROD	Record of Decision
RPC	Report Package Collection
RQPG	right angle prism goniometer
RRL	reference repository location
RSED	Regulatory and Site Evaluation Division
RSN	Raytheon Services Nevada
RTISA	request to initiate site activity
RW	radioactive waste
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
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
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
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
UNE	Underground Nuclear Explosion
UNLV	University of Nevada at Las Vegas
UNR	University of Nevada, Reno
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
WRD	Water Resources Division
WRG	Western Region Geology
WRI	Water Resources Investigations
WRIR	Water Resources Investigations Report
WRR	Water Resources Research
WSNSO	Weather Service Nuclear Support Office
WSP	Water Supply Paper
WT	water table
WVDP	West Valley Demonstration Project
WY	water year
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

All Technical Data Information Forms (TDIFs) and data in the Participant Data Archives (PDA) have been converted to the new DOE-mandated numbering system. The submittal of TDIFs/data and the subsequent processes have been revamped and streamlined.

The PDA accepted 46 TDIFs covering SCP Activities 8.3.1.2.2.3.2, 8.3.1.2.3.1.2, 8.3.1.4.2.1.5, 8.3.1.4.2.2.2, 8.3.1.5.1.3.1, 8.3.1.5.2.1.4, 8.3.1.5.2.1.5, 8.3.1.17.2.1.4, 8.3.1.17.4.1.2, 8.3.1.17.4.3.1, 8.3.1.17.4.4.1, and 8.3.1.17.4.7.1. Two TDIFs were submitted for WBS number 1.2.3.2.2.1.

The PDA has requested and received approval to keep a VAX terminal and modem, which was already on the premises. This will enable the data input into the ATDT to be done more efficiently than by using a PC.

The first quarterly data catalog has been issued by DOE. This catalog has more than 260 entries concerning data collected on the Yucca Mountain Project; over 200 entries are from the USGS.

Requests have been filled for EG&G concerning certain locations of boreholes for their mapping program.

Two items were completed and submitted to the Reference Information Base (RIB). At present, the USGS has seven other RIB items in various stages of completion.

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. (SCP Sections 8.2.2 and 8.3.5)

WBS 1.2.1.4.4.2 Favorable and Adverse Conditions

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

3GPA001 Develop imbibition system at OSU

Core samples were organized and selected to use in the development of the imbibition system. The selected samples exhibit a wide range of permeability and should, therefore, exhibit a wide range of imbibition rates needed to develop the system.

Quality Assurance

Planning and Operations

WBS 1.2.1.4.6 Development and Validation of Flow and Transport Models

Principal Investigator - L. Hayes

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

3GVF004 Literature review of thermal conductivity and heat capacity

Several sources of information have been reviewed to gather potential methodologies. A variety of techniques appear to be available but have different suitability for the soils and rock at Yucca Mountain. Further review is still necessary.

3GVF013 Analyze horizontal var from Shardy base transect

Preliminary analysis has been completed and a presentation was made at the Soil Science Society of America meetings in Denver, CO. Further analysis is underway to finalize the data and prepare a first draft of the paper.

3GVF009 Continue development of 3D borehole imbibition model

The framework for the 3D model has been completed; however, several important matrix properties are not yet available from RSN-MTL where they are currently being tested.

Permeability and the water characteristic function are all that need to be added to data set to start model calibration.

3GVF015 Finalize geostatistical software and text
Several chapters of the text have been completed, others are in draft form and under revision. Several modules of the geostatistical package are complete while several others are still under revision.

Quality Assurance

Planning and Operations

WBS 1.2.1.4.7 Supporting Calculations for Postclosure Performance Analyses

Principal Investigator - L. Hayes

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

3GPC001 Develop calibration procedure, test CX-2

Two calibration techniques were tested for the CX-2. One technique used different concentration of NaCl, the other used different saturated salts (i.e., NaCl, MgCl, Li Br). The saturated salt solution proved to be the most stable for the large water potential range measured by the CX-2. Water potential samples from the prototype hole UZ P4 (Apache Leap) are currently being tested to further develop the procedure.

Quality Assurance

Planning and Operations

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. USBR 0G3192B1

ACTIVITIES AND ACCOMPLISHMENTS

R. Craig attended (a) Prototype Management Team Meetings on November 8, 15, and 22; (b) status

meetings on various Test Planning and Job Packages on November 8, 15, and 22; (c) the Technical Integration Group meeting on November 17; (d) YMPB staff meetings in Denver on November 4 and 18; (e) a "Team Building" seminar November 12 and 13 with surface-based drilling participants; (f) C. Gertz's "State of the Project" speech on November 25; (g) a Field Change Control Board meeting on November 25; (h) an ESF meeting on November 26 (plans for testing were presented to YMPO senior staff); (i) a presentation to the TPOs on current ESF testing plans on November 5; (j) an Exploratory Studies Test Committee meeting November 19; and (k) a drilling meeting about neutron hole N55 at the test site on November 14.

R. Craig provided overviews of Yucca Mountain geology and hydrology programs as part of the public open house tour on November 16.

R. Craig met with Sandia performance assessment personnel on November 6 to discuss analyses for waste isolation impacts due to surface-based testing.

J. Boernge continued coordination of hydrologic testing activities; reviewed costs-to-date and current budget estimates for hydrologic testing activities; and coordinated preparation of the October/November report of USBR activities.

M&I - Geologic Studies Program 0G3192G1

ACTIVITIES AND ACCOMPLISHMENTS

J. Stuckless continued to work on organizing GSP; attended a workshop on Ground Water Travel Time; and began work on a manuscript for Waste Focus '92.

Revised study plans 8.3.1.4.2.1, 8.3.1.5.1.2, 8.3.1.17.3.1, 8.3.1.17.3.4, and 8.3.1.17.4.5 were submitted.

NRC approval was received for study plans 8.3.1.17.4.6 and 8.3.1.17.4.10.

M&I OA Implementation GSP 0G3192G2

ACTIVITIES AND ACCOMPLISHMENTS

Three QMPs were reviewed; four technical procedures were revised; and QA and GET training continued for all GSP personnel.

The following draft technical procedures were changed as requested and returned to the HIP:

HP-60, R2	Method for Monitoring Water-Level Changes Using Pressure Transducers
HP-114, R1	Estimating Streamflow Discharge
HP-121, R0	Installing and Retrieving Information from a Setra Pressure Transducer
HP-169, R1	Determination of Peak Discharge by the Slope-Area Method
HP-194, R1	Approximation of Relative Humidity Using a Silica Gel Tower Within Unsaturated Zone Test Holes as an Aid in Determining Pumping Efficiency
HP-204, R0	Liquid Scintillation Spectrometry Method for Tritium Measurement of Water Samples
HP-230, R0	Determination of Water Potential Using the Decagon SC10-A Thermocouple Psychrometer

Final drafts of the following technical procedures were prepared and returned to the HIP for signatures:

HP-23, R2	Collection and Field Analysis of Ground-Water Samples from the Saturated Zone
HP-40, R2	Estimation of Peak-Streamflow Discharge by the Slope-Conveyance Method
HP-43, R2	Installation, Operation, and Examination of Two Types of Non-Recording Rain Gages
HP-44, R2	Installation, Operation, and Examination of Crest-Stage Streamflow Gages
HP-45, R2	Method of Installation, Operation, and Examination of a Recording Streamflow Gage Using the Bubble-Gage STACOM Manometer System
HP-116, R1	Methods to Install, Operate, and Examine a Recording-Streamflow Gage that Uses a Stilling-Well System with a Continuous Graphic Recorder
HP-225, R0	Methods Used to Collect and Analyze Ground-Water and Surface-Water Samples
HP-229, R0	Determination of Water Content and Physical Properties for Laboratory Rock Samples

The following preliminary drafts have been prepared and returned to the authors for further input:

GCP-14, R2	Extraction and Recovery of H ₂ O from Mineral-Hosted Inclusion Fluids
GCP-17, R3	Determination of the Isotopic Ratio H/D in H ₂ O
GCP-26, R0	Determination of the d ¹⁸ O Value of H ₂ O
GPP-02, R1	Heat-Flow Studies Related to Nuclear Waste Investigations
GPP-05, R2	Heat-Flow Studies Calibration Procedures
GPP-21, R1	Measurement of Thermal Conductivity of Rocks
GPP-22, R1	Determining Porosity and Density of Rock Samples
SP-10, R1	Deep Seismic Reflection Study of the Tectonic Environment

Activity 8.3.1.4.2.1.2 was assisted in the preparation of a Request for Proposal (RFP) for a seismic reflection line as well as a Criteria Letter for the drilling of the shot holes.

The GSP was assisted with responses to and/or remedial/investigative actions for YM-CAR-91-50, CAR-91-03, CAR 91-05, CAR-91-10, NCR-90-37, NCR-91-26, NCR-91-31, NCR-91-32, NCR-91-35, NCR-91-36, and NCR-91-39.

The GSP was represented on committees to determine how to return to work and to revise procurement control QA procedures.

TDIFs and Technical Data Review Forms were prepared and submitted to the LRC and the PDA for two data packages received from L. Anderson, USGS/GD.

Quality Assurance Grading Reports G1236212, R0 and G123847, R0 were prepared for SCP Study Plans 8.3.1.5.1.2, Paleoclimate Study of Lake, Playa, and Marsh Deposits, and 8.3.1.17.4.7, Subsurface Geometry and Concealed Extensions of Quaternary Faults, respectively. Revision 1 of QAGR G1232211 (SCP 8.3.1.4.2.1, Characterizing the Lateral and Vertical Stratigraphy Within the Site Area) was prepared and submitted to the Principal Investigator for signature approval.

Informal Prerequisite Status Notebooks were prepared to assist in tracking the readiness of SCP Study Plans 8.3.1.5.1.2, 8.3.1.17.4.6 (Quaternary Faulting Within the Site Area) and 8.3.1.17.4.7 to begin work.

The SCM Librarian was assisted in reviewing GD CIRFs of baselined software and software with only baselined CIRFs that were not required to provide a Software Verification Report. This investigative action was done in response to CAR YM-91-077.

A matrix between the draft SQAP (ICN to the QAPP) and the QARD, R4 was completed.

P. Nelson, was assisted in the disposition response to NCR 91-36 concerning Software QA documentation by preparing the CIRFs for Nelson's review for NORMAL, REVANSI, POR, and TCKUT.

A telephone survey (15 people) was completed for Software QA Training to obtain scientist's opinion on previous software training and ideas on how to improve future training.

The following draft technical procedures were changed as requested and returned:

HP-100, R1	Stream Discharge Measurement Using a Type-AA Price Current Meter
HP-166, R1	Stream Discharge Measurements Using a Pygmy Meter
HP-169, R1	Determination of Peak Discharge by the Slope-Area Method
HP-219, R0	Method to Install, Operate, and Examine a Recording Streamflow Gage Using the Fluid Data G-11 Manometer System
HP-231T, R0	Identification, Monitoring, and Sampling of Perched and Groundwater Encountered While Drilling Surface-Based Boreholes
HP-233T, R0	Thermal Pulse Slowmeter Survey

Final drafts of the following technical procedures were prepared and returned to the HIP for signatures:

HP-117, R1	Installation, Examination, and Maintenance of Scour Chains at Streamflow Gaging Sites
HP-204, R0	Liquid Scintillation Spectrometry Method for Tritium Measurement of Water Samples
HP-213, R0	Long-Term Hydrological Data Collection
HP-225, R0	Methods Used to Collect, Analyze, Preserve, and Process Surface and Groundwater Samples
HP-230, R0	Determination of Water Potential Using the Decagon SC10-A Thermocouple Psychrometer

Activity 8.3.1.4.2.1.2 was assisted in the preparation of preliminary input to a Test Planning Package for seismic reflection profiling. An informal prerequisites review continued for Studies 8.3.1.5.1.2 and 8.3.1.5.1.3 to prepare for work authorization.

The GSP was assisted with responses to and/or remedial/investigative actions for YM-CAR-91-50, CAR-91-03, CAR 91-05, CAR-91-10, NCR-90-37, NCR-91-26, NCR-91-31, NCR-91-32, NCR-91-35, NCR-91-36, and NCR-91-39; follow-up on overdue reading assignments and Document Transmittal Notices (DTNs); gathering raw data for manuscript record packages as well as completing TDIFs; and representation on committees to determine how to return to work and to revise procurement control and control of purchased materials, equipment and services.

J. Sass, USGS/GD, was assisted with the preparation of four technical procedures required per his Management Agreement with the YMP-USGS. The draft procedures are awaiting his concurrence review prior to being submitted for technical review. The four procedures are:

GPP-20, R2	Measurement of Subsurface Temperature
GPP-21, R1	Measurement of Thermal Conductivity of Rocks
GPP-22, R1	Determining Porosity and Density of Rock Samples
GPP-23, R0	Determination of Heat Flow From the Earth's Crust

Four TDIFs have been completed for two SCP Activities. Two TDIFs were submitted to the LRC for SCP Activity 8.3.1.5.2.1.5 and one for Activity 8.3.1.4.2.1.5 to complete Manuscript Record Packages. The fourth TDIF was submitted to the PDA as preliminary data.

A Memorandum to the File was prepared for K. Futa's (USGS/GSP) out-of-tolerance Class S 5-milligram weight that was calibrated by the Colorado Dept. of Agriculture. It was determined that no data were affected by the defective weight.

A Quality Assurance Grading Report (G1232722) was initiated for John Sass' SCP Study Plan 8.3.1.15.2.2.

Activity Planning Packages (APP) were prepared to be used as an informal method of tracking the status of the prerequisites required for an activity prior to beginning work. The APPs may also be used to implement the requirements of AP-5.32Q, Test Planning and Implementation Requirements.

Review comments on draft QMPs-5.05, R3 and 3.15, R0 were provided.

P. Nelson, USGS, was assisted in the disposition response to NCR 91-36 concerning Software QA documentation by reviewing and submitting the CIRFs for NORMAL, REVANSI, POR, and TCKUT to the SCM System. This completes the required actions for NCR-91-36.

The Software Committee met several times to answer the review comments for QMP-3.03, R3 and the final draft was submitted to L. Hayes. The final issues concerning QMP-3.03 were discussed at the Management Agreement meeting on 11/12/91 and changes were made to the draft.

The Technical Procedure Master List was updated and forwarded to the YMP-USGS QA Office for September and October.

The QA Advisor for the YMP-USGS Technical Project Officer (TPO) evaluated configuration management change requests and change directives received from YMPO. Appropriate Affected Document Notices (ADNs) were completed for approval by the Associate Chief, YMP-USGS Branch.

M&I - Hydrology Program Management and Administration 0G3192H1

ACTIVITIES AND ACCOMPLISHMENTS

D. Gillies attended the YMP "Saturated-zone Groundwater Travel Time Workshop" in Tucson, Arizona, November 13 and 14.

D. Gillies (a) prepared detailed variance-analysis reports for hydrology program P&S accounts using PACS schedule-status data through August; (b) participated in a meeting near Fresno, California, November 4 and 5 with DOE, LBL, and USGS staff to further develop plans for OCRWM International Program project entitled "Field Tracer Test Development," which is being conducted in cooperation with Atomic Energy Canada, Ltd; and (c) met on November 18 and 19 with hydrology program staff at the HRF and USGS Las Vegas Subdistrict Office to review FY92-93 PACS schedules and discuss strategy for monthly reporting.

D. Gillies participated in YMPO-RSED FY91 review and strategy meeting on November 22. Information on major FY91 schedule and cost variances was provided to DOE WBS managers in preparation for the meeting. Emphasis in the meeting was on how to improve implementation of PACS in order to facilitate its use as a management tool.

D. Gillies and B. Lewis completed compilation of FY92 and FY93 PACS schedules and workscope for over 50 hydrology summary accounts.

B. Lewis revised and updated PACS input for schedules, worksopes, and correlating budgets for all UZ projects and traveled to LBL and HRF to discuss these PACS inputs with program personnel to ensure that DOE/YMPO and USGS programmatic milestones are achievable.

B. Lewis prepared for and attended a meeting with DOE/YMPO, plus participants, to update DOE management on USGS programs for ESF- and Surface-Based hydrologic testing, and how these programs relate to each other. This caused approximately one week delay in finalizing PACS input for the UZ hydrology section.

M&I QA Implementation, Hydrology 0G3192H2

ACTIVITIES AND ACCOMPLISHMENTS

HIP is currently processing 39 Hydrologic Procedures and six Scientific Notebook Plans.

J. Woolverton worked with A. Lykins from the YMP-QA Office and R. Hawinkson from the National Water Quality Laboratory to revise and approve the management agreement between the YMPB-USGS and the NWQL-USGS.

J. Woolverton assisted I. Yang and J. Ferarese in resolving technical changes including review comment documentation for HP-204, R0 entitled, "Liquid scintillation spectrometry method for tritium measurement of water samples".

J. Woolverton assisted W. Causseaux in performing an informal review of QMP 4.02 (proposed changes by the YMP QA office for the development of management agreements).

W. Causseaux, J. Woolverton, and M. Pabst met on October 9, 1991 to discuss HIP's internal procedures for processing Technical Procedures.

J. Woolverton assisted P. McKinley and W. Steinkampf in the comment resolution process of technical review documentation for HP-23, R2, entitled, "Collection and Field Analysis of Ground-Water Samples from the Saturated Zone".

D. Appel, J. Woolverton, and M. Pabst met on October 11, 1991 to discuss processing HP-225, R0, entitled, "Methods used to collect, analyze, preserve, and process surface and groundwater samples", as a technical procedure meeting all typical QMP 5.01 Quality Assurance requirements. The deviation from normal technical procedure processing stemmed from the QA grading report No. G12548A (Water Resources/Environmental Monitoring) which exempted QA criteria typically incorporated in YMP-USGS technical procedures.

J. Woolverton assisted D. Halm (Center Region National Research Program) in the final resolution of Audit-USGS 91-07 observation No. 1, which required NIST traceability for steel measuring scales to be used by the CSU Soils Laboratory for calibration purposes.

J. Woolverton travelled to the NTS on October 23, 24, and 25, 1991, to observe coring techniques using the ODEX system. The REECo Drilling Crew was in the process of removing (or attempting to remove) the casing from neutron hole N-55.

J. Woolverton prepared a memo on behalf of A. Flint explaining to the YMP-QA Manager that resolution of YMPO-SDR-018 would require more borehole information and neutron moisture meter data than previously anticipated.

W. Causseaux visited the LBL office at Berkeley on October 29, to participate in a HIP review of LBL technical activities and consult with G. Bodvarsson and L. Tsao about the status of QA activities.

W. Causseaux visited the HRF office at the NTS to consult with B. Davies and A. Flint about the status of QA activities, to assist Davies with on work deficiency actions, and to assist L. Flint with processing of a technical procedure.

J. LaMonaca attended a two-day Instructor Training course instructed by P. Chadwick, SAIC-T&MSS on November 13 and 14, at SAIC-Golden.

Six published report packages were submitted to the LRC by J. LaMonaca.

Computer Operation & Data Management. Hydrology 0G3192H3

ACTIVITIES AND ACCOMPLISHMENTS

WAN connections to the Parfet Building (TPO and QA office) were tested to determine why connection was slow. The reason is that the Novell Server acknowledged every packet sent to it.

Met with B. Wakelee, USGS Headquarters, for three days, to review hydrology program computer operations.

Attended Data General Unix Course.

The installation of LAN connections in the HRF were supervised.

Met with the DOE Information Technology Resources (ITR) group for preparation of the Long Range Plan.

An upgrade to the SUN Server was installed which increased the speed by 50%.

The new Novell File Server was setup for testing.

New software (ARC) was installed on the SUN for testing. All tests show that the software is working perfectly.

The line from SPARC Station was set up to allow users to plot from ARC.

The Operating System was installed on all Data Generals.

The Tektronics Color Printer was set up in the users' room for use with Harvard Graphics.

Assisted USGS Central Lab in setting up their Data Generals.

The LAN telecommunication equipment was researched.

Scientific Reports and Project Documents. Hydrology 0G3192H4

ACTIVITIES AND ACCOMPLISHMENTS

HIP is currently processing 83 YMP-HIP scientific publications, 48 YMP-GSP scientific publications, 12 YMP-LBL scientific publications, and 19 abstracts.

Water-Resources Investigations Report 89-4025, "Geohydrology and rocks penetrated by test well USW H-6, Yucca Mountain area, Nye County, Nevada", by R.W. Craig and R.L. Reed, was published and distributed.

Open-File Report 91-241, "A system of computer programs (WATMOVE) for transferring data among data bases in the U.S. Geological Survey's National Water Information System", by G. Rogers and B. Kerans, was published and distributed.

USGS Map GP-1001, "Geophysical logs and core measurements from forty boreholes at Yucca Mountain, Nevada", by P.H. Nelson, D.C. Muller, U. Schimschal, and J.E. Kibler, was published and distributed.

Technical Journal, "Isotopic composition of U and SR in ground water and hydrogenic deposits, Yucca Mountain, Nevada--Evidence against upwelling water", was published in Science, v. 254.

Open-File Report 91-341, "Bibliography of publications related to the Yucca Mountain Site Characterization Project prepared by U.S. Geological Survey personnel through April 1991", was published and distributed.

The HIP review of the following reports was completed by T. Brady: "Three-dimensional, steady-state model of ground-water flow systems in the vicinity of Yucca Mountain, Nevada-California", by P.O. Sinton and J.S. Downey; "Preliminary isotopic data on unsaturated-zone flow at Yucca Mountain, Nevada", by I.C. Yang; "Flow and transport through unsaturated rock--data from two drill holes, Yucca Mountain, Nevada", by I.C. Yang; "Seismicity and focal mechanisms for the southern Great Basin of Nevada and California in 1990", by S.C. Harmsen; "Does the wind blow through Yucca Mountain", by E.P. Weeks; and "Development of a three-dimensional site-scale model for the unsaturated zone at Yucca Mountain, Nevada", by C.S. Wittwer, G.S. Bodvarsson, M.P. Chornack, A.L. Flint, L.E. Flint, B.D. Lewis, R.W. Spengler, and C.A. Rautman.

The final HIP version of Study Plans 8.3.1.2.2.8, Fluid Flow in Unsaturated Fractured Rock, by E.M. Kwicklis and 8.3.1.2.3.2, Saturated Zone Hydrochemistry, by W.C. Steinkampf, were reviewed by T. Brady and then transmitted to YMPO.

T. Brady participated in comment resolution verification for Study Plan 8.3.1.2.2.5, Diffusion Test in the Exploratory Studies Facility.

Technical Data Base Management. Hydrology 0G3192H5

ACTIVITIES AND ACCOMPLISHMENTS

The ARC/INFO GIS package has been moved from the Prime computer to the SUN file server. The GIS is now being used by several people. The big job now is to move the various GIS files from the Prime to the SUN.

Several members of the Computer Operations and Data Management Unit attended the Unix and X-Windows training associated with the Data General workstations and the SUN file server and workstations. We are attempting to get another time slot at the National Training Center to repeat this class by April or May, 1992. Several in Data Management also attended a course on Ingress applications. Ingress will be the data base language used in the National Water Information System.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU010A Compilation of existing boreholes, lithologic logs (WT)

This activity was deferred due to Section Chief's participation in development of PACS statements and work schedules. Task is 0% completed. There is no current impact on any milestones.

3GGU002A Geochemical and isotopic sampling and analysis - phase 1

Existing geochemical data bases are being examined to evaluate need for additional analyses to characterize trace element and isotope distributions in tuffs sampled in deep coreholes.

As part of this effort, a preliminary summary paper (abstract) titled "Trace Element Variability in Altered and Unaltered Tuffs at Yucca Mountain, Nevada" authored by R.W. Spengler, Z.E. Peterman and F.R. Singer has been submitted for consideration for the Third

High Level Radioactive Waste Management Conference. This activity is 10% completed.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Additional substantial time was devoted to development of work plan descriptions and work schedules (PACS statements) in support of these technical activities. Approximately 120 hours were spent on this unscheduled work.

SCP 8.3.1.4.2.1.2 Surface-based geophysical surveys OG3221B2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU221 Complete report on gravity/mag Fortymile Wash

Approximately 50% of the compilation and technical review of gravity and magnetic data from Fortymile Wash is complete. The work has been delayed due to the lack of a Memorandum of Agreement (MOA) in place. There is no milestone impact at this time.

3GTO005J Write seismic contract

This task is 80% completed. The specifications for running the seismic line across Crater Flat and Yucca Mountain have been developed, the Request for Proposal document completed, and the requisition submitted to Procurement.

3GGU222 Submit status of regional geophysical for review

This activity has been deferred due to lack of Memorandum of Agreement (MOA) in place. Task is 0% completed. Delineation of MOA is underway. There is no impact on milestones due to the length of time still available in this plan.

3GGU250 Collect and reduce gravity and magnetic in Yucca Wash

This activity to collect gravity and magnetic data on several lines perpendicular to Yucca Wash is awaiting final approval of the Study Plan. All review comments have been resolved.

Quality Assurance

3GGU220 QA documentation of software

This activity to complete QA documentation of data reduction software for gravity and magnetic studies is approximately 20% complete.

Planning and Operations

3GGU200 Complete comment resolution of study plan

This task is 100% completed, included under approval of the 8.3.1.4.2.1 "Vertical and Lateral Distribution of Stratigraphic Units within the Site Area" study plan. All review comments have been resolved. Final comment resolution meeting is scheduled for December 1991.

SCP 8.3.1.4.2.1.3 Borehole geophysical surveys OG3221C2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU332 Evaluate logs from G-2

This activity has been deferred due to lack of Memorandum of Agreement (MOA) in place. Task is 0% completed. There is no impact on milestones at this time.

3GGU392 Compute algorithms to density and resistivity logs

This activity has been deferred due to lack of Memorandum of Agreement (MOA) in place. Task is 0% completed. There is no current impact.

3GGU364 Write procedure for magnetometer logging

This activity has been deferred due to lack of Memorandum of Agreement (MOA) in place. Task is 0% completed. There is no current impact.

Quality Assurance

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF160 Revise technical procedure on analysis of volcanic rocks

No progress has been made on this activity due to delays in hiring necessary personnel. The task is 0% completed. There is no impact at this time.

3GGF131A Field check southern and western Yucca Mountain mapping

No progress has been made on this activity due to delays in hiring necessary personnel. The task is 0% completed, but there is no impact at this time.

3GGF184A Structural analysis of exposed fault zone

This effort to provide detailed structural analysis of exposed fault surfaces on faults such as the Ghost Dance, Paintbrush Canyon and Yucca Wash faults has begun with reconnaissance of the Ghost Dance Fault to evaluate appropriate field parameters for measurement along the faults. The reconnaissance was carried out in early November. Planning is underway for further reconnaissance and field examination to be held in early December. This task is 5 to 10% complete.

3GGF182A SEM, XRF, XRD analysis of samples TPT, THT, T

This activity to support geologic mapping with analytical efforts has begun with submission of a preliminary summary paper (abstract) entitled "Trace Element Variability in Altered and Unaltered Tuffs at Yucca Mountain, Nevada" to the 3rd High Level Radioactive Waste Management Conference. Authors of the paper are R.W. Spengler, Z.E. Peterman, and F.R. Singer. This activity is 10% complete.

3GGF124 Reconnaissance of study area

This activity to produce 1:12,000 maps of a geologically complex area of Yucca Mountain with no previous 1:12,000 mapping has been deferred due to delay in entry on duty of necessary personnel. The task is 0% complete.

Quality Assurance

Planning and Operations

SCP 8.3.1.4.2.2.2 Surface-fracture network studies OG3221H2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF160A Revise TPs, grid design, RC gage development

A Data Notebook TP originated from the USBR QA program as a result of the surveillance.

A meeting has been arranged for mid-December with E. Ervin to discuss possible changes to GP-12. The GP-12 problem areas have been delineated by the USBR.

3GGF159A Design fracture data base; software QA

"CLUSTRAN" (S. Gillett) has been ordered as the data analysis package for data on the sphere.

Training is complete in "FRACMAN" and "MAFIC", two DOE sponsored fracture network modeling packages written by Golder and Associates.

Attributes for the fracture data base are identified.

DBase IV was installed on the project PC and will be used initially for the data base.

Self-training in dBase IV has begun.

3GGF152A Fracture data login

Morgan's data login (OFR 89-92) is 60% complete. Copies of field notebooks are available.

The pavement data login is 50% complete. Original field notebooks or copies have not been located to date.

Login of Level 1 orientation data from uncleared outcrops is 100% complete.

Previous uncleared outcrop data (OFR 87-409) login is complete. Copies of field notebooks are available.

ASCII flat files are being created for each station or pavement.

3GGF100 Map and analyze fractures in Tiva canyon member

A working map (1:2000') showing the geographic distribution of existing fracture data is complete.

AVTD analyses along Dead Yucca Ridge are 80% complete using Morgan's data. Lateral

variation in the azimuth signature occurs for both cooling and non-cooling joints (distinguished based on roughness). Fracture intensity (#/Area) also varies laterally.

Preliminary stereoplots are 60% complete for the existing data. Final plots require the cluster analysis (CLUSTRAN) before final contour intervals and final counting areas for each station can be set.

Quality Assurance

3GGF130 Surveillance QA

USBR-S-91-05 was conducted on October 28 and 29. The report was completed as a milestone document on November 12 and has been submitted to the LRC to close this subtask.

3GGF159A Design fracture data base; software QA

Software QA has started on "DIPS" v 2.2, E. Hoek's (U of Toronto) stereographic diagram plotting program. Machine contouring has been verified by hand contouring a data set.

Software will eventually be certified under USBR QMP 3.03b, R0.

3GGF152A Fracture data login

The informal meeting with C. Barton has occurred. He does not have the data. He suggested that it may still be with the successor to F&S.

Planning and Operations

SCP 8.3.1.4.2.2.3 Borehole evaluation of faults and fractures 0G3221J2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

3GGF03AF Surveillance QA

This surveillance activity, requested by the USBR, was initiated. The surveillance team consists of J. Wright, M. Fahy, B. Scavuzzo, and D. Route. Work performed thus far included location and selective review of borehole television and televiewer data located at the LRC.

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GGF044B Modify study plan

This work has not begun, and is waiting on determination of the ESF configuration.

SCP 8.3.1.4.2.2.5 Seismic tomography/vertical seismic profiling 0B3221A2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF035M Report: progress VSP

The paper "Resolution of Tomographic Imaging Technique," by J. Peterson, Jr. was reviewed and returned to the author for final revision.

3GGF030B Validate interpretational codes ANI90 and BEAM87

The code VELIN3D was revised and updated to include proper damping when using P- and S- wave velocities.

Quality Assurance

Planning and Operations

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 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

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 8.3.6.1)

SCP 8.3.1.6.1.1.1 Development of geomorphic map of Yucca Mountain 0G3231A2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GER001A Scoping study-photogrammetric analysis

A scoping study to measure volume of sediment eroded off Yucca Mountain hillslope during a single large storm was initiated by J. Coe during November. Digital elevation terrain models of Jake's point were made from 1983 and 1991 large scale air photographs. A major storm occurred during 1984 that crated large hillslope hills on Jake's Point. Preliminary results suggest that about 2000 cu meters of sediment were eroded off Jake's Point by debris flow. These preliminary results will be presented at the AGU meeting in San Francisco during December 1991.

Quality Assurance

Planning and Operations

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 1.2.3.2.5.5 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 OG3255B2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GAT007 Reconfigure lab/field facilities

Fluids were changed in the temperature calibration baths and the truck-mounted temperature logging system has been reconfigured.

3GAT008 Revise technical procedure GPP-20

The technical procedure for the measurement of subsurface temperatures (GPP-20) was revised and will be submitted for USGS review in December.

3GAT014 Draft thermal conductivity technical procedure

The technical procedure for the measurement of thermal conductivity of rocks (GPP-21) was revised and will be submitted for USGS review in December.

The technical procedure for determining porosity and density of rock samples (GPP-22) was revised and will be submitted for USGS review in December.

A new technical procedure was written, GPP-23, entitled "Determination of the heat-flow from the earth's crust," and will be submitted for USGS review in December.

Quality Assurance

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

3GSR002 Prepare QA grading report and submit for review

M. McKeown completed preparation of the QAGR on November 15 and submitted it for approval.

3GSR003M QA grading report approval

Approval was received November 26.

3GSR005 Field exploration-mapping, drilling, excavation

M. McKeown and S. Beason completed the criteria letter for drilling and test pitting for the ramps and surface facilities. The letter was approved by the USGS and sent on to YMPO.

Planning and Operations

3GSR001M Study plan approval NRC

DOE/YMPO has sent the study plan on to the NRC for approval.

Work Performed but not in Direct Support of the Scheduled Tasks

M. McKeown and S. Beason continued work on the siting study for four additional North Ramp Portal alignments for the ESF. Conclusions and recommendations were faxed to B. Kennedy at RSN in Las Vegas on November 13. Work on the report for this work continued through the end of the month. (120 hours)

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GSM157A Continue test lab/field equipment

A successful test of a satellite telemetry link between Dallas, Texas and Golden, Colorado was performed.

3GSM150A Install SGBSN nodes (2); 3GSM156A Continue SGBSN site preparation; 3GSM113A Install USNSN node - Gold Mountain; and 3GSM120A Select SGBSN sites

These activities have been delayed because a signed MOA is not in place and funds for fieldwork are not available.

Quality Assurance

Planning and Operations

3GSM114A Complete transition - sign MOA

A transition plan was completed and signed on October 27. A memorandum of agreement was written in November based on this transition plan, but has not been signed because USGS/YMP is awaiting DOE approval of the transition plan.

WBS 1.2.3.2.8.4.2 Location and Recency of Faulting Near Prospective Surface Facilities

Principal Investigator - F. Swan

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 OG3284JB

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFP001 Excavate and log soil pits

Twenty soil pits were flagged and the locations were shown to people from DRI and EG&G who will complete the environmental surveys in December or January.

3GFP002 Surficial mapping in Midway Valley

Surficial geology mapping in the area of the Reference Conceptual Site on the east side of Exile Hill began in November. The work was started early because of anticipated surface disturbances to the site by construction vehicles in FY92.

Quality Assurance

Planning and Operations

SCP 8.3.1.17.4.2.2 Conduct exploratory trenching in Midway Valley OG3284JB

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFP012 Complete trench log on trench ABR-B

The field logging of trench ABR-B on the Bow Ridge fault was completed and the trench was backfilled in October. Office work on the trench log continued in November.

3GFP005 Write criteria letter and assemble job package for trenches

The long trench through the proposed ESF was sited and flagged and the location was shown to the environmental survey people from DRI and EG&G.

3GFP007 Excavate and log trench through proposed ESF; 3GFP009 Clean and log trench 17; and 3GFP010 Excavate and log trench A-3 on Paintbrush fault

F. Swan, J. Wesling, and J. Whitney met in Midway Valley for a field trip to decide trench locations for FY92. It was decided to clean and log the eastern end of trench 17 at the south end of Midway Valley, and to put a new trench on the northern end of Alice Ridge on the Paintbrush fault at the western edge of Midway Valley. The group also searched for surface evidence of the possible Midway Valley fault, the location of which has been suggested by recent USGS gravity profiles across Midway Valley. No evidence of surface faulting was found.

Quality Assurance

Planning and Operations

F. Swan gave a presentation on Midway Valley studies to the Edison Power Research Institute working group on probabilistic seismic hazards for Yucca Mountain.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTQ008B Review and synthesize existing work

Work began on collecting and compiling existing work. Met with former activity lead to discuss and go over status of previous and current work. Started development of Quaternary fault and reference data base.

Quality Assurance

Planning and Operations

3GTQ006B Complete study plan 8.3.1.17.4.3

Review and comment on draft study plan, Rev 0, dated June 26, 1991, was begun. On September 26, comments and suggested revisions were given to R. Keefer.

3GTQ001B Draft technical procedure - aerial photo

Initial draft procedures were completed on November 12 and submitted to the USBR QA office for review and comments.

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 0G3284Q2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

A memorandum of agreement with the Office of Energy and Marine was written for the half-time participation of D. O'Leary. The MOA is expected to be signed in early December.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GTD001B Complete comment response - study plan

Responses to DOE comments on Study Plan 8.3.1.17.4.5 were completed in November. The revised study plan and responses to comments were returned to DOE for study plan approval before the end of the month.

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 0G3284C1

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPF07A Hire project staff

Arrangements have been made for two scientists to transfer from the Geologic Division to YMP to work on this activity (one full-time and one part-time). A job description has been written to be advertised in December for a Quaternary geologist with expertise in neotectonics to join the project in early 1992. Also, the project has begun work on a cooperative agreement with the Nevada Bureau of Mines and Geology to obtain the services of 1-2 geologists to study the Solitario Canyon fault in FY92.

Quality Assurance

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GTE001K Draft study plan and USGS review

Work was initiated on the study plan for SCP 8.3.1.17.4.12. About one third of a first draft is complete.

3GTE06JA Order thematic map--1:100,00

Ordering of enhanced thematic mapper images at 1:100,000 scale has been delayed until the final budget for this activity is determined.

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 Forymile Wash drainage basin. (SCP Study 8.3.1.2.1.1)

SCP 8.3.1.2.1.1.1 Precipitation and meteorological monitoring OG3311E2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GMM080 Analysis of Yucca Mountain precipitation data-FY91

A preliminary geostatistical analysis of two storms (one winter and one summer) was completed using data from the rain wedge network. A more complete analysis will include tipping-bucket data as well as the remaining storms in FY91.

3GMM10A Analysis of station data-FY91

Data from the 5 existing weather stations have been downloaded to computer files and checked for completeness.

3GMM33A Design tipping-bucket network expansion

A geostatistical analysis of two FY91 storms revealed locations where additional gauges should be installed to reduce spatial variances. Work remains to pin-point locations of 20 additional gauges.

3GMM034 Analysis of regional data-FY91

Preliminary work began to correlate weather chart data with regional precipitation patterns, lightning strike data, and satellite data for precipitation events at Yucca Mountain in FY91. A regional geostatistical analysis of each storm event still needs to be accomplished.

3GMM060 Design optical lightning detection network

Work was done to determine how to modify the optical lightning detectors to operate in an automated mode at remote sites. The basic instrument was not designed for this purpose. The manufacturer is also developing modifications to permit automated and remote operations of the optical detector.

3GMM02A Monitor stations and tipping-bucket gauges FY92

Weather station and tipping-bucket gauge networks were checked for proper operations. Propane tanks were deployed to heat the snow gauges for the winter season. Data were collected and stored on magnetic media.

3GMM05A Acquire regional meteorological data-FY92

Precipitation and evaporation pan data were collected from regional sources as available.

3GMM070 Collect GOES data-FY92

Satellite images were collected and archived for October and November. Images are available at three-hour intervals unless technical difficulties are encountered with data transmission or computer problems.

3GMM07A Monitor collection gauge network-FY92

The network of 97 collection gauges was monitored for a small storm on October 26. Data were collected from each gauge. Upper Fortymile Wash received the most (.25 inch) while much of Yucca Mountain received little more than a trace to a few hundredths of an inch.

3GMM100 Monitor daily weather patterns-FY92

Daily weather charts, in conjunction with satellite data, were analyzed to determine the weather type affecting the Yucca Mountain region. The current study is being conducted to determine the frequency of storm types which result in precipitation events at Yucca Mountain.

3GMM23A Collect NTS lightning data-FY92

Lightning strike data was collected during October and November. No lightning events directly affected Yucca Mountain.

Quality Assurance

3GMM066 Graded QA and other QA requirements

All QA requirements were accomplished.

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Public Tours account for 16 hours.

Collecting precipitation samples for geochemical analysis comprised 2 hours.

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 0G3311E2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRS002A Collect FY92 runoff and streamflow data

Flow was noted on October 2, 1991, at Cane Springs Wash Tributary NR Cane Springs. It was assumed to have occurred on September 7, but the possibility that it could have been September 28 is noted here. An estimate of 17.9 CFS was calculated to have passed through the culverts.

3GRS022A Reduce FY83-85 data and prepare report

The U.S. National Weather Service Nuclear Support Office has furnished their quality assurance review of precipitation data. The report is with PI and waiting on coordinates

and site ID changes by EG&G for maps.

The report will be submitted to Carson City in early December for retyping and comment resolution. Surface-water records under final review by PI.

3GRS030A Install test prototype telemetry equipment
Install^d alert system on Amargosa River at Tecopa, California. Equipment in place, test procedures to be done in coming months.

3GRS016A Install 2 Amargosa River gages
Completed installation on Amargosa River at Tecopa, 10/16/91. One gage remains to be installed on this activity.

Quality Assurance

3GRS027A Revise technical procedures for streamflow data collection
Technical procedures HP45, 116 are complete and are being distributed for reading. HP-40, 43, 44, 169 are signed by PI and are at HIP for final signature approval. HP-117 is still in QA review. HP-100, R1 and -219, R0 are with author for technical review response.

Technical procedures HP-40, 43-44, 114, 117, along with HP-100, 166, 169, 219 are still with HIP QA.

Planning and Operations

3GRS010A Procure equipment for new gages
All equipment is in; the activity is complete as of 11/30/91.

SCP 8.3.1.2.1.2.2 Transport of debris by severe runoff OG3311G2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRS002B Field reconnaissance of severe runoff features
D. Beck, D. Grasso, and P. Glancy conducted a one-day reconnaissance of Amargosa River from Death Valley Junction to its outlet downstream of ancient Lake Tecopa (i.e., near the Dumont Dunes area at the southern end of Death Valley). The purpose of the trip was to examine sites for possible evidence of debris flow due to flooding. The reconnaissance included an examination of past/present fluvial features (e.g., river terraces) and associated stratigraphic deposits and soils; drainage features associated with the outlet of Lake Tecopa; and development (processes) of the modern floodplain of the Amargosa River at various points along the upper and lower reaches of the river.

P. Glancy, J. Johnson, J. Czarnecki, and C. Savard reconnoitered the Fortymile Wash alluvial fan downstream from U.S. Highway 95 on November 20. The purpose of the reconnaissance activity was to seek evidence of recent and historic flow events along the Wash toward the Amargosa River valley. Several distributary channels of Fortymile Wash were observed. Information was obtained from local residents regarding historic flow event and flooding in the area. The potential for flow along the river is important to understanding the possibility of radionuclide transport downstream from Yucca Mountain.

P. Glancy, D. Grasso, and C. Savard reconnoitered the lower Las Vegas Wash on November 21 for evidence of historic flooding. The purpose of the trip was to introduce Grasso and Savard to the geomorphology of the wash and the historic implications of increased flow.

D. Grasso reconnoitered the middle reaches of Duck Creek, a major tributary of Las Vegas Wash, on November 29. The purpose of the reconnaissance was to determine whether the Duck Creek stratigraphy shows a similar flow history to that observed within the Las Vegas Wash system. More work is needed to confirm or dispute this hypothesis.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

The PACS accounts for FY92 and FY93 were planned and revised. (24 hours)

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG055 Collect cuttings from oil-test wells in Amargosa Desert

Cuttings were collected during the construction of two oil-test wells in the Amargosa Desert in October, 1991. The first drillhole was completed to a total depth of 5,020'. Cuttings from the drilling fluid were collected by USGS personnel and/or contractors every 10', washed, and bagged. Unwashed samples were collected every 50' for conodont fossil analyses. Paleozoic-rock cuttings (dolomite) were first encountered at 1,960' and continued to the total depth of the drillhole. Preliminary conodont analyses that no conodonts were recovered from 2,960'-3,060' below land surface. Conodonts were recovered at intervals of 4,150'-4,210' and 4,210'-4,255'; preliminary analyses indicate an age of early Early Ordovician. Conodont indices indicated that the host rock reached a temperature of at least 300 °C. A second hole was constructed to a depth of 1,466' and was abandoned as a result of lost-circulation problems. Three "caverns" were indicated by lost circulation during drilling and geophysical surveys to occur at depth intervals of 1,320'-1,329', 1,413'-1,427', and 1,429'-1,433'. These caverns may be of some utility to coworkers in obtaining travertine core for determining climatic conditions for the last 60,000 yrs.

S. Keller served as a liaison between Felderhoff Brothers Production Co. and the USGS (HIP and Petroleum Branch) for the Felderhoff drilling in the Amargosa Desert. This included arranging for sample collection by Canyon Logging (mud loggers), for additional borehole geophysical logging by Halliburton, and for Felderhoff to provide to the USGS the borehole geophysical logs (paper and digital), mud logs, and well construction reports for Felderhoff Federal wells 25-1 and 5-1. He also assisted J. Grow (Petroleum Branch) in securing and storing cuttings samples from wells 25-1 and 5-1.

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. Activities included compiling data in a uniform format and plotting log data and descriptions using LOGGER software.

J. Czarnecki met with S. Keller to review the work related to the compilation of geophysical and lithologic logs from boreholes in the Amargosa Desert. Czarnecki supplied Keller with a copy of a report on a deep water well and observation well drilled to supply water for American Borate Corporation in Stateline, Nevada.

3GRG003 Measure water-levels in wells in the Amargosa Desert

Personnel were diverted to other unscheduled tasks preventing them from going to well sites. A meeting is scheduled to determine if quarterly water-level monitoring can be achieved in conjunction with the environmental water-level monitoring program.

Quality Assurance

Planning and Operations

3GRG007 Prototype equipment testing for small diameter wells

Plans were discussed by J. Czarnecki with personnel from USGS Las Vegas Subdistrict Office regarding the upcoming planned testing of a jack-pump in 2" diameter wells in the Amargosa Desert. Testing is on hold until appropriate permits are in place from the BLM.

3GRG003A Access permits for Amargosa wells

Permit application forms were received from the BLM for access to well sites throughout the Amargosa Desert, but specifically at deep observation wells constructed in mining-company exploration holes. Forms are in the process of being completed for access to these sites and testing the wells located there.

3GRG056 Coordinate temporary plugging of oil-test holes

Two oil-test holes in the Amargosa Desert were plugged per the request of USGS personnel by the driller of the holes with drillable cement plugs. No charge was incurred by the project for this service. Custody of the oil-test holes will revert to the BLM, which has agreed to transfer custody to the USGS.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 260 hours were spent on the following tasks:

J. Czarnecki prepared a requisition request for mud-logging services by Canyon Well Site Specialists for collection and description of cuttings from oil-test wells in the Amargosa Desert.

M. Ciesnik coordinated the comment resolution process of the technical review of QMP-3.03, R3 by HIP reviewers.

J. Czarnecki participated in water-permit hearings regarding DOE-requested withdrawals from well J-13 before the Nevada State Engineer in Las Vegas on October 2 and 3, 1991. Czarnecki testified as an expert witness regarding the regional ground-water flow system and the potential impacts of ground-water withdrawals from wells J-13 and J-12 near Yucca Mountain.

M. Ciesnik performed a technical review of a concurrent draft of QMP-3.03, R3 (Software Quality Assurance).

J. Czarnecki submitted a request for foreign travel to attend the AGU Spring 1992 meeting in Montreal, Canada.

M. Ciesnik represented USGS-HIP at a monthly meeting of the software Configuration Control Committee (CCC).

M. Ciesnik participated in training on the GEOREF system at the USGS Library in Bldg. 20, DFC.

J. Czarnecki performed an informal technical and editorial review of HP-200, R0 and discussed the review with author M. Ciesnik.

M. Ciesnik addressed technical review comments of HP-200, R0 ("Collection of Ground-Water Samples from Wells"). He drafted an additional figure using DrawPerfect software, and discussed ways to improve other illustrations with SAIC staff. The revised and corrected version of HP-200 was transmitted to J. Woolverton for further processing.

M. Ciesnik completed the reading assignment of QMP-8.03, R4. He also checked and updated YMP APs and QMPs against the most recent listings.

J. Czarnecki answered questions from the general public regarding the ground-water flow system in the vicinity of Yucca Mountain at public update meetings in Las Vegas, Beatty, and Reno, Nevada.

SCP 8.3.1.2.1.3.3 Fortymile Wash recharge study 0G3311C2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG004B Develop infiltration test procedure

A CR-21X program to monitor water levels using a ten-turn potentiometer was received from P. McKinley. Water levels will need to be monitored in the infiltration rings.

3GRG005B Complete procurement of infiltration test equipment

Steel rings were received from Denver for infiltration tests.

3GRG011B Develop Fortymile Wash hydrogeologic cross-section

The reports containing hydrogeologic data in the Fortymile Wash area were reviewed. Location, land surface elevation, well depth, water level, and geologic data were located for UE-29a#1, UE-29a#2, UE-29 UZN#91, UE-25 UZN#92, UE-25 WT#15, UE-25 WT#13, J-13, and J-12. Elevation data for the land surface, water level and geologic units were input into a computer spreadsheet. A request was made for water quality data and header information for U-29 SH#1 in Fortymile Canyon to be entered into USGS computer data bases. A reference list of the data sources was setup for future use.

3GRG003B Complete report on channel loss

Analysis of channel geometry data collected on Fortymile Wash, Topopah Wash, and the Amargosa River continued. Analysis of the effects of using different lag times on correlation integral results for the Merced River streamflow time series began.

3GRG106A Analyze imagery of Fortymile Wash

The possibility of overlaying different sets of Fortymile Wash imagery taken at different

times to compare channel changes and the possibility of using air photos to map the active channel area in Fortymile Wash were discussed with D. Grasso, USGS-Nevada District. Grasso thought these objectives were possible and future work together was possible.

3GRG028 Collect FY92 moisture data

Rain wedges at UE-25 UZN#85, UE-25 UZN#92, and UE-29 UZN#91 were read several times. UE-25 UZN#85, UE-25 UZN#92, and UE-29 UZN#91 were neutron logged several times. Surface Water data collection personnel from the Nevada District were notified that no runoff had occurred in the Fortymile Wash drainage basin in the Yucca Mountain area.

Quality Assurance

Planning and Operations

3GRG001B Complete criteria letter for ponding sites

Several candidate sites in Fortymile Wash were reconnoitered for ease in accessibility.

The 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 test 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.

3GRG006B Complete criteria letter for FM and FMN holes

A draft criteria letter for UZ infiltration neutron holes was obtained for use as a model for FMN holes.

3GRG010B Continue to site FMN and FM holes

The locations of FM-1, FM-2, and FM-3 were revised. This information was passed on to R. Craig for input to the drilling program.

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 objectives. Any delay will not impact major deliverables.

Work Performed but not in Direct Support of the Scheduled Tasks

C. Savard spent approximately 100 hours on the following activities: represented the USGS Saturated Zone studies during public open house tours and other tours; completed GET training 1.5; shuttled regional groundwater flow posters to/from DOE and SAIC offices for use in public meetings; escorted a Geological Society of America field trip on the NTS; provided field operations assistance to the USGS geologic investigations associated with the Felderhoff oil exploration holes in the Amargosa Desert; talked to D. Sawyer, USGS-GD, about test holes in the Pahute Mesa area (Savard worked on these holes for the Weapons Program); and attended the YMP Ground Water Travel Time symposium in Tucson, Arizona.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG205A Complete Report on vertical multilevel sampler, Franklin Lake Playa

L. Kroitoru (Weston) revised text on a report describing the deployment of a multilevel sampler at Franklin Lake Playa, Inyo County, California and returned it to J. Czarnecki for completion and processing. An abstract of the paper entitled "Hydrochemical Stratification at Franklin Lake Playa, Inyo County, California" was submitted to the 7th International Water-Rock Interaction conference to be held in Park City, UT in July, 1992. The paper was accepted for oral presentation at the meeting, although the submitted request was for a poster presentation.

3GRG209A Obtain permits for piezometer construction

Permit forms have been partially filled out for permission to access sites around Franklin Lake playa for piezometer construction and coring for application of the chloride profiling method to determine recharging or discharging conditions based on chloride concentration variation with depth.

3GRG206A Analyze Franklin Lake hydrochemical data

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

Not Started. See 3GRG215A below.

3GRG215A Participate in YMP field trips

This activity has been delayed to permit the joint participation of DRI/Reno personnel with project staff to identify candidate sites for obtaining core for chloride profiling and piezometer sites. Copies of the report entitled "Geohydrology and evapotranspiration at Franklin Lake Playa, Inyo County, California" were given to personnel on a DRI sponsored field trip of dry lakes in Nevada and California, which included Franklin Lake playa. Although invited, J. Czarnecki reluctantly declined to attend due a schedule conflict.

3GRG201A Perform prototype tests of ET measurement

Not started. Staff are being sought to assist in this activity, particularly someone with micrometeorological instrumentation experience. Access to sites is also pending permit filing and approval with the BLM.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 50 hours were spent on the following tasks:

J. Czarnecki revised text and illustrations to USGS Water-Supply Paper 2377 entitled "Geohydrology and evapotranspiration at Franklin Lake playa, Inyo County, California" per USGS final editorial review.

J. Czarnecki met with K. Larson and B. Hersh (USGS LRC) to categorize data contained in the records package for USGS OFR 90-356.

J. Czarnecki met with S. Tyler (Desert Research Institute, Reno) and C. Barnes (CSIRO, Australia) to discuss methods for estimating evapotranspiration in arid environments.

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 OG3311I2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRM020A Archive model results on magnetic media

Two duplicate 9-track magnetic tapes were made in ASCII format of all pertinent computer files (input, output, source code) related to the simulation of the potential effects of ground-water withdrawals from wells J-12 and J-13 near Yucca Mountain. Two additional tapes were made of the same files, but in MAGSAV format, which can be read more easily on the PRIME computer. The tapes will be submitted to the USGS LRC as part of the data package for the report dealing with these simulations.

3GRM027A Procure finite-element mesh generator

L. Kriger (USGS Procurement) was contacted by J. Czarnecki regarding the status of a purchase of a software package, GRIDBLDR, from the University of Waterloo, Ontario, Canada. Kriger is reluctant to sign the purchase order because of legal wording regarding the software licensing agreement between the USGS and the University of Waterloo. The software would be sold to the project at a savings of 65 percent of the commercial price.

3GRG018A Ground-water travel time workshop

A saturated-zone ground-water travel time workshop was organized and held at the Radisson Suites Hotel in Tucson, AZ and attended by about 50 YMP personnel. NRC and M&O representatives were also present. J. Czarnecki prepared and presented a paper entitled "Factors affecting ground-water flow direction and magnitude at Yucca Mountain." Czarnecki also led a wrap-up discussion at the end of the two-day meeting, and met with Hydrology Integration Task Force members afterward to coordinate the preparation of a summary paper of the meeting.

3GRM017A Hydrology integration task force participation

J. Czarnecki chaired a meeting of the Hydrology Integration Task Force (HITF) immediately following the HITF sponsored workshop on saturated-zone ground-water travel time on 11/14/91. Topics discussed included steps to take to insure that the cause and nature of the large hydraulic gradient is satisfactorily understood for site characterization, and plans for completion of a paper summarizing the saturated-zone ground-water travel-time workshop.

3GRM019A AGU Meeting preparation

J. Czarnecki prepared and sent out information packages for 13 speakers presenting papers at the Fall 1991 American Geophysical Meeting session entitled "Field Methods in

Subsurface Hydrology." Czarnecki will co-chair the session to be held 12/13/91 in San Francisco.

3GRM022A Publish paper on conceptual model of the Yucca Mountain flow system
A camera-ready version of a paper entitled "Conceptual Models of Regional Ground-Water Flow and Planned Studies at Yucca Mountain, Nevada" by John B. Czarnecki and William E. Wilson was finalized and sent to the American Institute of Hydrology for publication in Hydrological Science and Technology.

Quality Assurance

Planning and Operations

3GRM021A Publish paper on effects of withdrawals from J-13
USGS Director's approval was received for USGS Open-File Report 91-478 entitled "Simulated water-level declines caused by withdrawals from wells J-13 and J-12 near Yucca Mountain, Nevada" by J. Czarnecki. The paper was distributed at the Nevada State Engineer's water-permit hearings in Las Vegas, and is being prepared as camera-ready output by the USGS Manuscript Preparations Unit in Denver.

3GRM015A Test finite-element mesh generator
Procurement of the software (See 3GRM027A) has been delayed in USGS Procurement. Testing cannot begin until software is obtained.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 40 hours were spent on the following tasks:

J. Czarnecki worked with C. Washington in getting an IBM-PC computer hooked up on the USGS HIP Local Area Network.

M. Ciesnik reviewed a demo version of the AQUA modeling software system for its potential use on the project.

M. Ciesnik drafted a final response to the YMP/USGS QA Office on corrective action related to USGS-NCR 91-06.

J. Czarnecki met with D. Gillies to review the development of PACS schedules for FY92 and FY93.

M. Ciesnik began working with the transient version of MODFE and compiling it in the PC environment using the Lahey F77-EM/32 FORTRAN compiler. He also continued gaining familiarity with the advanced features of the QUATTRO PRO software package.

SCP 8.3.1.2.1.4.4 Regional three-dimensional hydrologic modeling 0G3311K2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

J. Downey completed final revision and review of "Three-dimensional, steady-state model of the ground-water flow system in the vicinity of Yucca Mountain, Nevada-California." (50 hrs)

K. Kolm and J. Downey completed final revisions on "Hydrology of structural discontinuities in the Amargosa Desert, South Western Nevada, determined from geomorphic, geologic, and hydrologic analysis." The paper was sent to T. Brady. (40 hrs)

F. D'Agnese attended informational/technical review meeting in Huntsville, Alabama with Intergraph's GIS/Ground-water Modeling Interface development team.

Intergraph invited our group along with the British Geological Survey to (1) discuss technical goals of their development team, (2) review British and U.S. Geological Surveys' planned use of software, (3) discuss potential problems with present software, and (4) establish free-flow of information to all involved parties.

Results of meeting include: (1) Establishing that Future/Quaternary Regional Model for Nevada-California is unique to Intergraph's original intentions for software use; (2) Intergraph has offered to have both programmer's and applications staff work closely with our team to link both 3-D GIS modeling and 3-D ground-water modeling efforts; (3) Intergraph established need for our team to attend training session on use of interface in early 1992.

WBS 1.2.3.3.1.2 Unsaturated Zone Hydrology

OBJECTIVE

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

WBS 1.2.3.3.1.2.1 Unsaturated Zone Infiltration

Principal Investigator - A. Flint

OBJECTIVE

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

SCP 8.3.1.2.2.1.1 Characterization of hydrologic properties of surficial materials 0G3312Z2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI002A Analyze rock outcrop samples

Lab analysis of outcrop samples is continuing for determination of physical and flow properties.

3GUI005 Test borehole logging tools in new neutron hole

A hand held gamma-gamma density tool was used to log the neutron hole N-55. The data will be analyzed when the core property determinations are finalized.

3GUI025A Procure SPARC station for GIS program
Initiated procurement of SPARC station.

3GUI026A Continue procurement of geophysical logging van
A GSA waiver has been obtained and procurement is ongoing.

Quality Assurance

3GUI023A Graded QA and other QA requirements
Implementation of all QA requirements were performed as needed.

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks
Sixteen hours were worked in support of Public Tours.

SCP 8.3.1.2.2.1.2 Evaluation of natural infiltration OG331212

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI302 Initiate small scale deterministic model

The preliminary results of infiltration modeling in Pagany Wash using the integral finite difference program TOUGH was presented at the Soil Science Society of America meeting in Denver. These results have been useful in identifying possible layers or lenses in the alluvium underlying the channel, and also for investigating the possible range of values for the hydrologic parameters characterizing the alluvium. The model is currently being modified to include a more accurate upper boundary condition.

3GUI311 Initiate analysis of moisture profiles

The analysis of moisture profiles was initiated as part of the small scale deterministic modeling project in Pagany Wash. An analysis of the moisture profiles of the new neutron access boreholes N-55 and N-54 was also initiated to help investigate the effects of drilling on moisture conditions by logging the boreholes on a daily basis during the drilling process. The continued analysis of moisture profiles for these deeper neutron access boreholes will be important for investigating the influence of geologic structure, lithology, and physiography on the movement and distribution of moisture within the upper unsaturated zone.

3GUI321 Install and calibrate automated evaporation pan

Calibration of the automated supply reservoir and installation of the automated evaporation pan was continued, but progress has slowed significantly due to lack of manpower.

3GUI385 Drill new neutron access holes

The installation of the first new neutron access hole (N-55) was successfully completed and the installation of the second new hole (N-54) was approximately 40% completed. The new holes have been logged on a daily basis in an effort to obtain data pertinent to meter calibration and also for investigating the effects of drilling on the hydrologic conditions of the host rock.

3GUI381 Log neutron access boreholes FY92

All neutron access boreholes were logged as scheduled during October. The next logging period is scheduled for the first week of December.

Quality Assurance

3GUI409 Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

3GUI387 Continue locating new neutron holes

The identification of new sites for additional neutron access boreholes was continued.

SCP 8.3.1.2.2.1.3 Evaluation of artificial infiltration OG331222

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI630 Determine field locations infiltration sites

Analysis of the new neutron holes N-55 and N-54 is being conducted to help determine the mechanisms on infiltration. These mechanisms once defined will help determine site locations.

Quality Assurance

3GUI695 Graded QA and other QA requirements

Implementation of all QA requirements was performed as needed.

Planning and Operations

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 OG3312U2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP007A Construct & test hi-flow permeameter

A dual coreholder permeameter has been constructed out of PVC pipe and fittings. The unit is currently undergoing testing, and preparations are in progress to add two additional coreholders. Use of the plastic pipe results in pressure limitations on the device (100 psi confining; 50 psi differential), and the minimum measurable permeabilities are about 10^{-18} meter² or one microdarcy. Plans call for electronic pressure and flow sensors to be added for automated data collection and monitoring.

3GUP026A Transect physical properties

Data on the spatial variability of physical properties in rock samples from transects across Yucca Mountain continues to be analyzed. No new data were collected during October/November. A presentation on the spatial variability of rock properties on Yucca

Mountain was made by C. Rautman of Sandia at the GSA meeting in San Diego. A presentation on geostatistical variances in the shardy base transect was made by J. Istok of Oregon State University at the SSSA meeting in Denver.

3GUP01AA Evaluate sample handling process

Canning samples from the drill rig within 10 minutes of core reaching the surface appears to be an acceptable procedure for measurement of state variables. Investigations are continuing on moisture loss through sealed Lexan tubes, and on the most efficient method for crushing psychrometer samples, and for slicing and plugging samples for porosity and permeability. A presentation on the effect of drying technique on porosity was made at the SSSA meeting in Denver by D. Soeder. A presentation on the relationships between pore mineral damage and petrophysical properties was made at the GSA meeting in San Diego by D. Soeder.

3GUP26AA Transect sample statistics

Statistical analyses continued on the physical property data generated from the transect samples. A technical paper on the subject has been prepared by A. Flint and C. Rautman (Sandia) for USGS review.

3GUP010A Develop and test imbibition procedure

A plastic box was fabricated to protect the imbibition experiment from air currents while running inside a temperature-controlled chamber. The design of the experiment is still being modified.

3GUP17AA Water retention from SPOC analyses

Equipment modification and experimentation continued on the SPOC apparatus. Data collected to date was presented by L. Flint at the SSSA meeting in Denver.

3GUP25AA Chilled-mirror psychrometer verification

Verification of the operating procedure and calibration of the data from the Decagon CX-2 Peltier psychrometer are continuing, using samples from Apache Leap.

Quality Assurance

3GUP02AA QA procedure, training & calibration FY92

QA procedure development, training and equipment calibrations are continuing as required.

Planning and Operations

3GUP022A Procure centrifuge

Procurement documents and a request for capital equipment expenditures has been initiated to obtain a specialized, high-speed centrifuge for experimental measurement of unsaturated hydraulic conductivity and water retention curves on tight rock samples. The unit will be custom-manufactured and procurement is expected to take 9 to 12 months.

3GUP044A Procure environmental chamber

Plans call for a large, controlled environmental chamber to be purchased. Literature from several manufacturers has been obtained and specifications for a procurement request are being generated.

Work Performed but not in Direct Support of the Scheduled Tasks

Sixteen hours were worked in support of Public Tours.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP053 Develop electronic diagnostic procedure for verification of SPECS electric equipment standards D.C. calibrator. This activity was started in August 1991 and is on hold pending receipt of a transfer purchase requisition for the calibrator was placed in early September 1991. Requisition documents are held up at the Branch QA office pending certification of the manufacturer, vendor for QA Level 1 purchase. Manufacturer projects an early January 1992 delivery date. Scheduled completion date will probably slip by several months, primarily because of a lack of staff to devote to this effort.

3GUP046 Complete development/design of Denver data base
This is an on-going activity that is being developed in conjunction with monitoring of the HRF boreholes and development of the IDAS. Scheduled completion date is pretty firm but depends on timely acquisition and installation of the optical disk storage media described under 3GUP040E.

3GUP003 Instrument and monitor HRF boreholes
Two of the three HRF boreholes were instrumented in October 1991. Monitoring of these boreholes began in mid October. The third borehole is scheduled to be instrumented in February 1992. Monitoring will continue as on-going activity indefinitely.

3GUP023 Develop/test/evaluate in situ pressure transducer recalibration
This activity has not yet started. In situ pressure transducer recalibration will be conducted as an adjunct to the testing and evaluation of the multi-station gas sampling apparatus. Schedule is firm at this time. Start of this activity can be delayed until mid FY '92 without impacting schedules.

Quality Assurance

3GUP059 Complete processing of thermistor, pressure transducer, psychrometer technical procedure
These technical procedures are in review at the project chief level. Current plans are to have these reviewed by the end of December 1991.

Planning and Operations

3GUP014 Acquire/install humidity generator
Manufacturing of the 2-pressure humidity generator is basically on schedule. Delivery and installation of the unit will probably be delayed until 03/15/92, approximately two weeks from scheduled completion.

3GUP020 Acquire/install mass flow
A purchase requisition for a mass flow meter calibrator was submitted in late October. Execution of the purchase has been delayed indefinitely awaiting final disposition of FY '92 capital equipment funds. Delivery and installation will probably be delayed for several months. It is not possible to project a finish date for this activity at this time.

3GUP040 Acquire, install, evaluate optical disk media
Market research for the optical disk storage media has been completed. Final selection of an appropriate device is currently under way. Purchase requisition will probably be placed in January 1992. There should be no impact on scheduled completion date due to purchasing delays if the order is placed and executed in a timely manner.

3GUP021 Construct/test/evaluate multi-station gas sampling apparatus

Construction of the first multi-station gas sampling apparatus was started in August 1991. All parts have been acquired. The 1st system should be assembled by the end of December 1991. Testing will occur throughout the remainder of FY '92. The 1st shakedown test will be conducted in February 1992.

3GUP035 Prepare for instrumentation of UZP-6

Purchase requisitions for all sensors needed to instrument UZP-6 were placed in October and November 1991. A criteria letter for instrumenting UZP-6 is currently in preparation. Engineering drawings to facilitate manufacture of the downhole instrument station apparatuses (DISAs) are currently in preparation and should be completed by mid January 1992. A possible device for remote access of the instrumentation cavity for water injection testing has been identified. J. Rousseau will be discussing possibilities with the manufacturer for modifying the device to meet UZ borehole instrumentation needs. This meeting will take place on December 3, 1991. A technical procedure for hydro instrumentation of UZ boreholes was begun in November 1991. Activity is pretty much on schedule. Maximum effort will be devoted to this activity until a final resolution is made with regard to which borehole, UZP 6 vs UZ 16 (a Vertical Seismic Profiling borehole) is drilled first. Project cannot staff both efforts simultaneously.

3GUP060 Hire and train new staff

A draft of a position description to fill the calibration laboratory manager's vacancy at the NTS has been prepared and will be forwarded to the USGS classification division for grade determination. A candidate for one of the hydro-technician's positions has been identified and will be interviewed in early December 1991 for possible hire beginning in January 1992.

SCP 8.3.1.2.2.3.2b Vertical seismic profiling 0G331232

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP017 VSP lab/physical & computer simulations: 2-D fault method

Physical and computer model data has been acquired. Physical model data are being processed.

Quality Assurance

Planning and Operations

3GUP050 Procure "X" windows computer terminal for VSP

Terminal type has been identified and specification written. The Justification and Identification of Need are being prepared.

3GUP025 VSP prototype field test and data analysis

Access to the test site has been completed.

3GUP035 Design/test/evaluate/procure geophone mounts

Source for mounts identified. Awaiting written price quote.

Work Performed but not in Direct Support of the Scheduled Tasks

A. Balch spent time working on the proposal and revisions.

H. Jaramillo worked on the imbricate fault model.

C. Erdemir worked on the mode separation and stacking (imaging) of converted waves.

SCP 8.3.1.2.2.3.2c Integrated Data Acquisition System OG331242

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP045 Develop Criteria Optical Disk Media

Several newly available variations of digital optical media may be suitable for data archiving and transfer. A. Greengard collected preliminary information from nearly 30 manufacturers on 1) writable CD-ROMS, 2) mastered CD-ROMS, 3) cross-platform WORM systems, and 4) Intel/PC-DOS based WORM/multifunction systems that use organic-dye polymer media, tellurium-based media, or platinum-based media.

J. Rousseau, M. Neil, J. Baer, A. Sims, and R. Getzen discussed these options with A. Greengard, decided to concentrate the market study on metal-based 5-1/4" WORM media as the most likely option, but to collect detailed pricing and technical information from at least one representative manufacturer of each of the other technologies. J. Baer and M. Neil have reviewed the preliminary literature to assure that each manufacturer's proposal is technically satisfactory and functionally complete.

J. Baer has been investigating the cost and capability of communications software that will be necessary if we choose one of the Intel/PC-DOS based storage systems; the PDPs and existing software do not readily communicate with PC-type machines.

A. Greengard, with assistance from Baer and Neil, is collecting detailed pricing and technical information from about 20 manufacturers so that purchasing criteria can be developed for a system that meets immediate IDAS needs and provides a technically feasible path for meeting future needs for data archiving and UZ on-line data storage. Criteria development should be complete in late December.

3GUP013 Development and module testing software-2

M. Neil partially developed tests for several existing IDAS software modules.

J. Baer has nearly completed detailed designs for the Interactive Subsystem, one of the most critical of the unwritten systems needed before we can begin 3GUP051C. A number of problems regarding operational consistency have delayed completion of the design, but the problems have now been resolved satisfactorily. He expects to give the complete design to A. Greengard and R. Getzen for review and to A. Sims for coding by December 6th.

New releases of DEC's RSX operating system have caused problems and delays for J. Baer and A. Sims.

3GUP035 Procure/deliver Microwave datacom

The first attempt at procuring necessary hardware failed because no vendor was willing to meet requirements under the conditions specified by the procurement office. R. Getzen is working on a revised RFP description and hopes to advertise the solicitation before the end of December. A. Sims and REECO are assembling computer hardware necessary to support a testing phase in the revised procurement.

3GUP032 Construct prototype IDAS instrument shelter (IIS)

J. Rousseau, G. LeCain, and R. Getzen reviewed proposals from seven vendors, excluded

one on technical grounds and considered the remaining six to be provisionally acceptable, pending satisfactory answers to several questions. The exchange of technical information between the vendors and technical evaluation committee required more than five weeks because of holidays and informal protests by the excluded vendor, but the list has now been narrowed to 4 competitors. Another round of negotiations, followed by inspection of the selected vendor's facilities will probably delay start of construction until approximately January 6, 1992.

3GUP025 Integration and test design for software

M. Neil completed a design for testing the integration of communications hardware and software and began working on code and test data sets. This test will be necessary for acceptance testing of proposed microwave data communications equipment.

3GUP045 Develop Criteria Optical Disk Media

Duration was extended about 16 days because of an unanticipated number of competing technologies to evaluate. Start of 3GUP046C will be delayed until approximately January 7, 1992. Expected long-term schedule effects are minor.

3GUP049 Write, review, revise IDAS computer procedures

Expansion of HP-144, to include operation and verification of data-communications equipment that has not yet been purchased, requires postponement of completion of the new procedure until late June. Expected long-term schedule effects are negligible.

3GUP013 Development and module testing software-2

Obtaining an official release of National Instruments; GPIB driver will not become a QA obstacle until next September, but testing the non-functional releases they have sent has delayed other activities by a few days. The delay in completing the design of the Interactive Subsystem may or may not affect the starting date for IDAS Prototype-2 evaluation (3GUP051C).

Quality Assurance

3GUP049 Write, review, revise IDAS computer procedures

J. Rousseau, A. Greengard, and R. Getzen decided to reduce the revision-approval cycle. As part of this general realignment of procedures, the draft procedure HP-144 will be expanded to include related information in two other planned procedures, HP-147 and HP-155.

3GUP025 Integration and test design for software

M. Neil made significant progress toward defining an overall plan for testing software integration.

3GUP062 Revise IDAS facility procedures, QA review

As part of the general realignment of IDAS procedures, J. Rousseau and R. Getzen determined that IDAS facilities could be more appropriately documented in a non-procedural format that requires no review and approval.

3GUP013 Development and module testing software-2

For several years, the GPIB software, that controls low-level communications between computer and instruments, has been operating with an unofficial "patch". For QA reasons, we need an official manufacturer's release of this software, and neither of the versions supplied by National Instruments has passed Baer's tests.

Planning and Operations

3GUP035 Procure/deliver Microwave datacom

The delay in equipment procurement will certainly delay start of 3GUP036C, but may have little impact on long-term schedules because the new RFP incorporated a significant part of the testing into the procurement/manufacture of the equipment.

3GUP032 Construct prototype IDAS instrument shelter (IIS)

Delay in construction will certainly delay evaluation of the prototype IIS (3GUP033C). The degree to which subsequent activities will be delayed depends very much on how satisfactory the prototype IIS proves to be during evaluation.

SCP 8.3.1.2.2.3.2d Air-permeability and gaseous-tracer testing 0G331252

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP001 Purchase mass-flow control calibration system

The purchase of the mass flow calibration system has been split into two purchases. This was necessary because of the high costs and questionable budget. The purchase paper work for the first half of the system (the calibration bench) was completed and submitted to the appropriate administrators. Purchase of the second half (the bell-provers) will begin when the funds are available.

3GUP003 Complete construction of 1st support trailer

The USBR continues construction of the first support trailer. The design of a rotating wheel to construct the hose bundle was completed.

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

A supplier for the 12-inch packer assembly pneumatic packers was selected and a purchase order released. The USBR continues to purchase and manufacture items for the 12" system.

3GUP002 Prototype drilling-monitoring UZ-13

Design of a packer system for prototype drilling and monitoring in UZ-13 is completed. Construction is scheduled for completion in February 1992. The system will monitor pressure and allow gas sampling.

3GUP010 Complete engineering drawings/assembly/test instrument packer

Assembly of the 8" packer system is complete. Testing will be conducted when the support trailer is completed in April 1992. The 12" packer system is in the parts purchasing stage.

3GUP011 Review/develop crosshole, single hole air injection

The PI continues to review and evaluate single and crosshole test methods in order to define those most applicable to the Air Permeability test program.

Quality Assurance

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

USBR continues to prepare the QA drawings for the 8" and 12" packer assemblies and support trailer.

Planning and Operations

3GUP022D Bring on staff and train

J. Walker has been hired as a hydrologist with the Air Permeability program. Walker will be stationed at the HRF.

WBS 1.2.3.3.1.2.4 Percolation in the Unsaturated Zone - ESF Study

Principal Investigator - B. Lewis

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 OG3312N2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS023J Journal paper, moire bench-mark and calibration

Dr. J. Cardenas-Garcia submitted a draft of a paper titled, "Implementation and Use of an Automated Projection Moire Experimental Set-Up" on 19 April 1991 to the HIP Reports Section. This paper includes the bench marking and calibration of the projection Moire equipment. The technical reviews have been completed and the draft was returned to Dr. Cardenas on 26 November 1991 to address the review comments.

3GUS005J Complete procedure; radial fracture sampling

All reviews were completed in September 1991. The Co-investigator has not completed addressing the minor editorial comments that remained to be incorporated into the technical procedure.

3GUS006A Continued moire projection; method development

Work continues to progress using image digitization and processing to look at moire fringes. Phase measuring interferometry (PMI) has been investigated this fall with some success. High resolutions have been obtained but the accuracy does not appear to be very good.

Stereoviewing does not appear to be a technique that will be used to reproduce rock fracture surfaces. In-plane (2-D) measurements have a high resolution and accuracy. However, 3-D plots of rock fracture surfaces yield poor representations of the true topography.

The use of transform analyses for replicating topographical surfaces appears to be the best technique to use. Fast-Fourier transform (FFT) analysis continues to produce high resolutions and accuracies (approximately 4 microns) with processing times of approximately 2 to 4 minutes. Up to 9 frames can be spliced together using a combination of joining and rotating the frames to obtain 3-D plots of surfaces.

Cosine transforms are being investigated and presently yield quicker plots due to the fact the data is in a spatial domain as opposed to a frequency domain as with the PMI or FFT techniques. High resolutions have been obtained but, the accuracy has not been compared to the FFT technique.

The high-resolution imaging equipment is scheduled to be installed and evaluation of the equipment completed within the next two months.

Met with Dr. J. Cardenas-Garcia, 20 and 21 November 1991 to discuss technical procedure for set-up and calibration of moire projection equipment and status of on-going work. Drafted summary of work completed and planned work for FY92.

3GUS012J Complete journal paper-Moire Automation
Work on this draft continues.

3GUS014A Complete design fabricate low-pressure vessel
This activity has not been started. Not enough time available to begin this activity.

3GUS001A Select analog site for fracture sampling
This activity has not been started. Not enough time available to begin this activity.

3GUS010A Continued development; axial fracture
This activity has not been started. Not enough time available to begin this activity.

Quality Assurance

3GUS007A Write technical procedure; moire calibration
A draft was started on this procedure. However, the methods developed since this activity was placed in the FY91 and FY92 PACS preclude the use of the original calibration during the set up of the equipment. The present approach will be to use a standard reference material (SRM) or a precisely machined object that is NIST-traceable rather than a "calibrated ruler".

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Completed technical review of manuscript regarding moire projection work, "Projection Moire as a Tool for the Automated Determination of Surface Topography," submitted to HIP Reports Section, 17 October 1991 (10 hours).

Obtained CASU surplus equipment, computer furniture, laser printers, and wire saw (4.5 hours).

Remaining DEC computer items were inventoried, itemized, and transferred to CASU (10 hours).

Received, unpacked, and inventoried Data General work station equipment (1.5 hours).

Completed Material Safety Data Sheet notebook for laboratory use, 15 October 1991 (1 hour).

Started review of USGS-QMP-3.15, R0 (1 hour).

Moved offices in Bldg 20 laboratory office space to better accommodate equipment and furniture and permanently installed local area network (LAN) hardware (26 hours).

Attended annual meeting of Soil Science Society of America, 28-31 October 1991 in Denver, CO (32 hours).

Provided support as USGS representative for onsite neutron hole drilling at NTS, 6 October - 11 October 1991 (50 hours) and 11 November - 15 November 1991 (48 hours).

Percolation Test Support:

G. Severson, during October 1991, completed instrument racks, electrical connections (backup power, etc), thermocouple psychrometer calibrations (6 hours); attended meeting with USGS Branch of Geochemistry to discuss services to be added to services provided on the Approved Vendor List, and submitted memo to USGS-YMP QA office to add x-ray diffraction analyses to USGS Branch of Geochemistry services on Approved Vendor List (2 hours); and, met with D. Stannard and E. Weeks on separate occasions (3.5 hours). During November 1991, completed water chemistry calculations (SAR and tracer) and amendments to J-13 water (7.5 hours); and logbook entries, photographs, and tensiometers (5 hours).

M. Brodie, during October 1991, completed data collection program and electrical connections for thermocouple psychrometers for large block test (32 hours). During November 1991, some work was done with archiving previous digital data collected and modifications to data collection programs for thermocouple psychrometers and other instruments for large block test (80 hours).

S. Anderton, during October 1991, completed tensiometer construction, electrical connections for transducers, boreholes instrumentation, data archiving, and thermocouple psychrometer and tensiometer transducer calibrations (133 hours). During November 1991, tensiometer construction, data archiving, and some programming (141 hours).

SCP 8.3.1.2.2.4.2a Prototype infiltration (percolation) testing OG3312O2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS002B Conduct ponding test on large block first stage

Testing began on October 28 in the laboratory at building 20. Water with a chemical composition that is similar to that of the unsaturated zone water was used. The water front in the fractured block is being tracked using thermocouple psychrometers, electrical resistance probes, and TDR. This stage will continue until the block becomes too wet where the psychrometers will not make accurate measurements.

3GUS029B Prepare data report of imbibition experiment

Previously collected data is being backed-up and archived on computer disks.

3GUS026B Prepare data report of large block ponding test

Data is being collected, backed-up, and archived on computer disks. The data include water potentials, electrical resistance, and TDR.

3GUS005B Construct equipment for second stage of pond test

Pressure transducers that will be used with the tensiometers have been calibrated. Tensiometer probes are half finished.

The investigator was assigned to sit on Neutron hole drilling in Nevada for two weeks during November. This activity was not scheduled and is not in support of this activity.

3GUS034B Prepare data report of hydrologic properties

This activity is delayed until the measurements in activity 3GUS035B resume.

3GUS035B Measure rock sample hydrologic properties

The properties were scheduled to be measured in the HRF laboratory in Nevada. However, the schedule of the laboratory staff did not permit them to continue with the measurements during this period.

3GUS101B Conduct imbibition experiments on small samples

This activity was delayed due to the assignment of unscheduled activities.

Quality Assurance

Planning and Operations

SCP 8.3.1.2.2.4.3a Prototype bulk-permeability testing 0G3312P2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS001C Test injection packer string for soundness

This activity did not start because of conflicting schedules for other work. There is no impact because work can be accomplished with 1-2 weeks of intensive effort. The planned finish data is still viable.

Quality Assurance

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGP08A Backlogged data

Preliminary review and compilation of the air-flow and gaseous-phase chemical data from boreholes UZ-6, UZ-6s, and selected neutron-access boreholes will begin during January 1991. This activity has been delayed because of lack of staff. When the review is completed, this data will be submitted to the LRC.

Cause: Compilation, checking, and submittal of backlogged air-flow and gas-phase chemical data from UZ-6, UZ-6s, and selected neutron-access boreholes has been delayed because of lack of staff.

Impact: Qualification of data and outyear level 3 milestones are negatively impacted, but workarounds are still possible.

Corrective Action: In progress: replan schedule and obtain additional staff.

3GGP002A Collect UZ borehole data

The need to collect additional UZ borehole data during FY92 is being evaluated at this time. Periodic gas sampling and/or air-flow measuring may be conducted at selected UZ boreholes.

Cause: The need to collect additional UZ borehole data during FY92 is being evaluated.
Impact: Level 3 milestones are negatively impacted by this departure from the original schedule.

Corrective Action: None anticipated at this time.

3GGP04A Chemical analysis of gas samples

The chemical analysis of gas samples collected in FY91 is completed. Future chemical analysis of gas samples collected from UZ boreholes is dependent upon whether or not additional gas samples are collected.

3GGP06A Tabulate and analyze data

Analyzing data collected during FY91. When completed, this data will be included in the progress report on air flow and gas chemistry. If additional air-flow and gas-chemistry data are collected during FY92, this data will be tabulated and analyzed accordingly.

3GGP17A Continue progress report air flow and gas chemistry

This activity is in progress.

3GGP07A Develop and complete technical procedures

Air-flow measurement and gas-sample collection techniques are being evaluated. When this evaluation is completed, technical procedures will be prepared.

Quality Assurance

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUH027B Construct short packer for UZ13 to monitor UZP 6

A short packer has been constructed; however, since UZP6 is presently not planned to be drilled, the packer will be used in other boreholes instead. UZ6s will be used as a test hole to determine the reliability and/or feasibility of this packer design.

3GUH040B Compile UZ1 raw data gas sample anal 1984-1990
UZ1 raw data gas sample analyses for 1984-1990 have been compiled and completed as required for TDIF completion.

3GUH042B Compile UZ1 reduced data gas sample anal 1984-90
Reduction of UZ1 gas-sample data has been completed.

3GUH005B Monitor UZP6 drilling through UZ13 for tracer gases
UZP6 is not presently planned to be drilled; therefore, this work will not be performed.
The activity should be deleted from the schedule.

Quality Assurance

3GUH041B Submit TDIF for UZ1 raw data to LRC 1984-1990
The Technical Data Information File for UZ1 raw data from 1984-1991 has been completed and sent to the Local Records Center as required.

Planning and Operations

3GUH011 Procure straddle packer parts by USBR for UZP-6
Parts have been ordered for a straddle packer to be constructed for use in 12.25 inch boreholes such as UZP6, UZ16, UZ14, etc. Since UZP6 drilling has been indefinitely postponed, the packer system will be used in UZ16 at this time.

3GUH070B Procure lab chem, labware, and field apparatus
An Oxyclear gas purifier was ordered from VWR Scientific. This gas purifier is used in the gas chromatograph system to trap out any oxygen present in the nitrogen carrier gas. The item has not yet arrived.

Certified Balance Service, Inc. was requisitioned to calibrate the balances used and/or stored in the UZ Hydrochemistry Lab. The balances are calibrated twice a year in accordance with approved HPs which reference them.

3GUH037B Procure GC and DAS
A data acquisitions system procured from Dionex Corporation and the Bureau of Reclamation has been received. This data acquisition system has the capability to automate both the gas chromatograph and the ion chromatograph. It uses a high capacity personal computer for storage and post assay validation and optimization. A manufacture's service engineer has been scheduled to come and install the system. Another gas chromatograph and data acquisition system will be procured for use in the mobile sampling laboratory.

3GUH036B Procure 10 kw generator for gas sampling support
Various companies have been contacted for product information. With the information received, laboratory personnel can review and determine specification and needs requirements.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Ferarese has been appointed Chemical Safety Officer for HIP. Ferarese assists HIP management in maintaining compliance with OSHA safety regulations. For the months of October and November, she assured that laboratory managers obtained and filed necessary Material Safety Data Sheets. (32 hours)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUH013 Prepare core request for UZP-6

Requests for UZP6, UZ16 and UZ14 core have been prepared and sent to the USGS Sample Overview Committee representative for approval. The UZP6 borehole may not be drilled, resulting in the core request not being necessary.

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

Eleven nonwelded UZ4 cores were compressed. An average of 7.3 mls of water (ranging from 1.7 to 17.6 mls), and an average of 74.8 mls of gas (ranging from 49.8 to 109.8 mls) were obtained.

3GUH012A Prepare OFR-sp, dtps, proto and site UZ hydrochem

An outline has been prepared and supporting documents have been collected to begin the first draft of the report.

3GUH14AA Collect core from UZN-27 borehole

Coring of borehole UZN-27 has not yet begun. Core samples have been collected from UZN-55 and UZN-54 by the Unsaturated-Zone Infiltration Project. Selected cores are being distilled in conjunction with the Unsaturated-Zone Hydrochemistry Project for tritium determinations.

Cause: DOE drilling of neutron holes were behind the schedule.

Impact: Not serious.

Corrective Action: None on our part.

Quality Assurance

Planning and Operations

3GUH010A Procure refrigerator for core cold storage

Various companies have been contacted for product information. With the information received, laboratory personnel can review and determine specification and needs requirements.

Cause: Contacting many companies for the best product.

Impact: None, DOE drilling schedule delayed.

Corrective Action: If drilling schedule will be on time, search will be shortened.

3GUH018A Procure ion chromatograph and DAS

A data acquisition system procured from Dionex Corporation and the Bureau of Reclamation has been received. This data acquisition system has the capability to automate both the ion chromatograph and the gas chromatograph. It uses a high capacity personal computer for storage and post assay validation and optimization. A manufacturer service engineer has been scheduled to come to the laboratory and install the system. Another ion chromatograph and data acquisition system will be procured for use in the mobile sampling laboratory.

3GUH07AA Procure lab chem. labware & field apparatus

Sterile, plugged, plastic pipettes were ordered from VWR Scientific for use in pipetting

water samples for tritium analysis.

Certified Balance Service, Inc. was requisitioned to calibrate the balances used and/or stored in the UZ Hydrochemistry Lab. The balances are calibrated twice a year in accordance with approved HPs which reference them.

A Service and Supply Agreement contracted with Dionex Corporation has been approved and completed. The agreement includes full service and maintenance for the ion chromatograph as well as the purchase of analytical columns and miscellaneous supplies. A Dionex engineer was called in to repair a leak discovered in the ion chromatograph. The engineer found the source of the leak and repaired it.

Five-micro polypropylene wound filter and carbon cartridges were changed within the Modulab DI Recirculator system. The filters prevent particulate matter from reaching the DI beds and help insure that the purest water possible is delivered. The ultra-filtration membrane, microfiltration membrane, and ultraviolet light were changed within the Modulab UF/UV Water System. This system is used in the polishing of water that has been pretreated by ionization. New filters must be ordered and installed each year.

The cooling unit, necessary for proper operation of the liquid scintillation counter, had become non-functional and was sent to the manufacturer for service. The repaired unit has been received and installed in the counter. The counter was calibrated and newly mixed standard and background vials analyzed. A ventilation grid was put into the door of the counting room, and the ventilation fan in the ceiling was repaired. It is necessary to keep adequate ventilation to the room to assure optimum performance of the counter.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Ferarese has been appointed Chemical Safety Officer for HIP. Ferarese assists HIP management in maintaining compliance with OSHA safety regulations. For the months of October and November, she assured that laboratory managers obtained and filed necessary Material Safety Data Sheets. (32 hours)

Additional laboratory tests were required for information regarding tritium contamination (i.e., sample water exposed to HRF exit signs and the HRF compressor were tested for various lengths of time; performed road test on Pah Canyon core to study tar contamination). (8 hours)

WBS 1.2.3.3.1.2.8 Fluid Flow in Unsaturated Zone Fractured Rock

Principal Investigator - E. Kwicklis

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)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUF0021 Revise scoping calculations of percolation test

Major revisions in the organization and technical content have been made in this report as a result of U.S. Geological Survey technical review. Portions of the report have been rewritten, additional figures drafted and additional simulations performed.

3GUF015 Document variable aperture model VSFRAC

A table was prepared listing definitions of important variables in the program.

3GUF0051 Scoping and bounding calculations-FY92

The flow module of computer program SFIT (Kool and Parker, 1987) was used to simulate an hypothetical imbibition experiment into a 10 cm tall column of sand with properties taken from the VS2D documentation (Lappala and others, 1987, Table 1, soil#4). Results from this simulation were then treated as actual data and used as input data to the parameter estimation module of SFIT. Various amounts of "data" from the simulated experiment were used to estimate the saturated hydraulic conductivity and van Genuchten parameters n and α . Since the characteristics of the soil are known exactly, this permitted an investigation into the amount and types of data that would result in the most economical and accurate estimates of the soil properties from imbibition experiments. However, the flow module of SFIT does not seem capable of simulating flow problems involving hydraulic properties thought to be reasonable for tuffs. It will need to be modified before it can be applied to imbibition data collected on rocks from Yucca Mountain.

An analysis was made of the relative permeability versus moisture content and moisture content versus matric potential data for sample 3p of the data report by Flint and Flint (1991). This sample was one of few samples for which different measurement methods produced consistent data. The van Genuchten expression for the moisture retention curve fit the moisture content versus matric potential data quite well. However, estimates of effective hydraulic conductivity based on the related hydraulic conductivity function and parameters deduced from the fit of the moisture retention curve were poor predictors of the measured effective hydraulic conductivity, even when the exponent in the tortuosity term of the relative permeability function was allowed to vary.

Using the FRACMAN-MAFIC modeling package developed by Golder and Associates, a three-dimensional fracture network was constructed similar to that contained in the block currently being tested as part of the prototype Percolation Test. The FRACMAN-MAFIC package may ultimately be used to analyze some aspects of the experiment.

Based on relations recently published in the hydrologic literature, a graph was prepared showing the minimum expected error in calculated permeability that results from ignoring the Klinkenberg effect in the analysis of air-injection tests. The graph, which shows relative error as a function of injection pressure and absolute permeability, indicates that relative error increases with decreasing permeability and decreasing injection pressure.

Quality Assurance

Planning and Operations

3GUF001 Resolve study plan comments (DOE and NRC)

Minor revisions were made to the study plan as a result of editorial review conducted by the USGS Reports Specialist.

Work Performed but not in Direct Support of the Scheduled Tasks

E. Kwicklis spent approximately 40 hours serving as well-site hydrologist during the drilling of neutron hole N-55 at Yucca Mountain. (October 21-25)

E. Kwicklis spent approximately 32 hours attending the FRACMAN Workshop sponsored by DOE-YMP in Seattle, Washington on November 18-21.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUF002L Complete dual-porosity code

A few bugs have been found and removed from the dual-porosity code, such as incorrect initialization of the fracture/matrix flux term in the event of nonconvergent iteration, etc.

Work is continuing on verifying the accuracy of the dual porosity code for single phase moisture flow.

3GUF133L Correlate frac/determine approach to permeability

Work is underway, but has not reached full intensity because of preparation of papers for the ANS meeting.

3GUF08L Sorptivity/characteristic curve

Analysis has been started on the problem of inverting sorptivities to find characteristic curves using certain sorptivity approximations.

3GUF006L Prepare paper for 1992 IHLRWM conference

A draft of a paper entitled, "Dual-porosity Simulator for Flow in Unsaturated Fractured Rock Masses," by R. Zimmerman, G. Bodvarsson, and E. Kwicklis is being prepared.

Quality Assurance

3GUF007L Continue software QA and all other QA requirements

Reading assignments were completed by various staff members.

Planning and Operations

3GUF008L Revise FY92 budget and work plan

G. Bodvarsson and R. Zimmerman met with B. Lewis on October 29 to discuss workscope, budget and preparation of PACS.

WBS 1.2.3.3.1.2.9 Site Unsaturated Zone Modeling and Synthesis

Principal Investigator - B. Lewis

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM014A Develop alternative conceptual models of UZ

Began investigating mechanistic flow processes with LBL scientists, which may be used to describe flow in the UZ (i.e., fracture-dominated or matrix-dominated flow, or a combination of both).

3GUM05A Construct 2-D cross-section model using TOUGH

Activity not started due to insufficient staff.

Quality Assurance

Planning and Operations

3GUM06A Study plan revision & resolution of comments

Activity delayed 4 months due to non-receipt of reviewed SP from DOE/YMPO. Expect this document to be returned to PI in mid- to late January 1992. Will cause a similar delay of 4 months in 3GUM010A, graded QA, and other QA requirements, which are dependent on the revised study plan.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 108 hours were spent on the following tasks:

Provided on-site field support for the coring of neutron borehole USW UZ-54 during periods October 1 to October 4 and October 14 to October 18, 1991.

Coordinated USGS field support personnel for the coring of neutron boreholes USW UZ-54 and USW UZ-55 during the months of October and November 1991.

Completed technical review of QMP-5.05, R3 (Scientific Notebook) on November 21, 1991.

Completed technical review of QMP-3.05, R3 (Criteria Letter) on November 25, 1991.

Review of I. Yang's paper entitled "Flow and Transport Through Unsaturated Rock--Data From Two Test Holes--Yucca Mountain Nevada." Paper will be presented at the High Level Radioactive Waste Conference in Las Vegas in April 1992.

M. Whitfield Served as Acting Project Chief for Flow in Unsaturated Fractured Rock project.

SCP 8.3.1.2.2.9.2 Selection, development, and testing of hydrologic-modeling computer codes 0B3312D2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM17A Develop alternative conceptual models of UZ

Contour maps and isopach maps were prepared for the base of the Tiva Canyon, the Paintbrush and the Topopah Spring hydrogeologic units, as well as for the ground-water table for the area of the site-scale model. These maps are needed to build a three-dimensional grid for the numerical modeling. The maps were sent to M. Chornack and R. Spengler for review in order to make sure that they are consistent with the larger scale data.

Quality Assurance

3GUM18A Grading of QA and other QA requirements

Reading assignments were completed by various staff members.

Planning and Operations

3GUM14A Study plan revision and resolution of comments

No comments were received during October and November. This activity has not started because DOE review of the study plan is not complete.

SCP 8.3.1.2.2.9.3 Simulation of the hydrogeologic system 0B3312E2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM02B Development of 3-D grid

The areal grid of the site-scale model has been designed and completed. Current work includes the development of the complex, non-uniform vertical grid for the model.

3GUM01B Data compilation and analysis

All available data is being compiled on the unsaturated zone for the development of the site-scale model. These data are being used in the design of the three-dimensional numerical grid.

3GUM04B Integrate UZ properties

Work has started on evaluating the properties of the various hydrological units within the unsaturated zone.

3GUM11B Prepare paper for AND conference

A draft of the paper entitled, "Development of a Three-Dimensional Site-Scale Model for the Unsaturated Zone at Yucca Mountain, Nevada," was written by C. Wittwer and G. Bodvarsson, for the American Nuclear Society Conference on High Level Radioactive Waste Management in April, 1992. The paper has been sent to the USGS for review by the co-authors (M. Chornack, A. Flint, L. Flint, B. Lewis, and R. Spengler with R. Rautman of SNL). The paper has also undergone LBL internal review by Y. Tsang and K. Karasaki. The paper includes a site-description with emphasis on modeling needs, the modeling approach, the development of the grid and the description of preliminary numerical simulations performed in order to evaluate the effect of the vertical element size on the numerical results.

Quality Assurance

3GUM14B Grading of QA and other QA requirements

Reading assignments were completed by various staff members.

Planning and Operations

3GUM13B Study plan revision and resolution of comments

No comments were received during October and November. This activity has not started because DOE review of the study plan is not complete.

WBS 1.2.3.3.1.2.10 Prototype Hydrologic Tests that Support Multiple Site Characterization

Activities

Principal Investigator - B. Lewis

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT002 Continue reduction & examination of ALTS Arizona

Reduction and examination of ALTS test data continues. The temperature data is presently being reduced and checked to insure that the pneumatic testing assumptions of an isothermal system are adequate.

3GUT003 Continue analysis of ALTS data

Analysis of the ALTS data continues. The data is being compared to several possible models in an attempt to best describe the flow system.

3GUT001 Continue ALTS testing

The ALTS testing scheduled for October of 1991 was canceled due to scheduling conflicts with the University of Arizona. The testing may be rescheduled for the spring of 1992, if time and budget allow.

Quality Assurance

Planning and Operations

Prototype Tracer Testing 0G3312J2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT04DD Design tracer gas sorption tests

The design of the tracer gas sorption tests has been completed. Both batch and column tests have been designed. The batch experiments utilize a glass manifold with specially designed flasks. The sample is placed in the flask, pumped to vacuum, and injected with the desired tracer gas. Analysis of samples is by gas chromatograph. The column experiments utilize a

glass column connected to teflon tubing. The tubing forms a closed system that flows through an analyzer appropriate for the gas of study. A pump provides a continuous flow of the gas through the system.

3GUT03DD Prepare WRI report on aqueous tracer tests
Manuscript sent to author for retyping.

3GUT13DD Conduct tracer gas sorption test on stem materials
A batch experiment testing the sorption of SF₆ on gypsum cement is in progress.

Quality Assurance

Planning and Operations

3GUT011D Procure supplies for monitoring gas tracer @ NTS
The tracer gas analyzer has been returned to the manufacturer for repair. Gas flow regulators and data loggers are either on order or on hand. All other supplies are to be provided by REECO or RSN.

3GUT007D Design method for monitoring gas tracer @ NTS
A meeting with representatives from REECO and RSN to coordinate system design is scheduled for mid-December.

3GUT009D Procure lab supplies for gas tracer tests
Ordering of supplies for batch and column testing has been completed. All supplies are in readiness at our laboratory except the following: the glass columns have not arrived from the manufacturer; the ITI model 120 leakmeter SF₆ analyzer and the EGM CO₂ gas monitor have been returned to the manufacturers for repair and custom modification.

Prototype Dry Coring of Rubble 0G3312L2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT01FF Complete test effects block/gas used coring tech
Results of rubble tests indicate that a surface-set-bit cores faster than an impregnated bit, but wears out faster also. The bit penetration rate depends on fabric orientation in the welded rock; parallel to fabric is best, and the faster penetration rates are better for keeping the core cool. A moderate force applied to the drill is best for maximum penetration and minimum heat produced. Compressed air works well for bit cooling and can be applied at the minimum pressure required to remove cuttings (~ 50 psi). The best rotational speed is about 250 rpm. Both hydrostone and sulfaset will produce minimum heat inside a rubble piece (5-15 °C) and thus either is appropriate as a blocking material for rubble.

3GUT03FF Complete preparation of report on G-Tunnel work
An outline and an annotated outline have been prepared for this report.

3GUT01EE Complete testing effects of core sealing method
Cores were weighed in October and November for variation in weight.

3GUT02EE Reduce data for effects of coring methods
Data has been compiled from coring results and is in the process of being compiled in a Lotus spreadsheet format.

3GUT13FF Complete reduction of data effect of core sealing
Graphical analysis of data is currently underway.

Quality Assurance

3GUT004F Develop technical procedures on core sealing
The first draft for the technical procedure on core sealing has been written and is being reviewed.

Planning and Operations

3GUT08FF Procure lab supplies
Required supplies were purchased for the blocking and coring tests.

Prototype Pore-Water Extraction 0G3312M2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT030G Complete reduce pore-water chem-vs-compress
Pore-water chemistry data was plotted for all chemical analyses done as of October 1991. Plots were reviewed and discussed by project personnel. Presently, chemical models are being run using the results.

3GUT026G Complete WRI report
The WRI report on triaxial and one-dimensional pore-water extraction testing is presently being edited. Work is progressing according to schedule.

3GUT029G Ext/anal pore water-use high press cell, UZ welded
Compressed 11 cores from UZ4.

Cut and prepared 15 core samples from UZ4 and UZ5.

Received and inventoried 22 new core samples from the Sample Management Facility for UZ4, UZ5 and UZ6s.

Procured necessary supplies for compression tests.

Tests of intact versus fragmented welded core indicates that fragmented core can produce almost as much water as intact core. Tests of continuous versus pressure step increase extraction methods are ongoing.

3GUT020G Procure & construct additional high press 1-D cells
Materials for construction of the 1-D cell have been ordered. Construction cannot begin until all materials are received.

3GUT034G Complete development of compress method extract water
Completed 1-D tests for welded tuff cores are being analyzed for relationships between water content, percent saturation and degree of success as well as water chemistry versus pressure of extraction. This data is required to complete the method development.

3GUT002G Complete ext/analysis chem of PW, UZ4,5,6 and GT
Water samples are being collected from 1-D tests described above. Samples will be sent out for chemical analyses once a substantial number have been collected.

3GUT040G Prepare request for UZP-6 core

Requests for UZP6, UZ16 and UZ14 core have been prepared and sent to the USGS Sample Overview Committee representative for approval. The UZP6 borehole may not be drilled, resulting in the core request not being necessary.

Quality Assurance

3GUT035G Complete technical procedure for 1-D compression

The technical procedure was returned to the author after review in November 1991. The procedure is presently being modified according to reviewer comments and should be completed in December.

Planning and Operations

3GUT009G Procure second data acquisition system (IBM-386)

The second data acquisition system has been received.

3GUT018G Procure/develop data acquisition software

Software has been ordered. The data acquisition system will be set up once all the software has been received.

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 - R. Luckey

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF004 Continue 1991 water-level data collection

Three wells are being monitored on a quarterly basis; 15 zones in 15 wells are being monitored on a monthly basis; 21 zones in 13 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.

Transducers were replaced and calibrated at wells USW H-1 (tube 3) and UE-25p #1.

Transducers were calibrated at wells UE-25b #1 (lower interval), USW H-1 (tube 2), USW H-3 (upper interval), USW H-3 (lower interval), UE-25 WT #6, USW WT-11, and UE-25 WT #16.

HP-60, R1, Method for monitoring water-level changes using pressure transducers was revised and is ready for technical review.

Four 5-psig pressure transmitters were received from Handar.

Barometers 22352 and 22353 received operational check and were within specifications required by the technical procedure.

3GWF41AA Continue preparing 1989 water-level report

Both reviews of the report "Water levels in continuously measured wells in the Yucca Mountain area, Nevada, 1989" by D. Lobmeyer and R. Luckey have been completed and the authors are revising the report. Only minimal progress was made on this task because of lack of personnel.

This activity is extended four months because no one is available to work on the report. Milestone G007 is delayed four months as a result. It will likely have trickle-down impact on 1990 and 1991 reports as well. Milestone G008 will likely be delayed in future variance reports.

3GWF20AA Continue analysis of water-level trends

G. O'Brien studied barometrically induced water-level fluctuations in the upper interval of USW H-4. This interval does not respond in a classical manner and will require further study.

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

The draft of the report "Precision and accuracy of water-level measurements taken in the Yucca Mountain area, Nevada, 1988-90" by M. Boucher has been returned from three reviewers and the author is revising the report. Minimal progress was made on this task during this period because the author was diverted to working on quality assurance tasks for other activities.

This activity is extended three months due to the diversion of the investigator to other duties. Milestone G009 is delayed three months as a result. There is no impact on other activities.

3GWF117A Convert HP-196T (notebook)

M. Boucher completed a first draft of technical procedure HP-196, "Use of Data Collection Platforms to Collect Water-Level Data." The draft is with the PI for his review.

3GWF42AA Complete 1990 water-level data report

Regression analyses were done for all transducer calibrations for 1990 and results were compiled into tables suitable for inclusion in the report.

Compilation of transducer histories was begun.

3GWF037 Research NWIS software

D. Burkhardt developed a method for using the USGS National Water Information System software to process 1990 transducer output to water levels. The method needs to be tested to determine if it is acceptable.

Quality Assurance

Planning and Operations

3GWF006 Convert six sites to DCPs

Six satellite data collection platforms (DCP) were received from the manufacturer along with associated antennae and cables. The systems cannot be installed until suitable shelters are found. D. Baldwin contacted several trailer manufacturers for specifications after he determined that portable shelters would be most suitable.

3GWF129A Develop software QA for data reduction

The technical contact for this software retired in September. G. O'Brien was designated as the new technical contact for this software but was instructed not to spend much 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.

Work Performed but not in Direct Support of the Scheduled Tasks

R. Luckey attended the hearing on the Water Appropriation Permit for use of J-13 water (32 hours). He also reviewed approximately 1,000 pages of testimony of hydrologic aspects and made recommendations to attorneys writing the summary brief (60 hours). He reviewed intervenor's summary brief, again reviewed testimony, and made recommendations to attorneys writing rebuttal brief (40 hours).

G. O'Brien and R. Luckey attended "Ground-Water Travel Time" Workshop in Tucson, Arizona. Luckey made a presentation on one alternative conceptual model of the large hydraulic gradient in which he suggested that the gradient was simply a mis-interpretation of semi-perched water levels. (55 hours)

M. Boucher prepared a Technical Data Information Form training course and gave a "dry-run" to selected people. (40 hours)

M. Boucher provided QA support to various activities, especially Evaluation of Past Discharge Areas, to address and close several outstanding items. (35 hours)

M. Boucher began training J. Watson, a QA specialist that will handle QA for several activities. (22 hours)

R. Luckey spent considerable time on tasks related to Saturated Zone and Quaternary/Future Regional Hydrology tasks. (102 hours)

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF001D Finish intraborehole flow & stress test report

G. Patterson continued work on the draft of the report, which is now 90% complete. The

draft was not completed due to diversion of staff to initiate work on the newly approved project with the Atomic Energy of Canada Limited (AECL), under an international agreement between DOE and AECL. The staff was further diverted to evaluate, at the request of YMPO, the feasibility and impact of an accelerated testing schedule at the C-well complex. It is now anticipated that the finish date for this activity (3GWF001D) will be 1/31/92.

3GWF005D Monitor strain-related pressure response in wells

Data collection for pneumatic diffusivity calculations (needed for analysis of barometric effects in uncased boreholes) continued in UE-25c#3.

Monitoring of water level fluctuations (used in earth tide and atmospheric loading analyses) continued at USW H-4 and UE-5B#1.

Seismic monitoring continued at USW H-4.

3GWF010D Develop scientific notebooks/hydrologic procedures for monitoring hydraulic changes from seismic stress

HP-220T, HP-221T, HP-222T are in the comment resolution phase between the authors (G. Patterson and J. Gemmill) and the technical reviewer (G. O'Brien).

Quality Assurance

3GWF011D Develop software QA for analysis programs under the 8.3.1.2.3.1.3 activity

The start of this activity has been postponed to 1/1/92 for the same reasons explained under 3GWF010D above.

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Finalized the updating of the PACS (Planning and Control System) schedule for FY92 and FY93.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0G3313G2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF020F Construct two 3-zone packer strings

The USBR has been assembling the monolithic "test sections" which consist of protective casing that houses the instruments needed for monitoring of pressure and temperature changes, and injection of tracers, during hydraulic and tracer testing at the C-holes. The completion of these "test sections" is being done in parallel with preparing for laboratory functional testing although the latter activity, 3GWF023F, had not been planned to commence until 12/1/91.

3GWF001F Build discharge pipeline for C-Holes tests

The feasibility of the proposed pipeline and the steps necessary for completing it are being studied.

3GWF002F Run power and obtain permits for hydraulic tests at the C-Holes

Estimates have been obtained of the cost of running a power line to the C-holes and the alternative of providing generator power during the testing. The cost estimates indicate that the two approaches are comparable. The decision was, therefore, made that the power line

option be selected because it is more reliable during testing. A criteria letter will be written to initiate the process of securing the power.

3GWF003F Purchase additional packers/materials for third 3-zone packer string

The USBR has been issuing requisitions for purchase of the additional components to complete this task.

3GWF106F Refine and add modules to aquifer test analysis program

Plans for contracting the process of updating the modules to outside consultants were discussed. No decision has been reached yet.

3GWF018F Oversee LBL prepare cross-hole seismic work

Discussed LBL's plans for conducting the seismic work at the C-holes in 1/92 with LBL staff.

3GWF027F Preliminary numerical/analytical modeling to assist in cross-hole test design

Plans for A. Geldon to use the software package, FracMan, to conduct preliminary modeling were made.

3GWF029F Log C-Hole temperature to define intraborehole flow (for test zone selection)

G. Patterson used the logging truck that belongs to the Saturated Zone Fractured Rock Hydrology Project to log the temperature profiles at the C-Holes. This task is complete.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Completed updating the PACS (Planning and Control System) schedule for FY92 and FY93.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0B3313G2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF02C Prepare for cross-hole seismic work

Preparation for the cross hole seismic survey test at the C-Holes and calibration of the electronics continued.

Quality Assurance

Planning and Operations

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF161A Preliminary modeling for tracer tests

Consideration is being given to trying a simple 1-dimensional analytical solution to the advection-dispersion equation for porous media to come up with estimates of tracer volumes and concentrations needed for the planned tracer tests.

3GWF160A Expand injection permit to full suite of tracers
Discussions were held with K. Stetzenbach at UNLV regarding the list of tracers to be considered for expansion of the permit.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Completed the updating of the PACS (Planning and Control System) schedule for FY92 and FY93.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWH004 Assess data (extant), phase 1

The principal investigator obtained written record of aqueous $^{87}\text{Sr}/^{86}\text{Sr}$ data for the region containing the Nevada Test Site. This information will be put into a spreadsheet file for manipulation. Unpublished USGS K, U, and Th data from cores and cuttings from boreholes GU-3 and G-3 were input into a spreadsheet file. These, together with other extant data to be input as time permits, will provide the basis for calculations of estimated subsurface *in situ* production of selected radionuclides of interest.

3GWH024A Develop ion-chromatograph methods

The principal investigator obtained uncontrolled copies of two technical procedures developed by investigators at LANL and Hydrogeochem (Tucson, Arizona) for consideration and possible adaptation by this study. Examinations of the documents, and subsequent discussions with LANL and Hydrogeochem staff and investigators revealed differing philosophies regarding perceived content needs.

A lack of progress in hiring a staff member for this study forces the slippage of the planned completion date of this effort. If requisite document preparation can be completed in December, it is conceivable that the position could be filled by early summer and the planned completion date met.

Quality Assurance

Planning and Operations

3GWH022A Complete study plan comment resolution

The principal investigator completed responses to DOE headquarters and project review comments. The revised document was returned to the project office in late November for

disposition -- submission of revised document, with individual comments and responses, to reviewers for consideration/acceptance.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 112 hours were spent on the following:

The principal investigator attended meetings of the ASME subcommittee on nuclear waste management and the high-level waste work group in Fort Worth, Texas on October 1 and 2. The topic of primary relevance to the Yucca Mountain Project was the need for revision of NQA-3. Recognition of the need derived from the review of the document performed by the project quality integration group in July. The subcommittee, which wrote NQA-3, agreed that there had been insufficient customer (i.e., scientific investigator) input. A formal proposal for revision was prepared and submitted to the ASME main committee.

The principal investigator attended a meeting of the quality integration group in Las Vegas on October 3 and 4. The group reviewed and commented on the review draft of the new OCRWM quality assurance requirements document. Comments were synthesized and submitted to OCRWM QA.

The principal investigator participated in the monthly teleconferences of the project geochemistry integration team on October 31 and November 25. Because errors in the summary of the geochemistry exchange held in July at the NTS have been brought to the group's attention, copies of the summary were re-distributed to USGS participants for review and possible editing. Preparations were made to present data collection plans at a forthcoming workshop (December 4 and 5, Las Vegas) that will address performance-assessment geochemical data needs.

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

Technical Activities

3GWH014A Develop mobile laboratory

The principal investigator discussed laboratory needs and potential designs with investigators from Atomic Energy Canada Limited (AECL - J. Ross, M. Gascoyne), the Svensk Kärnbränslehantering AB (SKB - K. Almqvist), and the University of Nevada, Las Vegas Environmental Research Center (K. Stetzenbach).

3GWH015A Develop downhole data-collection and sample-collection equipment

The principal investigator discussed equipment needs and design with J. Ross (AECL).

The principal investigator visited Tam International, Inc. in Houston, Texas on November 20 and 21. Tam is a manufacturer of hydraulic testing equipment, and has supplied equipment and conducted tests for the DOE at the NTS. Discussions focused on the possible incorporation of specific Tam equipment (hydraulic shifter, sliding-port sampling screens) into an equipment system and assemblies planned for purchase in FY93. Tam representatives expressed a strong interest in coordinating system assembly and manufacture. This provides an alternative to purchase of the complete system in Sweden. They also made several suggestions regarding possible means of obtaining hydraulic potential data during planned sample collection.

The principal investigator participated in a drilling-integration meeting in Lakewood on October 8. Discussions focused on the need to integrate planned activities, and revealed that there is considerable uncertainty in the minds of individual investigators as to

construction plans for sd, UZ, and WT boreholes.

The principal investigator met with B. Lehman (Institute of Physics, University of Bern) and J. Fabryka-Martin (LANL) in Tucson, Arizona on November 14. Bern is the site of the only laboratory currently capable of performing determinations of ^{39}Ar activity. Based on YMP sampling plans, Lehman suggested that the determination of ^{39}Ar in gas-phase samples was quite feasible. He further indicated that the level of effort required for aqueous sample collection would be much higher than for gas-phase samples. Discussion also briefly touched on world-wide analytical capabilities for ^{81}Kr and ^{85}Kr .

Quality Assurance

Planning and Operations

SCP 8.3.1.2.3.2.3 Regional hydrochemical characterization 0G3313L2

Technical Activities

Quality Assurance

Planning and Operations

3GWH905 Select sample sites, phase 1

The principal investigator spoke with W. Werrell (National Park Service) regarding previously discussed sampling of springs and seeps within Death Valley National Monument. A meeting was tentatively planned for late January '92 to examine Werrell's map files and to discuss a reconnaissance of feasible sites.

WBS 1.2.3.3.1.3.3 Saturated Zone Hydrologic System Synthesis and Modeling

Principal Investigator - R. Luckey

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM05AA Synthesize potentiometric map

E. Ervin completed corrections to the average 1988 water levels in wells near Yucca Mountain as a result of the effects of temperature and density variations, by techniques discussed by Oberlander, P., 1989, 'Fluid density and gravitational variations in deep boreholes and their effect on fluid potential', Ground Water, Vol.27, No. 3, pp. 341-350.

3GWM07AA Develop geologic model of C-holes and site

A. Geldon attended at week-long LYNX training course in Albuquerque, New Mexico to

aid in the determination of which Geographic Information System would best suit the needs for geologic modeling initially at the UE-25C-hole complex and later at the site scale.

Quality Assurance

Planning and Operations

3GWM002A Revise and resolve (USGS) study plan comments

The 115 comments on study plan 8.3.1.2.3.3, from 7 DOE reviewers, are being examined. There are approximately 44 major comments. Responses to more than half of the minor comments have been made and added to the revised draft by E. Ervin.

Work on resolving study plan comments is slightly behind schedule as a result of other commitments, such as preparation of talks and papers for the GSA field trip and Ground-Water Travel Time meeting in Tucson. Anticipated delay is approximately one month.

Work Performed but not in Direct Support of the Scheduled Tasks

E. Ervin attended the 1991 Geological Society of America annual meeting in San Diego. She ran the post-meeting field trip with D.L. Galloway, M.P. Chornack, and A.C. Riggs entitled "Hydrogeologic overview and field trip of the regional ground-water flow system in relation to Yucca Mountain, Nevada" held October 25-27, 1991 and presented talks at 3 stops on the trip: Tippihah Spring, the regional hydrologic overview from the top of Yucca Mountain, and fracture pavements 200 and 300 in the Tiva Canyon Member of the Paintbrush Tuff. Eighteen geologists, including three professors, scientists from the Savannah River site, Desert Research Institute, and Weston, signed up for the three-day field trip that covered the area from Pahute Mesa to Death Valley. (95 hours)

SCP 8.3.1.2.3.3.2 Development of fracture network model 0G3313B2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM014M Prepare and present fracture mapping results

E. Ervin's and M. Chornack's abstract entitled "Fractures in the Bullfrog member of the Crater Flat Tuff east of Little Skull Mountain, Nye County, Nevada" was accepted and published by the American Geophysical Union for the fall meeting to be held in San Francisco. The talk will be given in the Hydrology Section called Field Methods in Subsurface Hydrology on Friday, December 13.

E. Ervin continued working with the preliminary fracture data from the Bullfrog Member of the Crater Flat Tuff east of Little Skull Mountain, including loading the grid data into the Rockware stereonet program and making slides for the AGU talk.

3GWM007B Coordinate LBL fracture-network modeling phase I

E. Ervin and K. Karasaki, LBL, discussed plans for presenting fracture talks at the Ground-water Travel Time Workshop in Tucson, Arizona, November 13 and 14.

E. Ervin presented a talk at the Ground-water Travel Time Workshop in Tucson, Arizona, entitled: Fracture-data needs for ground-water flow modeling at Yucca Mountain in the session on data needs on November 13.

3GWM01CB Initial mapping of the Crater Flat Tuff

E. Ervin attended a four-day training seminar by Golder and Associates, Seattle,

Washington, on the use of their models FRACMAN and MAFIC. She plans to analyze the preliminary fracture data from the Bullfrog Member of the Crater Flat Tuff, east of Little Skull Mountain using the FRACMAN and MAFIC programs.

Quality Assurance

Planning and Operations

3GWM015B Revise fracture mapping technical procedure

E. Ervin discussed revising the fracture-mapping technical procedure, GP-12, with R. Spengler, GSP, and S. Beason and M. Fahey of the Bureau of Reclamation. It is planned that the USBR scientists will help the GSP program in performing the fracture mapping that C. Throckmorton and E. Verbeek were conducting in rocks of the unsaturated zone. A meeting is scheduled between Ervin and the USBR scientists in December to get their suggestions for revisions to GP-12.

SCP 8.3.1.2.3.3.2 Development of fracture network model 0B3313C2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM01CA Complete borehole fracture data bias study

A new borehole bias correction method was devised where a uniform and random component from fracture data is filtered out to obtain anomalies from the data.

3GWM04CA Incorporate outcrop data to network model 1

Preliminary statistical comparisons are being made between three fracture data sets: that from aerial survey of Little Skull Mountain, that from C-Hole borehole survey, and that of Barton's pavement mapping of UZ tuffs.

3GWM06CA Complete radioactive waste conference journal article

A two-dimensional fracture network was constructed using the preliminary outcrop data supplied by USGS scientists. Seven fracture sets were superimposed to produce a hierarchical fracture network. A tracer test was simulated in the network using TRINET. It was found that dispersion phenomena due to fracture intersections are highly irregular and quite different from those in porous media.

An energy surface was constructed by testing the sensitivity of the goodness of the match to the existence of each element. The resemblance of the surface profile to the "real" mesh indicates that this may be a good pre-conditioner for the inversion scheme.

3GWM005C Assist USGS prototype multiple well test phase 1

This activity has not started because no assistance has been requested by the USGS.

3GWM10CA Assist USGS with first hydraulic test report

This activity has not started because no assistance has been requested by the USGS.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

K. Karasaki attended the Workshop on Ground-Water Travel Time in the Saturated Zone held in

Tucson on November 13 and 14.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFR007 Incorporate FY91 data in the data base

Storms and runoff during FY91 were minimal. Data collected for the few known runoff events are being reduced and compiled. They will soon be transmitted to PDA.

3GFR016 Analyze/evaluate FY91 flood data

Storms and runoff during FY91 were minimal. Data collected for the few known runoff events are being reduced and compiled. Analyses and evaluation of these data are being conducted as part of this process.

3GFR002 Collect, analyze, and evaluate FY92 flood data

No storms with sufficient strength to cause serious runoff or flooding occurred during October or November 1991. Therefore, no data have yet been collected for FY92.

Quality Assurance

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

The PACS accounts for FY92 and FY93 were planned and revised. (8 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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GCL005 Develop study plan

PACS schedule and budget were established for this study. Potential scientific staff have been contacted at the University of Utah, Salt Lake City. They would be brought into the program with an IPA or appropriate contract.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

3GCL001B Hire and train staff
The study was QA graded at Level 1.

Planning and Operations

3GCL001B Hire and train staff

PACS schedule and budget were established for this study. Potential scientific staff have been contacted at the Desert Research Institute, Reno, Nevada, and at the University of Utah, Salt Lake City. These people will be brought into the program using an IPA or appropriate contracts. Special permission has been sought to start technical work without NRC approval.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GCL101 Hire and train staff

PACS schedule and budget were established for this study. Potential scientific staff have been contacted at the Desert Research Institute, Reno, Nevada, and at the University of Utah, Salt Lake City. These people will be brought into the program using an IPA or appropriate contract.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GCL001A Complete transition and hire staff

PACS schedule and budget were established for this study. Most of the scientific staff are currently in either GSP or HIP.

SCP 8.3.1.5.1.4.3 Eolian history of the Yucca Mountain region 0G3621J2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCL018C Collect sediment samples - wet/dry playas

Surface sediment samples were collected from several playas in the Mohave Desert region and in the region of Yucca Mountain.

3GCL019C Submit analyses of mineral and selected elements

Surface sediment samples were submitted for isotope and paleontology analyses.

Quality Assurance

Planning and Operations

3GCL018C Collect sediment samples - wet/dry playas

PACS schedule and budget were established for this study. Scientific staff are in place.

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 - J. Stuckless

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GQH01AA Update/review (DOE) study plan

Study plan revisions, as per reviewer's comments and suggestions, are currently being made. At this time, the activity is approximately 80% finished. An evaluation of the activity's objectives (SCP) have been made to ensure that these guidelines are met by the rationale and methodology present in the study plan. This is particularly important in terms of responding to reviewer comments.

D. Grasso worked with P. Glancy in the Carson City office on comment resolution issues and editorial problems regarding study plan update/review.

Work Performed but not in Direct Support of the Scheduled Tasks

The PACS accounts for FY92 and FY93 were planned and revised. (24 hours)

SCP 8.3.1.5.2.1.3 Evaluation of past discharge areas 0G3622B2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH012 Analyze water by NWQL and GSP Isotope Staff

On October 2 the NWQL completed 12 water analyses of water samples submitted in July. The water samples were for the Oasis Valley, Spring Mountains and Nevada Test Site.

3GQH028 Analyze faunal samples modern springs

R. Forester reports that samples collected in July are processed, and that the work is on schedule.

3GQH004 Study/analyze results from wet and dry playas

Surficial samples were collected from 16 playa sites in Nevada and 8 playa sites in California during late October. The field party consisted of C. Faunt, F. D'Agnese, and E. Gutentag.

3GQH007 Vegetation mapping phase 1

F. D'Agnese conducted a preliminary evaluation of Landsat Thematic Mapper data for use in regional mapping of vegetation using existing site specific data sets. Evaluation is also being made to determine the exact cost of Landsat data if purchases must be made.

3GQH002 Vegetation distribution mapping Amargosa Desert not started

This activity is to be conducted by A. Turner, but the start was delayed because Dr. Turner's IPA has not yet been approved for FY92.

Quality Assurance

Planning and Operations

3GQH005 Conduct field trips modern discharge springs FY91

Preliminary evaluations have been conducted for collection trips with GSP personnel.

3GQH008 Collect faunal from past discharge sites FY92

Preliminary planning has been conducted in planning collection trips for the activity.

Work Performed but not in Direct Support of the Scheduled Tasks

E. Gutentag attended the Saturated Zone Integration Ground-Water Travel Time (GWTT) meeting in Tucson, Arizona, November 12-15. (32 hours)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH15CA Complete data report Kawich FY 85-90

Data from Stewart Creek weir and flume for WY 1987 to 1990 were worked up and station analysis written.

Monthly and annual summaries of the weather data were completed.

Worked on Radsol for the determination of solar radiation at the analog sites.

Solar radiation results as determined by the Bird model were sent to E. Maxwell at Solar Energy Research Institute, SERI, for review and recommendations.

This activity will be delayed because of an additional trip to the analog sites in November which was not planned. This disrupted the completion of the discharge data. This disruption will delay the initial draft of the data report by approximately one month.

3GQH16CA Complete data report Stewart FY 85-90

Monthly and annual summaries of the weather data were completed.

This activity will be delayed because of an additional trip to the analog sites in November which was not planned. This disrupted the completion of the discharge data. This disruption will delay the initial draft of the data report by approximately one month.

3GQH012C Collect/reduce hydro data from remote sites FY 92

Analog sites were visited and maintenance work completed, November 18-22.

Determined of precipitation for October.

Input weather data into ADAPS for Veg Spring Stewart base, Kawich Peak and Kawich base.

Input flume and weir data into ADAPS.

3GQH026C Reduce ET data

Leaves collected from the field session were dried, prepared for weighing, and statistical methods development started to determine the relation between leaf weight and leaf area.

3GQH13CA Conduct chloride leaching test FY 92

Contact was made with B. Arbogast and B. Adrian GD, Geochemistry about crushing samples for leaching.

Collected tuff samples from Kawich and Stewart.

Contacts have been made to secure analytical services but arrangements are not complete.

This activity has not actually stated but preliminary arrangements have been made to help be prepared for the actual start of the test. Hopefully, there will be a positive impact. The availability of analytical services is still giving problems. The present solution is to gain

access to HIP IC equipment and do the analysis ourselves. The HPs are not in place but work is in progress with the authors to get them finished.

3GQH21CA Development of HRU analog basins

This activity will not be started until after an Arc Info class in January. The class was postponed until January which was unknown at the time the PACs schedule was completed. This will impact the beginning of activity 3GQH14C possibly by as much as a month. The impact on the finishing date of 3GQH21CA can not be determined at this time.

Quality Assurance

3GQH15CA Complete data report Kawich FY 85-90

TDIF on Stewart flume and weir data prepared.

3GQH026C Reduce ET data

Scientific notebooks from summer ET work to LRC.

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

Technical review of HP-23 follow up. (2 hours)

Technical review of HP-200. (8 hours)

Provided C. Savard with potentiometer program. (1 hour)

Surveying non-essential property paper work. (3 hours)

Technical review of HP-43 and HP-44. (3 hours)

Reading assignment QMP-3.08. (1/2 hour)

SCP 8.3.1.5.2.1.4b Geochemistry of arid-zone infiltration OG3622E2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH006D Install long-term meteorological monitoring instrumentation

The sonic anemometers and their associated electronics have finally been accepted from the vendor, paving the way for final development and installation of the long-term meteorological monitoring equipment.

3GQH016D Selection and preliminary mapping of micro watersheds

This activity has not started due to scheduling conflicts. There is no significant impact.

3GQH012D Quarterly bulk precipitation collection

The October samples were collected on schedule and without incident.

3GQH003C Soil and moisture chemical sampling

This is periodic sampling and none was scheduled for October and November.

Quality Assurance

3GQH008D Prepare watershed monitoring scientific notebook plan

The problem with an insufficiently calibrated piece of apparatus at the calibration vendor for soil moisture samplers has been solved and the scientific notebook plan is apparently very near to being approved.

Planning and Operations

Work Performed but not in Direct Support of the Scheduled Tasks

A. Riggs led one full day of the post-GSA field trip "Hydrogeologic overview and field trip of the regional ground-water flow system in relation to Yucca Mountain, Nevada." (40 hours)

SCP 8.3.1.5.2.1.5 Studies of calcite and opaline silica vein deposits OG3622D2

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH813A Evaluate total carbonate system - Yucca Mountain area

K. Futa started Sm-Nd analyses of calcite fracture fillings from Yucca Mountain drill core samples to compare UZ and SZ calcite with the surface pedogenic calcite.

B. Marshall continued efforts to model the carbonate system at Yucca Mountain.

Efforts are underway to characterize the Sr isotopic compositions of the major mountain ranges composed of Paleozoic marine carbonated in the Yucca Mountain area. Current Sr work is focusing on Bare Mountain and the Striped Hills and indicates that the bedrock substrates contribute little to the formation of associated secondary calcretes.

3GQH814A Prepare reports - drill hole calcite silica

Papers entitled "The $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of epigenetic calcite within Yucca Mountain, Nevada: Paleohydrologic implication" by J. Whelan and J. Stuckless; "Strontium isotope characterization of ground-water flow systems in southern Nevada" by Z. Peterman, Stuckless, S. Mahan, E. Gutentag, and J. Downey; and "A model for the formation of pedogenic carbonate based on strontium isotope data from southwest Nevada" by B. Marshall and Mahan were presented at the annual meeting of the Geological Society of America in San Diego, October 21-14.

Manuscripts entitled "Strontium isotope geochemistry of calcite fracture fillings in deep core, Yucca Mountain, Nevada" by Z. Peterman and others; and "Paleohydrologic implications of the stable isotopic composition of secondary calcite within the Tertiary volcanic rocks of Yucca Mountain, Nevada" by J. Whelan and J. Stuckless were prepared for the proceedings volume of the 1992 AND meeting in Las Vegas.

3GQH809A Analyze samples trench 14 original exposure

Papers entitled "The $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of epigenetic calcite within Yucca Mountain, Nevada: Paleohydrologic implication" by J. Whelan and J. Stuckless; "Strontium isotope characterization of ground-water flow systems in southern Nevada" by Z. Peterman, Stuckless, S. Mahan, E. Gutentag, and J. Downey; "A model for the formation of pedogenic carbonate based on strontium isotope data from southwest Nevada" by B. Marshall and Mahan; "Lead isotopes in the carbonate-silica veins of trench 14, Yucca Mountain, Nevada" by R. Zartman and L. Kwak; and "Isotopic evidence for a per descensum origin for hydrogenic veins in faults near Yucca Mountain, Nevada" by J. Stuckless, Z. Peterman, J.

Whelan, and D. Muhs were presented at the annual meeting of the Geological Society of America in San Diego, October 21-14.

3GQH803A Analyze isotopes/fossils - Solitario Canyon and Windy Wash
R. Forester performed micropaleontologic examinations of samples from the Crater Flat Spring Deposits.

3GQH815A Research sites for N-S speleothem transect
Time simply has not permitted research on possible speleothem localities for paleoclimate studies.

Quality Assurance

Planning and Operations

3GQH801A Hire and train geologists

A MOA has yet to be completed between Isotope Geology and YMP; this has resulted in delays in the start of work predicated on cooperation with IG scientists. Hiring of a geochemist to perform U-series dating and two lower level geologists to work in the micropaleontology and stable isotope laboratories has not yet taken place. This has pushed forward the expected finish dates for the following activities: 3GQH810A (Analyze samples - deepen trench 14), 3GQH803A (Analyze isotopes/fossils - Solitario Canyon and Windy Wash), 3GQH806A (Analyze isotopes/fossils - depths of known origin), 3GQH809A (Analyze samples trench 14 original exposure), and 3GQH813A (Evaluate total carbonate system - Yucca Mountain area).

Work Performed but not in Direct Support of the Scheduled Tasks

J. Whelan attended SOC meetings in October and November at the SMF.

J. Whelan prepared PACS for FY92 and FY93 and detailed budget for FY92.

All project members took GET refresher tests and passed.

Z. Peterman served as an expert witness at the hearing for DOE's application to the State of Nevada for increased production of J-13. Subsequent distortion and misrepresentation of his testimony prompted him to write a letter of protest to the State Engineer.

WBS 1.2.3.6.2.2.2 Future Regional Hydrology due to Climate Changes

Principal Investigator - J. Stuckless

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

Quality Assurance

Planning and Operations

3GFH010A Revise and submit study plan

Study plan revisions, as per reviewer's comments and suggestions, are currently being made. At this time, the activity is approximately 80% finished. An evaluation of the activity's objectives (SCP) have been made to ensure that these guidelines are met by the rationale and methodology present in the study plan; this is in response to reviewer's comments. Research is also being conducted for surface-water model and data set application and availability.

There is a short-term impact caused by additional time needed for employee training for D. Grasso (GET, Driver's Education, Computer Security courses, QA training, etc.); conference and job interviewing for GS-9 position; research regarding study plan comment resolution; and other YMP activities, such as PACS revisions and planning, and study plan revisions (Activity 8.3.1.5.2.1.1, Regional paleoflood evaluation).

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 84 hours were spent on the following:

Attended the First National Conference on Climate Change and Water Resources Management (Albuquerque, New Mexico, November 4-7, 1991) to ascertain the present state of knowledge regarding future climatic change, and to make contacts with other researchers involved in climatic change and/or surface water modeling.

Conducted search and interview recruitment sessions for surface-water modeler to fill the GS-9 position for this activity. We hope to get someone on staff by January or February 1992. Contacts made at the climatic change conference look very promising.

Revising and planning PACS for FY92/93.

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

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFH004C Analyze structural geology

C. Faunt completed GIS input of mapped faults at all scales (1:24,000 to 1:500,000). Faults are attributed to orientation (strike), type, and author.

C. Faunt input data on regional and local stress fields.

3GFH003C Conduct literature search for GIS (Future/Quaternary GW)

C. Faunt continued literature search and review including: Reheis (1990), Reheis and Noller (1990), Frizzel and Zoback (1987), Anderson and Ekren (1977), Stock and others (1985), Zoback and Zoback (1980), Warren and Smith (1985), Stewart and others (1968), Stewart (1971), Wright (1976), Thompson and Burke (1973), Zoback and Thompson (1978), Carr (1974, 1984, 1990), Hamilton (19xx), Scott (1990), Rogers et al. (1983, 1987), Wernicke and others (1988), Anna (1986), Kolm and Downey (in review).

F. D'Agnes continued literature search and review including: Evans and Thames (1981), Huete (1988), Huete and others (1985), Kurzius (1981), Lillesand and Kiefer (1979), Shantz and Piemeisel (1940), Smith and others (1990a, 1990b), Tueller (1987), Meinzer (1927),

Robinson (1958), Burbey and Prudic (1991).

3GFH023C Develop recharge/discharge estimates

F. D'Agnese and K. Kolm developed preliminary methodology for regional recharge/discharge modeling. This included methods for locating areas of average annual, monthly, and daily recharge/discharge. Also, temporal and spatial problems that would need to be resolved with GIS methods were discussed.

F. D'Agnese conducted preliminary evaluation of Landsat Thematic Mapper data for use in regional mapping of vegetation using existing site specific data sets. Evaluation included determination of data, time and economic requirements for regional mapping. Vegetation mapping layer will be used for calculation of recharge/discharge estimates in regional model. This task is also conducted as part of Past Discharge Study.

3GFH028C Gather input data to GIS

F. D'Agnese acquired and traced regional cross-sections to be used for regional 3-D hydrogeologic framework.

F. D'Agnese acquired and converted eighteen (18) 1:100,000 scale Digital Line Graph data files of surface hydrology for regional area.

C. Faunt and F. D'Agnese converted most of the GIS data base from PRIME Arc/Info to SUN Arc/Info. This was result of discontinued license for Arc on the PRIME.

C. Faunt assisted D. Burkhardt in data conversion of large-scale surficial geology maps of Amargosa Region.

F. D'Agnese arranged for free-flow of Arc AML (Arc Macro Language) files from USGS GIS Lab in Building 53 to YMP computers. Also, D'Agnese was trained in AML use and code development from GIS support staff.

D. Williams (USGS unpaid volunteer) instructed F. D'Agnese and C. Faunt in use of Arcplot (Arc/Info Plotting software) and ArcTIN (Arc/Info Triangulation software).

Quality Assurance

Planning and Operations

3GFH004C Analyze structural geology

C. Faunt and K. Kolm reviewed progress on structural analysis methods and discussed the direction of further work.

3GFH028C Gather input data to GIS

F. D'Agnese sent correspondence to State Soil Conservation Service of California and Nevada requesting STATSGO (State Digital Soil Survey Data at 1:250,000). Response from state agencies received. Nevada will accommodate request for regional areas ASAP. California will accommodate request as early as January 1992 because they have encountered software/hardware problems with size of data file requested.

3GFH025C Establish data documentation procedure for GIS

A. Turner, C. Faunt, F. D'Agnese began developing structure for data documentation procedures. Issues included tracking source of data, published date, author, scale, etc.

Work Performed but not in Direct Support of the Scheduled Tasks

C. Faunt and F. D'Agnese conducted field sampling (50+ hrs/person) of wet and dry playas with E. Gutentag for Past Discharge from October 16-27.

C. Faunt, K. Kolm, and E. Gutentag co-authored "Characterizing the Distribution of Pedogenic Carbonates Using a GIS and a Carbonate Accumulation Program, Amargosa Desert, Nevada". Faunt presented paper at GSA Annual Meeting, San Diego, Oct. 20 - 24. F. D'Agnese and Faunt attended GSA Annual Meeting as part of Past Discharge Wet/Dry Playa sampling trip. (32 hrs/person)

C. Faunt attended Saturated Zone Integration Committee Meeting, in Tucson, Arizona, from November 12-15. Faunt also presented paper (prepared by Faunt, K. Kolm, J. Downey, E. Gutentag) on "Framework-based, Three-Dimensional, Conceptual and Numerical Modeling Efforts of Future/Quaternary Regional Ground-water System of Southern Nevada - Death Valley Region". Faunt also conducted sampling of selected playas in Sonoran Desert with Gutentag for Past Discharge. (40+ hrs)

C. Faunt and F. D'Agnese attended special training session with B. Wales, Applications Specialist of Intergraph Corp., Houston. The meeting addressed methods for constructing 3-D hydrogeologic model from interpretive cross-sections in three-dimensional space. (Since no other Intergraph user has developed a 3-D model of this kind, Wales has decided to dedicate time to developing methods specifically for YMP Future/Quaternary Regional Hydrology activities and plans to meet on a regular basis until completion of model. Next meeting was scheduled for early January 1992.) (16 hrs/person)

J. Downey completed paper co-authored with H. Classen on the applications of SNODIF simulation model. (40 hrs)

1.2.5 REGULATORY AND INSTITUTIONAL

OBJECTIVE

To support the Department of Energy (DOE)/HQ in the development of the site-related aspects of compliance with Nuclear Regulatory commission agreements, requirements, and policies, environmental and permitting requirements, and related DOE orders, and the development of site-related regulatory documentation; to plan and conduct environmental field investigations and transportation studies related to environmental compliance, permitting and repository design; to plan and conduct socioeconomics studies to assess the regional socioeconomic action studies; to coordinate Project activities with the community and state and local governments; and to plan and implement a public communication plan.

WBS 1.2.5.2 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 1.2.5.2.5 Study Plan Coordination

Principal Investigator - L. Hayes

OBJECTIVE

To coordinate the preparation review and revision of SCP Study Plans.

ACTIVITIES AND ACCOMPLISHMENTS

The Study Plan for Stratigraphic Studies, "Characterization of the Vertical and Lateral Distribution of Stratigraphic Units within the Site Area", Study 8.3.1.4.2.1, was revised. All review comments were resolved, and the completed SP was submitted to DOE. Final comment resolution meeting is currently scheduled for December 1991.

S. Keller transmitted the October HIP study-plan status report to W. Causseaux October 31.

Study Plan 8.3.1.2.1.4 (Regional hydrologic system synthesis and modeling) - S. Keller completed the revisions necessary to close out the Project Office verification of the study plan, and the document is now in the Project Office approval process.

Study Plan 8.3.1.2.2.8 (Fluid flow in unsaturated, fractured rock) - E. Kwicklis and S. Keller finalized the author-reviewer concurrences on the author responses to DOE review comments. The study plan was transmitted to T. Brady for HIP review on October 28, and will be transmitted to the Project Office in early November.

Study Plan 8.3.1.2.3.2 (Saturated-zone hydrochemistry) - B. Steinkampf and S. Keller completed the revisions required from the May 21-22 comment resolution workshop. The document will be transmitted to T. Brady for HIP review in early November, and then transmitted to the Project Office.

Study Plan 8.3.1.2.3.3 (Site saturated-zone synthesis and modeling) - S. Keller assisted E. Ervin with author responses to DOE review comments.

Study Plan 8.3.1.5.1.2 (Paleoclimate Study) - F. Singer revised figures and tables for Sections 1.2 and 4 of the study plan in response to YMP comment review.

Study Plan 8.3.1.2.2.8 (Fluid flow in unsaturated, fractured rock) - E. Kwicklis and S. Keller finalized the document and its comment resolution form package in response to HIP review by T. Brady. On November 26, the study plan was produced at SAIC and transmitted with the CRF package from USGS-HIP to the Project Office for verification and approval.

Study Plan 8.3.1.2.3.2 (Saturated-zone hydrochemistry) - W. Steinkampf and S. Keller finalized the document and its CRF package in response to HIP review by T. Brady. On November 27, the study plan was produced at SAIC and transmitted with the comment resolution form package from USGS-HIP to the Project Office for verification and approval.

Study Plan 8.3.1.4.2.1 (Vertical and lateral distribution of stratigraphic units in the site area) - F. Singer revised text, figures and tables for Sections 1.2, 4 and 5 of the study plan in response to YMP/OCRWM review comments.

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

M. Chornack completed and submitted input to the six-month, SCP Progress Report for SCP 8.3.1.2.2.4.1.

J. Czarnecki finalized the Technical Status Report for the period of April-September, 1991.

The TSR was prepared for SCP Activity 8.3.1.2.3.1.2, Site Potentiometric-Level Evaluations.

The semi-annual progress report for SCP Activity 8.3.1.5.2.1.4a, Analog Recharge Sites, was prepared.

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 - J. Gibson

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

3GWR001 Groundwater levels/springflow monitoring

Water level measurements were made at 13 monitoring sites during the month of November. All data collected were reviewed and entered into the USGS project data base.

3GWR005 Groundwater monitoring quarterly report, first quarter FY92

Continued to review and compile historic water level and springflow data to be included into the project data base.

3GWR010 Aquifer pump test JF-3

Acquired and began initial tests of instrumentations needed to collect continual water level data for wells associated with the pump test of proposed well JF-3.

Quality Assurance

3GWR001 Groundwater levels/springflow monitoring

A final review of the draft for technical procedure HP-225, Methods used to Collect and Analyze Ground-Water and Surface-Water Samples, was made by the project staff with only a few minor corrections required. The procedure was returned to the QA office for final

typing.

Project staff participated in various QA training assignments as directed by the QA office.

Planning and Operations

3GWR009 Locate and design well JF-3

Consulted with DOE/YMPO contractors on the plans and specifications as to the location, objectives, and development of the proposed monitoring well, JF-3.

3GWR005 Groundwater monitoring quarterly report, first quarter FY92

Prepared a draft outline for the first quarter data report.

Consulted with DOE on a draft memo for the National Park Service describing the scheduling and contents of planned quarterly data reports summarizing water levels and springflow measurements associated with the Water Resources monitoring activity.

3GWR010 Aquifer pump test JF-3

Prepared plans for instrumentation, pumping strategies, water level monitoring, and water quality sample collection for the proposed monitoring well JF-3 and NTS production wells J-12 and J-13.

Work Performed but not in Direct Support of the Scheduled Tasks

Review and evaluation of transcripts from the State water rights permit hearings in September.

1.2.9 PROJECT MANAGEMENT

OBJECTIVE

To provide overall management of the Yucca Mountain Project including: project control, quality assurance, technical integration, and interaction with other OCRWM Program demands on Project management activities.

WBS 1.2.9.1 Management and Integration

OBJECTIVE

To provide overall management of the Yucca Mountain Project including: technical integration and interaction with other OCRWM Program elements.

WBS 1.2.9.1.4 Records Management

Principal Investigator - L. Hayes

OBJECTIVE

To provide a Yucca Mountain Project Records Management System that will meet the requirements of: DOE-NNWSI, Quality Assurance Plan, DOE-NNWSI/88-9; DOE-OCRWM Records Management Policies and Requirements, DOE/RW-0194; and the Licensing Support System (LSS); and to establish and operate all local records centers.

ACTIVITIES AND ACCOMPLISHMENTS

The following deficiency documents relative to the records management program were addressed:

CAR-YM-91-52

ICN No. 6 was issued 10/11/91, closing all actions for this finding.

AFR-USGS-9013-08	An amended response was prepared completing this finding.
AFR-USGS-9010-07	A supplemental response was prepared completing this finding.
AFR-USGS-9010-08	An amended response was prepared completing this finding.
USGS-CAR-91-08	USGS LRC continues to hold documents as a part of USGS-CAR-91-08 until resolution of this CAR-YM-91-065 by the Central Records Facility (CRF).
CRF CAR-YM-91-065	A guidance letter from C. Gertz will be incorporated into the next revision of QMP-17.01.

QMP-17.01, R5, YMP-USGS Records Management, has been through review and comment resolution, and is ready for signatures. However, modifications were issued to QMP-17.01, R4 as well as QMP-17.03, R0 to expedite the closure of audit findings as well as to ensure that QMP-17.01, R5 will be complete when it is issued. Issues yet to be resolved are (1) how best to implement the requirements of receipt control, and (2) completeness and legibility issues in the DOE guidance letter. QMP-17.01, R5 will be re-evaluated before issuance.

The LRC received 354 QA "stand-alone" documents and 16 packages. No new manuscript packages were received. Two raw data segments were submitted to the LRC. One is for GD report OFR 90-474 by L.A. Anderson, the other is for an LBL report which is, by contract, processed through HIP. Neither report has been published yet.

Sixteen packages containing 2,622 pages of QMP-related documents were transmitted to the Central Records Facility (CRF). There were four transmittals to the CRF containing 11 manuscript packages with a total of 1,314 pages. Three packages of Cited References were sent to the CRF containing 25 references and 1,357 pages.

File maintenance required 25 hours, system testing 19 hours, and restoration and verification of back-up took 8 hours of time. Computer backup involved 13 hours and research and correction of discrepancies required 16 hours. Quality Verification Check of documents required 23 hours, document search and pulling of documents totaled 54 hours, and document clean-up 52 hours. Nine hours were spent on the RIS, 6 hours on NCR packages and 2 hours on Procurement. Forty-eight devolocorder tapes were picked up from the Earthquake Center and sent to Security Archives.

The 10/15-18/91 DOE audit of several QA criteria required the attention of several of the LRC personnel, as much of the audit activity is centered in the LRC. T. Brainard was given 26 hours of YMP-USGS training.

A meeting was held to determine the status of corrections and enhancements to the records management software. Formal testing has been completed to compare the performance of the file server at the LRC and the file server at HIP in Building 53 in providing file access for the Records Database System.

Interim Change Notice (ICN) - 06 to the YMP-USGS Quality Assurance Program Plan was distributed.

The following approved Quality Management Procedures (QMP), QMP Modifications, and technical procedure were distributed:

QMP-1.01, R4	Organization Procedure
QMP-5.03, R7	Development and Maintenance of Quality Management Procedures
QMP-5.04, R4	Preparation and Control of YMP-USGS Quality Management Procedures

OMP-2.01,R2-M1	Management Assessment of YMP-USGS Quality Assurance Program
OMP-2.01,R2-M2	Management Assessment of YMP-USGS Quality Assurance Program
OMP-2.02,R5-M1	USGS Personnel Qualification
OMP-2.07,R1-M3	YMP-USGS Personnel Qualification
OMP-3.04,R3-M2	Technical Review, Approval, and Distribution of YMP-USGS Publications
OMP-3.05,R2-M1	Work Request for NTS Contractor Services (Criteria Letter)
OMP-3.07,R3-M2	YMP-USGS Review Procedure
OMP-3.10,R2-M1	Verification of Scientific Investigations
OMP-3.11,R1-M1	Peer Review
OMP-3.13,R1-M1	Design Input
OMP-4.01,R3-M3	Procurement Document Control
OMP-5.01,R4-M1	Preparation of Technical Procedures
OMP-5.02,R3-M1	Preparation and Control of Drawings
OMP-5.05,R2-M1	Scientific Notebook System
OMP-7.01,R4-M3	Control of Purchased Items and Services
OMP-15.01,R4-M3	Control of Nonconforming Items
OMP-18.01,R6-M2	Audits
OMP-18.02,R2-M1	Surveillances
HP-209, R0	Method for Preparing Tracers for Addition to a Water Supply System

Numerous routine document control functions were performed including issuing procedures to new copy holders, distributing replacement documents, sending out follow-up DTNs, decontrolling participants, and transmitting six completed DTN record packages to the YMP-USGS Local Records Center. There are currently no overdue DTNs.

A controlled copy of the YMP-USBR QA Manual was issued to M. Fahy, USBR; R. Scavuzzo, USBR, received controlled copies of the 24 newly approved USBR technical procedures.

The YMP-USGS Records Coordinator (L. Watt) attended Initial Instructor Training for Subject Matter Experts, Parts 1 and 2, in anticipation of commencing the next series of Records Management training.

Supplemental comments requested and provided for AFR-USGS-9010-07. Final actions were accepted for AFR-USGS-9020-08 and AFR-USGS-9013-08. Actions for USGS-CAR-91-08 will be complete upon issuance of QMP-17.01, R5. Information regarding records legibility and completeness is now incorporated into QMP-17.01, R5; therefore, CAR-YM-91-065 is expected to be closed in November.

Training for the revised QMP-17.01 (Rev. 5) has been postponed until January. Issuance of the procedure is anticipated to have a January 31, 1992 effective date.

Acceptance criteria for records into the CRF has stabilized. Procedures for handling details are now more uniform, without frequent changes/reversals in how specific corrections should be handled.

Barbara Hersh will begin handling the developocorder film activities in December, as this is a data activity and not a records activity.

All requested actions concerning identifying and segregating microfilm and hardcopy that contain

privileged information for Privacy Act System 80 records were researched and answered.

The Local Records Center received 331 QA "stand-alone" documents and 22 new packages. A total of 471 documents were processed, 71 packages verified and 34 packages were issued "fix-its." Two Geologic Studies Program (GSP) publication packages were received and 51 rolls of developocorder film were picked up from the Earthquake Center.

Thirteen packages, containing 1,889 pages of Quality Management Procedure OMP-related records were transmitted to the Central Records Facility (CRF). There were two submittals of publications packages containing 510 pages and two submittals of Cited References with a total of 237 pages.

Interim Change Notice (ICN) - 07 to the YMP-USGS Quality Assurance Program Plan, and OMP-8.03, R4, Control and Transmittal of Technical Information to the Project Technical Database, were distributed.

The following approved modifications to QMPs were distributed:

OMP-2.08,R1-M1	Non-Federal Contractor Personnel Qualification
OMP-2.08,R1-M2	Non-Federal Contractor Personnel Qualification
OMP-4.01,R3-M4	Procurement Document Control
OMP-17.01,R4-M6	YMP-USGS Records Management
OMP-17.03,R0-M2	YMP-USGS Local Records Center

The following approved technical procedures were issued:

HP-23, R2	Collection and Field Analysis of Groundwater Samples from Saturated Zone
HP-45, R2	Method of Installation, Operation, and Examination of a Recording Streamflow Gage Using the Bubble-Gage STACOM Manometer System
HP-116, R1	Method to Install, Operate, and Examine a Recording-Streamflow Gage that Uses a Stilling-Well System with a Continuous Graphic Recorder
HP-121,R0	Installing and Retrieving Information from a Setra Pressure Transducer
HP-230,R0	Determination of Water Potential Using the Decagon SC10-A Thermocouple Psychrometer

Numerous routine document control functions were performed including issuing procedures to new copy holders, distributing replacement documents, transferring controlled documents to new copy holders, sending out follow-up DTNs, and transmitting five completed DTN record packages, five approved YMP-USGS technical procedure records packages, and one approved YMP-USBR technical procedure record package to the YMP-USGS Local Records Center.

WBS 1.2.9.1.5 Training

Principal Investigator - L. Hayes

ACTIVITIES AND ACCOMPLISHMENTS

Individual reading assignments were distributed per management's request. Participants requiring unescorted access to Yucca Mountain were scheduled for DOE's General Employee Training (GET). The Training Coordinator proctored GET Refresher Training exams for Denver-area participants. YMP-USGS orientation was updated to reflect organizational changes. Orientation classroom instruction and videotape assignments were provided. Arrangements were made for a T&MSS instructor to present Initial Instructor Training, Parts 1 and 2, in Denver on November 13 and 14.

S. Boucher (Foothills) was provided assistance in preparing to instruct HIP personnel on completing TDIF forms. A. Handy (USGS) and T. Mendez-Vigo (SAIC) were assisted in preparations to present orientation to personnel in San Francisco, Menlo Park, and Flagstaff.

Reading assignments were issued for the following procedures:

HP-209,R0	Method of Preparing Tracers for Addition to a Water Supply System
AP-5.1Q,R2	Control and Transfer of Technical Data on the Yucca Mountain Site Characterization Project
QAPP-01, R5, ICN-6	USGS Quality Assurance Program Plan, ICN-6
HP-229, R0	Determination of Water Content and Physical Properties for Laboratory Rock Samples
HP-230, R0	Determination of Water Potential Using the Decagon SC10-A Thermocouple Psychrometer
QMP-2.08,R1-M2	Non-Federal Contractor Personnel Qualification
QMP-4.01,R3-M4	Procurement Document Control
QMP-8.03, R4	Control and Transmittal of Technical Information to the Project Technical Database
QMP-17.01,R4-M6	YMP-USGS Records Management
QMP-17.03,R0-M2	YMP-USGS Local Records Center
YMP-USGS-QAPP-01, R5, ICN-7	Quality Assurance Program Plan

A letter was distributed to all active YMP-USGS personnel regarding changes resulting from the October managerial reorganization. The letter and accompanying highlights sufficed for YMP-USGS instruction purposes; however, reading assignments were distributed for the following:

QMP-1.01, R4	Organization Procedure
QMP-5.03, R7	Development and Maintenance of Quality Management Procedures
QMP-5.04, R4	Preparation and Control of the YMP-USGS Quality Assurance Program Plan
QMP-2.01,R2-M1 & M2	Management Assessment of YMP-USGS Quality Assurance Program
QMP-3.05,R2-M1	Work Request for NTS Contractor Services (Criteria Letter)
QMP-5.01,R4-M1	Preparation of Technical Procedures
QMP-5.04,R3-M1	Preparation and Control of Drawings

Planning for instruction to QMP-17.01, R5 started. A letter was distributed to management requesting reading and classroom assignments for revision 5.

The Training Coordinator met with G. Abend to provide QA indoctrination and to discuss training issues for A. Flint's group at the HRF.

As a follow-up to a commitment made at the September DOE Training Representatives Meeting, copies of the YMP-USGS Training Database and QUAD programs, source codes, and user's manuals were distributed to TRW, LANL, and LLNL.

Seven training program records packages were prepared and submitted to the Local Records Center.

Information regarding reading assignment completion status was provided to the TPO QA Advisor.

Individual reading assignments were distributed. Participants requiring unescorted access to Yucca

Mountain were scheduled for DOE's General Employee Training (GET) and the Training Coordinator proctored the Refresher Training exams for Denver-area participants. Orientation classroom instruction was provided to participants in Denver, San Francisco, Menlo Park, and Flagstaff. A T&MSS instructor presented Initial Instructor Training for Subject Matter Experts, Parts 1 and 2, in Denver on November 13 and 14.

Review comments were prepared for the DOE/T&MSS YMP Performance-Based Training Specifications and User's Manual.

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 SAIC-Golden actual cost distributions, estimated cost distributions, FTE reports, and the USGS cost reports for September and October were compiled. The September actual costs and schedule status for the USGS were sent to Las Vegas for input into the PACS system. The compilation of the USGS monthly status report for September was completed and the report was edited and submitted to DOE.

The Project Worker Data Forms were submitted for the USGS for the third quarter of 1991 with projections for the fourth quarter of 1991 and the first quarter of 1992.

PACS descriptions of work for FY92 and FY93 summary accounts were compiled.

The status and updating of all USGS schedules, was completed on time and sent to Las Vegas for input into the APECS system.

An effort has been directed to get the schedules changed and new logic plotted for all USGS work for FY-92 and FY-93. This has required a large amount of overtime due to the deadlines that were imposed. This effort is well underway and on schedule for completion within the given time frame.

PACS descriptions of work for FY92 and FY93 summary accounts were compiled and the work scopes for the Hydrology Program and the management accounts were sent to Las Vegas.

This month was devoted entirely to the completion of redoing all schedules for the Saturated Zone, Unsaturated Zone and the Geologic Division for PACs input to the APECS system in Las Vegas.

This consisted of a total of 109 separate schedules and a network containing approximately 3,000 activities. This was a very difficult task to accomplish within the given time frame, requiring a very structured planning schedule and a large amount of overtime. This was accomplished with all schedules being approved by the PIs involved with the individual study plan or program and all data submitted to Las Vegas on time, with the balance of this month being used for minor cleanup and housekeeping of the files.

L. Shaffron used a dBase III+ procedure to reduce data in support of the Amargosa boreholes task (Regional saturated-zone study) for S. Keller.

S. Barnes furnished actual FY91 travel costs at the third level WBS to the USGS.

USBR submitted Information Resources Long Range Plan data consisting of FY91 expenditures and FY92-FY98 plans.

WBS 1.2.9.3 Quality Assurance

OBJECTIVE

To establish and implement a Yucca Mountain quality assurance program.

WBS 1.2.9.3.1 Quality Assurance Program Development

Principal Investigator - T. Chaney

OBJECTIVE

To establish and maintain the QA program descriptions.

ACTIVITIES AND ACCOMPLISHMENTS

The following Quality Management Procedures and QMP Modifications were approved:

QMP-1.01, R4	Organization Procedure
QMP-5.03, R7	Development and Maintenance of Quality Management Procedures
QMP-5.04, R4	Preparation and Control of the YMP-USGS Quality Assurance Program Plan
QMP-2.01,R2-M2	Management Assessment of YMP-USGS Quality Assurance Program
QMP-2.02,R5-M1	USGS Personnel Qualification
QMP-2.07,R1-M3	YMP-USGS Instruction
QMP-3.04,R3-42	Technical Review, Approval, and Distribution of YMP-USGS Publications
QMP-3.05,R2-M1	Work Request for NTS Contractor Services
QMP-3.07,R3-M2	YMP-USGS Review Procedure
QMP-3.10,R2-M1	Verification of Scientific Investigations
QMP-3.11,R1-M1	Peer Review
QMP-3.13,R1-M1	Design Input
QMP-4.01,R3-M3	Procurement Document Control
QMP-5.01,R4-M1	Preparation of Technical Procedures
QMP-5.02,R3-M1	Preparation and Control of Drawings
QMP-5.05,R2-M1	Scientific Notebook System
QMP-7.01,R4-M3	Control of Purchased Items and Services
QMP-15.01,R4-M3	Control of Nonconforming Items
QMP-18.01,R6-M2	Audits
QMP-18.02,R2-M1	Surveillances
QMP-8.03, R4,	Control and Transmittal of Technical Information to the Project Technical Database
QMP-2.08,R1-M1	Non-Federal Contractor Personnel Qualification
QMP-2.08,R1-M2	Non-Federal Contractor Personnel Qualification
QMP-4.01,R3-M4	Procurement Document Control
QMP-17.01,R4-M6	YMP-USGS Records Management
QMP-17.03,R0-M2	YMP-USGS Local Records Center

A draft of QMP-4.02, R3 was finalized. This revision addresses management agreements not

covered by AP-5.19Q; that is, the OMP will address intra-agency suppliers as well as other non-YMP-Participants who will provide support for YMP-USGS work.

A review of the draft OCRWM QARD was conducted and extensive review comments were prepared for transmittal to the YMP QA Office.

OMP-4.02, R3, Control of Intra-USGS Acquisitions, has been distributed for approval signatures.

The following OMPs were distributed for Division Review:

OMP-3.05, R3 Request to Initiate Job Packages and Work Authorization (Criteria Letter)
OMP-3.15, R0 Application of Graded Quality Assurance
OMP-5.05, R3 Scientific Notebook System

The following draft OMPs were changed as requested and returned to their respective authors:

OMP-3.03, R3 Software Quality Assurance
OMP-3.04, R4 Technical Review, Approval, and Distribution of YMP-USGS Publications
OMP-7.01, R5 Control of Purchased Items and Services
OMP-7.04, R0 Vendor Evaluation
OMP-16.03, R3 Trend Analysis
OMP-17.01, R5 YMP-USGS Records Management

Management meetings were held to reach consensus on the final draft for OMP-3.03, R3. One outstanding issue concerning distinguishing verification and validation requirements for software will require discussion with DOE/YMPO QA and the Software Advisory Group before this procedure is approved.

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

Participated in the YMPO Audit of the YMP-USGS criteria 1, 2, 15, 16, and 18.

Amended responses to the USBR's Audit Finding Reports from Audit USGS-91-15 were evaluated and accepted.

The National Water Quality Laboratory's responses to Audit Finding Reports from Audit USGS-91-18 were evaluated and amended responses were requested.

The audit report for Audit 91-21 on two GD activities was written and issued. It included one Corrective Action Report (CAR-91-11).

Several extension requests, amended responses, and supplemental responses to Audit Finding Reports were reviewed and accepted.

Responses and recommendations for closure of Audit USGS-91-09, Observation 1, Radiation and Energy Balance Systems (REBS) and for USGS-AFR-9114-01 were recommended.

Audit Report USGS-91-23 for EG&G Geometrics, Inc. was submitted, recommending their retention on the Approved Vendors List (AVL).

Following review of the USBR response for AFR 9007-01R1, it was concluded that an amended response will be needed to clarify the root cause and preventive actions for the finding.

Corrective Action Report USGS-CAR-91-11 concerning scoping work performed without the use of any planning documents was issued to the TPO. This CAR was generated from Audit USGS-91-21.

Corrective Action Report USGS-CAR-92-03 concerning a recurring deficiency related to the lack of management agreements was issued to HIP.

Numerous Nonconformance Report and Audit Finding Report corrective actions were verified and subsequently closed. These included NCRs -91-32, -35, -40, -41, -42, AFRs -9101-04, 9105-03, 9105-04, 9110-04, and 9112-03.

The AVL has been reformatted to better meet user's needs.

Vendor Evaluation Report USGS-92-E01, Sverdrup Technology Corp., was submitted, recommending their retention on the AVL.

An interim report on the evaluation of the capabilities of Scott Specialty Gases, Inc. to provide Freon, gases was submitted.

Provided information to complete/update Nonconformance Report Log in preparation for the DOE Audit. Participated in the audit as point of contact for QMP-15.01 and part of QMP-18.01.

Performed reviews, assembled and prepared transmittal document record packages concerning approximately 45 NCRs.

Investigative Reviews for verification of completed corrective actions were submitted for the closing of NCRs -91-27, -32, and -35.

Input was prepared for use in the Trending Report of Root Cause statements for approximately 25 deficiency documents.

Nine Nonconformance Report and Audit Finding Report corrective actions were verified and subsequently closed. These included NCR-91-29, AFR-9013-08, 9101-04, 9105-04, 9110-08, 9110-10, 9112-03, 9112-04, and 9119-01.

Several extension requests, amended responses, and supplemental responses to Audit Finding Reports were reviewed and accepted. These included Audit Findings from Audit 90-13, 91-10, 91-15, 91-18, and 91-19.

Reviews were performed, packages assembled, and necessary documents prepared for transmittal of 46 previously closed NCR record packages.

Met-One Instruments, Inc. was contacted regarding the status of the delinquent response to Audit Finding AFR-9119-01. The deficiency and a proposed response were discussed with the vendor, who subsequently submitted the response to the QA Office, resulting in closure of the Met-One Instruments audit findings this month.

Investigations and discussions regarding the resolution of CAR-91-11 on scoping activities were conducted. These investigations included the review and study of the QAPP, QARD, QAPD, and various implementing procedures.

QMPs -18.01 and -18.02 were reviewed and considered for subsequent revision. As part of the review to determine what changes were necessary to these two procedures, a comparison of QMPs -2.05, -18.01, and -18.02 to the "Draft" of DOE/RW QARD, Rev. 0 was begun. Subsequently, a draft revision of each QMP was submitted to the QA Office.

An amended response to Audit Finding Report AFR-USGS-9007-01, R1 was requested from the USBR. Subsequently, the Lead Auditor had a meeting to clarify the amended response requirements for the Audit Finding. This AFR remains open.

Surveillance USGS-92-S01 of the USBR soils work was researched and planned. A surveillance plan was subsequently written and distributed.

The quarterly Approved Vendor List (AVL) was updated and issued. It reflects the annual requalification of Geochron Laboratories Division of Kruger Enterprises; USGS Stable Isotope Laboratory; Air Products and Chemicals, Inc.; Druck, Inc.; LaCoste and Romberg Gravity Meters, Inc.; National Geodetic Survey (NGS); Teledyne Hastings-Raydist; Sverdrup Technology, Corp.; and EG&G Geometrics. The AVL has been reformatted to better meet the user's needs.

Five vendor evaluations were either completed or were started during the month, including: (1) Vendor Evaluation USGS-92-E01, of Sverdrup Technology, Corp. was performed to determine if the vendor's approved scope of services could be expanded to include calibration services for optical levels and theodolites. The evaluation resulted in the inclusion of these services for the vendor on the AVL. (2) Vendor Evaluation USGS-92-E02, National Geodetic Survey, was performed and a report was submitted recommending retention on the AVL. (3) Vendor Evaluation USGS-92-E03, Intertyme Metrology Laboratory, Inc. is in progress to determine if YMP-USGS-approved calibration services can be expanded to include balances. (4) The Vendor Evaluation of Wave-Tek Datron, Inc. is in progress. (5) A Vendor Evaluation is in progress to determine if the YMP-USGS-approved services provided by Scott Specialty Gases, Inc. can be expanded to include Freon, gases. This includes a coordination effort with DuPont Chemicals and the National Institute of Standards and Technology (NIST) to determine if NIST traceability for Freon, gases can be established.

WBS 1.2.9.3.3 Quality Assurance - Quality Engineering

Principal Investigator - L. Hayes

OBJECTIVE

To provide quality engineering support to the project through reviews of documentation and assistance with QA training.

ACTIVITIES AND ACCOMPLISHMENTS

The Open Items Committee met to review the status of open items. The following open items received attention during the month:

External Item(s): DOE CARs YM-91-50 (technical reviewer qualifications), YM-91-51 (software QA), YM-91-52 (LRC safes), YM-91-77 (software QA), and DOE SDR-018 (NIST traceability for calibration standards).

Internal Item(s): AUDITS: AFR 9002-05 (calibration), AFR 9007-01 R1 (maintenance of USBR QA Program), AFR 9013-08 (data package submittals), AFR 9110-02 (qualification records), AFR 9110-07 (record rejections), and AFR 9110-08 (30-day submittals); CAR 90-01 (interface controls), CAR 90-04 (timeliness of corrective actions), CAR 91-03 (unapproved vendors), CAR 91-06 (management assessments), CAR 91-07 (misinterpretation of QMP requirements), CAR 91-08 (transmittals for individual QA records), CAR 91-09 (repetitive incidences of misinterpretation of software QA requirements), CAR 91-10 (repetitive incidences of misinterpretation of exemptions from procurement QA requirements), CAR 91-11 (scoping activities without documented authorization), CAR 92-01 (organizational changes not reflected in QA program documents); NCR 90-37 (calibration requirements), NCR 91-12 and -13 (software QA), NCR 91-14 (qualification records with Study Plans), NCR 91-31 (calibration), and NCR 92-01 (document review forms). Other miscellaneous action items included follow-up of instruction assignments, resolving overdue document control notices, coordination of audits/surveillances, discussions regarding management agreements, management assessment planning, trending, and coordination of actions resulting from QA evaluations or verifications of vendors.

Several planning meetings were attended with the TPO, QA, GSP, and HIP to discuss technical activities - progress, future plans, criteria letters, job packages, test planning packages, study plans, technical procedures, grading, transitioned GD activities, USBR, etc.

Approximately 98 software items have been received, reviewed, and/or processed by the SCM Librarian in accordance with QMP-3.14. This includes updating the Configuration Status Log, the SCM Document Tracking database, and the Directory of Users. Technical Contacts have been notified upon the receipt of SQA Documentation and upon SCM Baselineing of Software Products. Preliminary design efforts have continued for a revision to SCM Tracking System.

An Agenda and Minutes were prepared and distributed for the CCC meeting held 10/10/91. A CCC Review Plan and Report was completed for each of the CCC Reviews conducted at those meetings.

Meetings were attended to provide specific input regarding the reviews of SQA Documentation, to complete a draft QAPP ICN including the SQAP incorporating the informal comments received, and to coordinate a response for USGS-CAR-91-09 regarding misinterpretation of QMP-3.03.

Amended responses were provided for USGS-NCR-91-12 and 91-13.

The members of the Open Items Committee provided periodic updates to the QA Office for the Open Items Report. The QA Advisor for the YMP-USGS TPO worked on the following Open Items during the month:

External Item(s): DOE/YMPO CARs YM-91-74 through YM-91-77 (Software QA).

Internal Item(s): AUDITS: AFR 9007-01 R1 (maintenance of USBR QA Program), AFR 9013-08 (data package submittals), AFR 9110-02 (qualification records), AFR 9110-07 (records rejections), and AFR 9110-08 (records submittals); CAR 90-01 (interface controls), CAR 90-04 (timeliness of corrective actions), CAR 91-03 (unapproved vendors), CAR 91-06 (management assessments), CAR 91-07 (misinterpretation of QMP requirements), CAR 91-08 (transmittals for individual QA records), CAR 91-09 (repetitive incidences of misinterpretation of software QA requirements), CAR 91-10 (repetitive incidences of misinterpretation of exemptions from procurement QA requirements), CAR 91-11 (scoping

activities without documented authorization); NCR 90-37 (calibration requirements), NCRs 91-12 and 91-13 (software QA), NCR 91-14 (qualification records with Study Plans), NCR 91-18 (data submittals), NCR 91-31 (calibration), NCR 91-39 (seismic group contracts), and NCR 92-02 (SGBSN management agreement). Other miscellaneous action items included follow-up of instruction assignments, resolving overdue document control notices, discussions regarding management agreements, trending, and vendor actions.

Several planning meetings were held to discuss the status and readiness of several technical activities. Topics included progress and schedule for activities, future plans, criteria letters, job packages, test planning packages, study plans, technical procedures, grading reports, transitioned Geologic Division activities, etc. As activities are ready to commence or as planning takes place, the technical personnel working with QA Implementation Specialists need to assure that the necessary prerequisites are complete or will be tracked and completed prior to work.

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

A new draft revision of QMP-16.03, Trend Analysis, was prepared and submitted for review. The September Open Items and Trend Analysis Report was written and issued. The Quarterly Status of Open Items Report was issued for the third quarter of 1991.

Work continues on a status list to report the needed actions associated with technical activities that transferred responsibilities for the activities from the GD to the Geologic Studies Program under the Water Resources Division, including any support activities requiring management agreements.

A draft revision of QMP-16.03, Trend Analysis, was submitted for review.

A meeting was held regarding revision of the Open Items database and to determine future plans for the Open Items Coordinator and the Open Items system. Ongoing research into the tracking and trending of deficiency documents resulted in a proposal to change the Open Items database and reports. Draft report formats and a database configuration were developed, discussed with the software programmer, and a software services request was subsequently processed. Completion is expected in about two months.

The October Open Items and Trend Analysis Report was issued.

The QA Advisor for the YMP-USGS TPO continues to work on a technical activities status log to list open action items associated with activities that transferred from the Geologic Division to the Geologic Studies Program under the Yucca Mountain Project Branch of the USGS Water Resources Division.