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**Civilian Radioactive Waste Management System
Management and Operating Contractor**

**FY 1995 ANNUAL TECHNICAL IMPLEMENTATION PLAN
FOR WBS 1.2.3 SITE INVESTIGATIONS
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**

**DRAFT FINAL
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1. INTRODUCTION

The Fiscal Year (FY) 1995 Technical Implementation Plan (TIP) for WBS 1.2.3 (Site Investigations) results from a program-wide planning process initiated in the second quarter of fiscal year 1994. That process re-cast the overall Program strategy, articulated new Program goals, and refined the milestones and deliverables for the Yucca Mountain Project (YMP) such that they supported the new goals. The resulting strategy is termed the Program Approach.

To document the Program Approach, a new long-range plan was developed for the YMP in late FY 1994. This plan covers the next five years and describes the higher-level activities, deliverables, and milestones required to achieve the goals of the Program Approach. Based on this 5-Year Plan, the Long-Range Plan for WBS 1.2.3 was also updated in late FY 1994 to be consistent with the Program Approach. The work activities identified in the FY 1995 TIP for WBS 1.2.3 were derived from this Long-Range Plan and, therefore, are consistent with the overall Program plans and goals.

Management of site investigations activities is the responsibility of the Assistant Manager for Scientific Programs (AMSP). This responsibility is administered by AMSP WBS managers and team leaders with support from the Management and Operating Contractor for implementation, coordination, integration, and management of scientific programs. Specific responsibilities for testing coordination are presented in the Surface-Based Testing Coordination Management Plan (SBTC) (YMP/92-27), ESF Testing Coordination Management Plan (in preparation) and the Site Characterization Management Plan (in preparation).

This FY 1995 TIP for WBS 1.2.3 is organized as follows:

- Section 2: Purpose and Scope of the Plan
- Section 3: Methodology for Activity Selection and Prioritization
- Section 4: Goals of the Site Investigations Activities for FY 1995
- Section 5: Description of FY 1995 Tests and Activities by Function
- Section 6: Schedule for FY 1995 SBT and ESF Activities, Milestones, and Deliverables
- Section 7: Long Range Plan and Discussion of Variance of FY 1995 Activities
- Section 8: Management and Coordination of Site Characterization Activities
- Section 9: Site Investigations Interface with Other YMP Elements

2. PURPOSE AND SCOPE OF THE PLAN

Purpose

This Fiscal Year (FY) 1995 Technical Implementation Plan (TIP) for Work Breakdown Structure (WBS) 1.2.3 is a management document. Its purpose is to:

- Define, in the context of the Program Approach and the Site Investigations Long Range Plan (LRP), the Yucca Mountain Project (YMP) objectives for site investigations in FY 1995;
- Identify specific activities to be conducted in FY 1995 to achieve those objectives;
- Identify Participants and budget allocations for each activity;
- Identify sequence and schedule requirements for activities; and
- Provide the baseline from which adjustments to priority, funding, and scheduling can be made as studies progress during the year.

The TIP also identifies interfaces with other YMP WBS elements such as Design, Performance Assessment, and Suitability and Licensing. In addition, external influences are recognized, such as the YMP's commitment to respond to inquiries from the Nuclear Regulatory Commission (NRC) and other interested parties.

Scope

This document provides information on the rationale and plan for FY 1995 surface-based and ESF testing activities to support the achievement of near- and longer-term Program and Project goals. The scope includes:

- Present the planned site investigations program for FY 1995;
- Describe the priorities, goals, milestones, and deliverables of the FY 1995 program;
- Provide an overview framework within which more detailed planning, integration, and coordination of the site investigations activities can proceed, and against which the progress of site investigations planning activities can be monitored;
- Provide a preliminary basis to anticipate FY 1996 activities, and a means for planning for those activities; and
- Provide a basis for measuring progress in achieving the goals of the Long-Range Plan for the YMP.

3. METHODOLOGY FOR ACTIVITY SELECTION AND PRIORITIZATION

The selection and prioritization of work for Fiscal Year (FY) 1995 is based on both the status of ongoing site characterization activities and the guidance provided by the Program Approach as outlined in the Project 5-Year Plan. The Site Investigations plan for FY 1995 is also constrained by a budget allocation of \$85,782,000. As identified in the 5-Year Plan, the FY 1995 activities are focused on direct support of "higher level findings" which represent the near-term site suitability milestones of the Program Approach. Nominally, all of the planned activities provide useful and necessary information to the development of the technical basis for the identified findings. It is also true that all of the planned activities provide information that will ultimately be used in development of a License Application for the site, should the site be found suitable for use. In the remainder of this section, a description is provided of how these two factors influenced the selection of activities to be carried out in FY 1995.

3.1 Status of Site Characterization Activities

In general, the progress made by the Project during FY 1994 includes progress in constructing the Exploratory Studies Facility (ESF), surface-based testing, advanced conceptual design of both repository and waste package components of the disposal system, performance assessment, planning, and licensing support system development. Much of the work has been preparatory to FY 1995 planned activities.

The ESF plays an integral role in the evaluation of the suitability of the site. Considerable progress in the design and construction of this facility was achieved in FY 1994. The starter tunnel and the first testing alcove were excavated, and underground mapping and testing efforts were initiated. Tunnel excavation activities are now ready to be conducted to the extent required to test and investigate the conditions in the mountain.

In parallel with these efforts, considerable progress was achieved in the surface-based testing program. These include ongoing geological investigations that have provided the information necessary for the design of the ESF itself, scientific studies of the saturated and unsaturated zones, and tests relevant to the evaluation of the waste package environment.

Rock characteristics data and the results of laboratory geotechnical analyses have been collected and synthesized for use in ESF design. Construction of discharge piping and a spreading basin has been completed for the C-Well complex in preparation for the planned saturated zone pump testing. Testing of a grouting technique was completed as a prerequisite to installation of instrumentation in selected boreholes for pneumatic monitoring within the mountain during winter months in advance of ESF construction. Studies of perched water found at or just below repository levels north of the repository block were conducted. Geophysical survey, both in boreholes and along surface transects, were continued. Quaternary faulting studies continued such that these studies can be concluded in FY 1995 to support a seismic hazard analysis in FY 1996. Geochemistry studies have made substantial progress in understanding processes and measuring specific parameters describing retardation of radionuclides in the mountain. The list of important radionuclides to be investigated has been prioritized on the basis of sensitivity analyses conducted as part of the Performance Assessment evaluations of the mountain. In the

course of validating the regional climate modelling code, reasonable agreement has been achieved between model predictions and the observed present-day climate.

3.2 Program Guidance

The strategy for site characterization testing during FY 1995 evolved with the development of the Program Approach, its subsequent documentation within the Project 5-Year Plan, and the related update of the Long-Range Plan (LRP) for Site Investigations (WBS 1.2.3). As part of the Program Approach, four Project priorities were identified:

- **Site Suitability Evaluation:** Complete an evaluation of the technical suitability of the Yucca Mountain site in 1998 and, if the site is found suitable, prepare a Site Recommendation Report by the end of FY 2000.
- **National Environmental Policy Act (NEPA) Process:** Prepare the Draft and Final Environmental Impact Statements in FY 1998 and 2000, respectively.
- **Repository Licensing:** Develop a license application for submission to the Nuclear Regulatory Commission (NRC) in FY 2001, if the site is suitable.
- **Management and Compliance:** Carry out normal management activities required for direction and control of the Project and special allocations required to support external agencies and the public in their review and interactions with the Project.

All site characterization activities should support one of the above priorities.

In establishing priorities for activities within WBS 1.2.3, only two of the four Project priorities are used: Site Suitability Evaluation and Repository Licensing. Activities in support of these two priorities are assumed to provide the information needed to support the NEPA process also. No additional work will be required within WBS 1.2.3 for the sole purpose of supporting the NEPA process.

To support the Site Suitability Evaluation priority, seven key products need to be completed within WBS 1.2.3 by 1998. These seven reports, each based on a subset of the siting guidelines in 10 CFR 960, provide the primary focus for planning of site investigation activities for the three-year period beginning in mid-1995. The reports cover the following topics:

- Surface Processes
- Preclosure Rock Characteristics
- Tectonic Hazards
- Preclosure Radiological Safety
- Geochemistry/Postclosure Rock Characteristics/Natural Resources
- Geohydrology/Transport
- Total System Performance Assessment.

The testing strategy to support achievement the Program priorities is discussed in the LRP for WBS 1.2.3. The LRP gives an overview of the site investigations program for the five-year period FY 1995 through 1999 consistent with both the Program Approach and the 5-Year Plan for the Yucca Mountain Project. The LRP relates planned activities to both the waste isolation strategy being pursued by the Project and to the products needed to achieve the Program goals. Selection of testing activities for FY 1995 are guided by and must be considered in light of these shorter- and longer-term goals. To facilitate this understanding, salient aspects of the five-year plan are described in Section 7.

Site Investigations activities can generally be classified as surface-based testing (SBT), testing in the Exploratory Studies Facility (ESF), or testing support such as design, construction, and planning. Both the SBT and the ESF testing programs gather data that contribute to the determination of the suitability of the Yucca Mountain Site. The SBT program encompasses all activities that gather information using surface-based methods such as geologic mapping, drilling, trenching, field monitoring, geophysical surveys, field testing, laboratory testing, and associated analyses. The ESF testing program consists of investigations carried out underground within the ESF and associated laboratory and analytical studies. Other ESF testing, design, and performance assessment activities occur within WBS elements 1.2.2 (Waste Package), 1.2.4 (Repository), and 1.2.5 (Regulatory and Licensing). These other activities supporting other WBS elements are described in their respective Technical Implementation Plans.

The relation of specific SBT and ESF testing activities for FY 1995 to Project priorities and key products is summarized in Section 4. Appendix A provides additional information on each FY 1995 work element, including its scope of work, funding, deliverables, and, for continuing work, status at the end of FY 1994. Appendix A also includes information on links to design requirements, licensing requirements, site suitability issues, test prioritization evaluations regarding the contribution of the tests to YMP goals, and planned performance assessment objectives.

4. GOALS OF THE SITE INVESTIGATION ACTIVITIES FOR FY 1995

The Site Investigation activities to be implemented in Fiscal Year (FY) 1995 support the objectives of the Program Approach as described in the 5-Year Plan for the Yucca Mountain Project (DOE, 1994) and in the most recent revision of the Long-Range Plan (LRP) for WBS 1.2.3 (Site Investigations). An update of the Site Characterization Plan Baseline to reflect the current strategy is also being prepared.

Two goals identified in the Program Approach are relevant to WBS 1.2.3 planning:

- Site Suitability Evaluation
- Repository Licensing

In FY 1995, Site Investigations activities primarily support the goal of a Site Suitability Evaluation and, to a lesser extent, Repository Licensing. Activities supporting Repository Licensing are generally long-lead activities including regional hydrology, future climate, and thermal effects evaluations. There are no allocations of Site Investigations activities to the NEPA priority, based on the assumption that site information developed for suitability and licensing purposes will be sufficient to support the required environmental assessments.

4.1 Priority 1: Site Suitability Evaluation

Activities supporting this priority are those required to evaluate the technical suitability of the Yucca Mountain site as a geologic repository for high-level radioactive waste. Completion of this evaluation is scheduled for 1998. If the site is found suitable, additional activities to prepare a Site Recommendation Report by the end of FY 2000 would also have to be carried out.

A phased approach to evaluating technical site suitability is included as part of the Program Approach. The suitability of the site will be examined over a period of years through a series of Technical Basis Reports. These reports will address different sets of the 10 CFR 960 guidelines. Site Investigations work addressing this priority is structured around a series of seven major deliverables supporting the planned Technical Basis Reports.

An overview of work to be accomplished during FY 1995 is given in the context of the seven deliverables leading to the FY 1998 Site Suitability evaluation. This is followed by a short summary of drilling activities planned for FY 1995 and then a discussion of metrics for the FY 1995 work.

4.1.1 Preclosure Rock Characteristics Technical Basis (WBS 1.2.3.2)

The response of the rock of the repository horizon to the heat from emplaced waste is key to evaluating the long-term stability of emplacement drifts and the feasibility of retrieval operations. In FY 1995 tests will be performed in the laboratory to study long-term rock behavior at elevated temperatures as well as to measure rock properties at expected emplacement drift temperatures. Samples from coreholes as well as from the Exploratory Studies Facility (ESF) will be used for laboratory testing. High-resolution shallow seismic line surveys will be performed along two east-west lines in the repository block to investigate the presence, if any,

of buried faults west of the Ghost Dance fault. Standard tests in the laboratory for thermal and mechanical properties of rock will continue. Observations and monitoring of rock movement and rock stress in the ESF will provide additional data to support the development of the technical basis report scheduled for FY 1996.

4.1.2 Tectonic Hazards Technical Basis (WBS 1.2.3.2)

The Qualifying Condition for Preclosure Tectonics specifies that tectonic or volcanic processes during the preclosure period will not require design features beyond reasonably available technology. The preclosure tectonics program, therefore, is directed at assessing the hazard at the site related to vibratory ground motion, surface fault displacement, and volcanism.

In FY 1995, data collection activities to characterize the spatial extent and orientation of Quaternary faults and their history of activity will be completed. Analysis of these data and synthesis of results will continue in FY 1995 to support development of inputs for a seismic hazard analysis in FY 1996. In particular, a ground motion attenuation relation will be developed and a workshop will be held to evaluate the different approaches to ground motion modelling that can be used at Yucca Mountain. The seismic hazard assessment process will be initiated through identification of experts to provide interpretations of the data that will serve as inputs and holding a workshop to familiarize the experts with the data available to support interpretations and evaluate their sufficiency. Development of a Topical Report on Seismic Design Methodology will also be completed in FY 1995 as an activity within WBS 1.2.5. These activities will lead to a probabilistic seismic hazard assessment, development of seismic design inputs, and preparation of a report on the tectonic hazards technical basis in FY 1996. These activities will also provide information needed to address seismic issues in the Advanced Conceptual Design (ACD).

4.1.3 Geochemistry / Postclosure Rock Characteristics Technical Basis (WBS 1.2.3.2, 1.2.3.4)

The qualifying condition for postclosure geochemistry specifies that the present and expected geochemical characteristics of a site will be compatible with waste containment and isolation taking into account the likely chemical interactions among radionuclides, the host rock, and the ground water. In addition, the qualifying condition for postclosure rock characteristics specifies that the present and expected characteristics of the host rock and surrounding units will be capable of accommodating the thermal, chemical, mechanical, and radiation stresses that are expected to be induced by repository construction, operation, and closure and by expected interactions among the waste, host rock, ground water, and engineered components. The qualifying conditions for human interference specify that the natural resources at the site will not be likely to give rise to human interference activities that will lead to releases greater than those allowable by applicable standards. Taken together, these qualifying conditions require information on the stratigraphy, mineralogy, rock properties, chemistry, and ground-water characteristics of the host rock and surrounding units.

To address the relevant qualifying conditions, a 3-dimensional (3-D) integrated geologic model of the site will be established using geologic framework information and the best available spatial distributions of mineral zones and hydrogeologic parameters. The preliminary model will

incorporate structural and lithologic logs for additional deep boreholes in and near the controlled area, results of surface geophysical surveys, results of surface mapping and fracture studies, and results of geologic mapping in the north ramp of the ESF. This model will provide the geologic framework of the site that will be used for some of the process modeling activities and for subsystem and total system performance assessment. It will also provide estimates of porosity, permeability, water content, and other parameters that are required for hydrologic modeling and design analyses. Geotechnical data on the material and thermal properties of the host rock and geologic mapping and rock deformation studies in the ESF will also support ACD.

A letter report on the nature of the vitric-zeolitic transition in the Calico Hills unit will be produced. This information will provide a preliminary basis for the spatial distribution of sorptive and transmissive properties within the Calico Hills. This also provides some of the initial information for near-field environment and altered zone studies. A report on geochemical alteration will summarize current knowledge of mineral alteration history, including discussion of any evidence for Quaternary alteration. The findings will be discussed as a possible analog for alteration under repository conditions. Future alteration will be predicted. An understanding of mineral alteration is required to determine if conditions exist or could exist that would degrade the ability of the site to isolate waste. A report on a saturated zone ground-water chemistry will be produced to support the ground water chemistry model.

To support evaluations of the potential for human interference, an industry standard natural resource exploration study will be completed in FY 1995.

4.1.4 Geohydrology / Transport Technical Basis (WBS 1.2.3.3, 1.2.3.4)

The qualifying condition and disqualifying conditions for the postclosure geohydrology siting guideline are concerned with the compatibility of the geohydrologic system with waste isolation and containment. For the qualifying condition, the present and expected geohydrologic setting of a site shall be compatible with waste containment and isolation. The disqualifying condition specifies that the site will be disqualified if the pre-emplacement ground-water travel time from the disturbed zone to the accessible environment is less than 1,000 years along any pathway of likely and significant radionuclide travel.

Investigations of fluid pathways in the unsaturated zone (UZ) are needed for performance analyses of both the engineered and natural components of the geologic repository system. Characterization of the flow paths and mixing effects in the saturated zone (SZ) rock below the water table is required to support calculations of the ground water travel time (GWTT) and to determine potential radiation doses to the biosphere. The radionuclide transport program will provide analyses of how ground water would carry radionuclides from the repository to the accessible environment or biosphere. Numerous physical and chemical processes, including radioactive decay, will be analyzed to predict arrival distributions of radionuclides at outflow boundaries of the hydrologic system.

Hydraulic testing in boreholes at the C-wells complex will be initiated and preliminary results analyzed to provide hydrologic-property values for input to the ground-water flow and total-system performance-assessment computational models. Construction-phase testing will be initiated in the ESF and an additional ESF alcove or alcoves will be excavated to support hydrologic assessment of the Bow Ridge Fault. Hydrologic testing and sampling and pneumatic testing will be conducted in the ESF access to the Bow Ridge Fault to determine the hydrologic

and pneumatic properties of the fault and to evaluate the hypothesis that this structural feature may provide a preferential flow pathway.

In FY 1995, weather conditions will continue to be monitored at network stations located within the boundaries of the site to provide input to the gas-phase circulation study and infiltration studies. The analysis of paleoenvironmental data collected in southern Nevada and adjacent areas will continue, providing a preliminary basis for inferring climatic conditions and change in the Yucca Mountain region during the Quaternary. Evaluations of core samples from paleodischarge areas, interpretations of the age and floral content of packrat middens, and age information from vein minerals will be integrated in a preliminary paleoclimate/paleoenvironmental synthesis.

The development and testing of the site-scale, three-dimensional UZ moisture and gas flow models will be advanced sufficiently to incorporate ESF effects and to constrain the role of major faults in the hydrology of the site. A preliminary saturated-zone hydrologic framework description will be provided in FY 1995 to support evaluations of ground-water travel time and dilution effects.

Studies on radionuclide transport parameters will focus on those areas where there is the greatest uncertainty that the qualifying condition for the postclosure geochemistry siting guideline can be met. Radionuclide sorption, solubility and speciation, colloidal behavior and diffusion into the rock matrix pore space will be examined. Dynamic transport studies will be conducted to examine the applicability of basic parameters for describing flowing systems both fractured and unfractured. Investigation of neptunium, plutonium, and uranium will be emphasized. These are elements for which more refined transport parameters seem most critical due to high solubility, low sorption, or high uncertainty in sorption mechanisms. Development of transport models that combine hydrology and transport parameters for the key radionuclides will continue. This information is basic input needed to model the release of radionuclides to the accessible environment.

A summary report on site-scale radionuclide transport and a companion retardation sensitivity analysis will be completed in FY 1995.

4.1.5 Drilling Activities

In FY 1995, drilling activities support data collection for several of the site investigations products supporting the evaluation of site suitability. Drilling activities will include the final phase of two SD-holes and the first phase of a third to provide design input and rock characteristics information; drilling a WT-hole to explore the large hydraulic gradient north of the site; workover and/or test pumping of 7 wells (including cross-hole experiments at the C-well complex) to examine saturated zone behavior; and stemming of 5 boreholes to provide hydrologic information (4 holes) and vertical seismic profiling capability (1 hole).

4.1.6 Metrics

In performance based budgeting, metrics are measures of progress, both tangible and intangible. Outputs are those discrete, tangible items such as reports and physical advance of the ESF construction. Outcomes are less-tangible progress such as refining models to reduce uncertainty, continuing to collect otherwise irretrievable monitoring data, and providing management and compliance functions. For site investigations activities during FY 1995 that support the priority to carry out a site suitability evaluation, the following outputs and outcomes are expected.

Outputs:

- Report on development of an empirical ground motion attenuation relation for Yucca Mountain.
- Report on ground motion modelling approaches for Yucca Mountain.
- Report summarizing the Data Needs Workshop for the probabilistic seismic hazard assessment.
- Three-dimensional integrated geologic model of the site, incorporating structural and lithologic logs for additional deep boreholes in and near the controlled area, results of surface geophysical surveys, results of surface mapping and fracture studies, and results of geologic mapping in the north ramp of the ESF.
- Letter report on the nature of the vitric-zeolitic transition in the Calico Hills unit.
- Report on geochemical alteration.
- Report on saturated zone ground-water chemistry.
- Hydrologic assessment of the Bow Ridge Fault from testing in the ESF.
- Preliminary paleoclimate/paleoenvironmental synthesis.
- Site-scale, three-dimensional UZ moisture and gas flow model.
- Summary report on site-scale radionuclide transport and a companion retardation sensitivity analysis.
- Preliminary regional three-dimensional hydrology model and an updated report on site-scale boundary conditions.

Outcomes:

- Monitoring of rock movement and rock stress in the ESF.
- Completion of site and regional fault studies to support development of seismic source inputs for a probabilistic seismic hazard analysis.

- Industry standard natural resource exploration study will be completed.
- Hydrologic-property values from hydraulic testing in boreholes at the C-wells complex.
- Expert judgement on range of interpretations in volcanic hazard assessment inputs that is consistent with the available data. (Carried out within WBS 1.2.5)

4.2 Repository Licensing

Activities supporting this priority include those required to ensure that required information will be available to develop a license application for submission to the Nuclear Regulatory Commission (NRC) in FY 2001, if the site is suitable.

A license application annotated outline is being used as a tool to develop the repository license application in a phased manner. As additional information becomes available through completion of site investigations activities, appropriate sections of the license application annotated outline are updated. In this way, the annotated outline will evolve into the repository license application, assuming the site is found suitable.

An overview of work to be accomplished during FY 1995 is given in the context of several site investigations program areas. This is followed by a discussion of metrics for the FY 1995 work.

4.2.1 Tectonics (WBS 1.2.3.2)

To address the Postclosure Tectonics qualifying condition, studies on volcanic hazard and tectonic effects will continue in FY 1995. Volcanism studies are structured to provide a probabilistic hazard assessment that incorporates geologic constraints on the time-space-volume evolution of basaltic volcanism in the Yucca Mountain region. During FY 1995, volcanism experts will be involved in a study to assess the range of interpretations in volcanic hazard assessment inputs that is consistent with the available data. In addition, geochronologic and geochemical studies will continue.

Activities in the area of tectonic effects will focus on incorporating geophysical information into an evaluation of structural controls on basaltic volcanism, and developing a hydrologic model of the site area to use as a baseline for examining the effects of tectonic processes.

Also within the tectonics program, monitoring of contemporary seismicity in the southern Great Basin will continue. The collected data will form part of the site description for the license application.

4.2.2 Saturated-Zone Hydrology (WBS 1.2.3.3)

The regional hydrology program will provide a preliminary regional 3-D model and an updated report on site-scale boundary conditions derived from the regional model in FY 1995.

4.2.3 Future Climate (WBS 1.2.3.6)

The future climate program will provide a strategy plan in FY 1995 for use of computer models to simulate regional climate for a range of global conditions and to provide comparisons between predictions and geologic observations for current and past climates. The status of validation of the global/regional climate model will be reported. Through these analyses, bounds on the magnitude and duration of future climate conditions will be developed and supplied for use in establishing limits on water influx for site scale performance modeling.

4.2.4 Thermal Effects (WBS 1.2.3.10, 1.2.3.12)

In FY 1995, the thermal effects program will continue characterization of the rock around the waste package, the effects of man-made materials on that environment, and impacts of the heat-affected zone surrounding a repository on repository performance and geochemical transport. Laboratory studies of actinide solubilities at elevated temperatures, mineralogical and chemical changes in vitrophyric tuffs subjected to a range of relative humidities at elevated temperatures, and preliminary numerical simulations of hydrologic-geochemical coupling will be conducted. Preparations for the Large-Block Test (LBT) will continue, and will include installation of the loading frame, drilling of instrumentation holes, and testing of small blocks taken from the LBT site. Changes in permeability resulting from mineral-water reactions or silica redistribution will be examined theoretically and experimentally. A report will include: (i) a description of the testing and analysis of expected thermo-hydrological flow in the LBT, (ii) a partial resolution of hypothesis tests and preliminary model validation, (iii) preliminary validation of conceptual models of water contact modes, (iv) early diagnosis of the significance of buoyant gas-phase convection, focussed vapor and condensate flow, and gas-phase diffusion, and (v) early diagnosis of the significance of geochemical-thermo-hydrological coupling.

4.2.5 Metrics

Outputs:

- Strategy plan for use of computer models to simulate regional climate for a range of global conditions.
- a report on the Large-Block Test (LBT) that will include: (i) a description of the testing and analysis of expected thermo-hydrological flow in the LBT, (ii) a partial resolution of hypothesis tests and preliminary model validation, (iii) preliminary validation of conceptual models of water contact modes, (iv) early diagnosis of the significance of buoyant gas-phase convection, focussed vapor and condensate flow, and gas-phase diffusion, and (v) early diagnosis of the significance of geochemical-thermo-hydrological coupling.

Outcomes:

- Laboratory tests to study long-term rock behavior at elevated temperatures.

4.3 Summary of Activities

This section contains a more detailed description of site investigation activities for FY 1995 and the manner in which they support the Program priorities of site suitability evaluation and repository licensing. Table 4-1 lists activities that support the evaluation of site suitability and Table 4-2 lists those that support repository licensing. Activities within each table are ordered according to their WBS element number. Tables 4-3 shows all FY 1995 activities along with their budgets. Table 4-4 shows the same information, but grouped according to Participant.

Table 4-1
Site Investigations Activities Supporting a Site Suitability Evaluation

WBS	Title	Contribution in FY 1995 to the Goal of a Site Suitability Evaluation
1.2.3.2.1.1.1	Mineralogy, Petrology, and Rock Chemistry of Transport Pathways	X-ray diffraction, x-ray fluorescence, electron microprobe, and scanning electron microscopy will be used to analyze bulk-rock and fracture mineralogy from new and existing drill core from the site. This will provide information needed for transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue and will directly address favorable geochemical processes, favorable geochemical conditions, geochemical reduction of sorption and lack of or favorable alteration in 960.4-2-2 and groundwater travel time 960.4-2-1.
1.2.3.2.1.1.2	Mineralogic and Geochemical Alteration	The alteration of Yucca Mountain will be examined as a self-analog to repository-induced thermal perturbations and to the paleohydrologic system. Experiments will be conducted to determine the stability of clays, zeolites, and glass in the presence of potential repository thermal loads. Suitability issues addressed include favorable geochemical processes, favorable geochemical conditions, geochemical reduction of sorption and lack of or favorable alteration and no Quaternary dissolution in 960.4-2-2; adverse dehydration/hydration in 960.4-2-3; and groundwater travel time in 960.4-2-1.
1.2.3.2.1.2.2	Kinetics and Thermodynamics of Mineral Evolution	This study supports the development of conceptual model to predict mineralogic changes in Yucca Mountain due to the potential repository thermal load. Kinetic and thermodynamic data will be gathered on zeolites to support numeric modeling. These activities support the transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue.

1.2.3.2.5.1.1	Probability of Volcanic Eruption	This activity determines probability distributions of new basaltic volcanic activity in the Yucca Mountain region (a parameter called E1) and the probability, given E1, that new volcanic activity will disrupt the repository (a parameter called E2). Geologic structural controls that may influence the location of new eruptive centers is investigated in this process. FY 1995 activity will focus on refined calculations of E1 and E2, and will investigate the role of geologic structure. This work will contribute to postclosure tectonics suitability issue.
1.2.3.2.5.1.2	Effects of a Volcanic Eruption Penetrating the Repository	This work investigates the possible effects, both extrusive and intrusive, that renewed volcanic activity might have repository performance. Analog studies of possible eruptive and intrusive effects will be conducted in FY 1995 as well as studies to estimate possible volumes of melt generation beneath the region. Studies of xenoliths will be used to constrain the amount of waste that could be entrained in a volcanic eruption and brought to the surface. The extent of subsurface alteration and induced hydrothermal circulation due to igneous intrusions will be investigated. All results will be incorporated into probabilistic risk calculations.
1.2.3.2.5.5.1	Characterization of Volcanic Features	This WBS is responsible for gather basic data on basaltic volcanic centers in the region of Yucca Mountain. Such data include geologic mapping, geochemistry of the basalts, age determinations, and volume estimates. These studies are required to understand the regional framework of volcanism, the source and evolution of magmatism in time and space, and to provide basic data for WBS 1.2.3.2.5.5.1 and 1.2.3.2.5.1.2. Work in FY 1995 will focus on the geochemistry of Crater Flat and Sleeping Butte basalts, regional synthesis of volcanic fields in the Yucca Mountain region and analog fields in the western United States, and dating of basalts from all post-Miocene volcanic centers in the region. This work will contribute to postclosure tectonics suitability issue.

1.2.3.2.6.2.1	Soil & Rock Properties Exploration	Prepare a geotechnical report to support the design of the ESF Main Drift (Design Package 8A) and the Muck Conveyor Foundation Design. The report will describe the geology, structure, rock properties and other expected conditions along the ESF main drift alignment using maps, cross-sections, drill hole logs, tabulated data and other illustrations and descriptions
1.2.3.2.6.2.1	Consolidation of core logging	Plan and implement a project-wide program to consolidate core logging efforts and submit a letter report documenting the work done including the core logging procedures.
1.2.3.2.6.2.2	Soil & Rock Properties Lab Tests	Conduct laboratory tests on samples of soil and rock for material properties data to support design. Tests on soil samples are for the design of foundations for the muck conveyor system. Perform rock quality estimates and develop rock mass mechanical properties for tunnel support design.
1.2.3.2.6.2.3	Soil & Rock Properties Field Tests	Prepare geologic and structural core logs for holes SD-7 and the deeper phase of SD-12. Develop rock quality estimates and rock mass mechanical properties for SD-7 and deeper phase of SD-12
1.2.3.2.7.1.1	Laboratory Thermal Properties Testing	Perform measurements in the laboratory for thermal conductivity and heat capacity of rock samples from NRG and SD holes. Prepare a report on the relationship, if any, of sample size and saturation on the thermal conductivity. Update RIB values for thermal conductivity and heat capacity
1.2.3.2.7.1.2	Laboratory Thermal Expansion Testing	Perform measurements in the laboratory for the coefficient of thermal expansion of rock samples from NRG and SD holes. Conduct experiments to investigate the effect of confining pressure on the coefficient of thermal expansion of TSw2. Update RIB values for the coefficient of thermal expansion.

1.2.3.2.7.1.3	Laboratory Determination of the Mechanical Properties of Intact Rock	Perform tests in the laboratory on intact rock samples from NRG, SD holes and the ESF for unconfined compressive strength, indirect(Brazilian) tensile strength, Young's Modulus and Poisson ratio. Perform tests to investigate the effect of confining pressure and elevated temperature(both singly and coupled) on the properties of intact rock samples of TSw2. Perform tests to investigate the time-dependent (creep) constant stress response of TSw2 at elevated temperatures under stress and temperature levels expected during the pre-closure period.
1.2.3.2.7.1.4	Laboratory Determination of the Mechanical Properties of fractures	Perform tests in the laboratory on samples from NRG, SD holes and the ESF to measure the mechanical properties such as:angle of friction, shear stiffness and normal stiffness etc. of fractures. Perform tests to investigate the long term time-dependent behavior of fractures at above ambient temperatures. Perform tests to investigate the instantaneous effect of elevated temperatures on the properties of fractures.
1.2.3.2.8.3.1	Relevant Earthquake Sources	Compile and evaluate geological, geophysical, and seismological data to identify potential earthquake sources and to characterize their maximum magnitudes and rates of earthquake recurrence. This activity supports the assessment of seismic hazards which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.3.3	Ground Motion from Regional Earthquakes and Underground Nuclear Explosions	Develop an empirical ground motion attenuation relation for Yucca Mountain. Organize and carry out a ground motion modeling workshop to examine the sensitivities, strengths, and weaknesses of different ground motion modeling approaches. This activity supports the assessment of seismic hazards which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.3.6	Probabilistic Seismic Hazard Analysis	Begin the seismic hazards assessment process. Organize and plan a series of workshops to allow experts to develop inputs to the hazards assessment. Develop approaches for characterizing fault displacement hazard inputs. Hold a workshop to examine data needs for seismic source/fault displacement and ground motion evaluations. The assessment process will be completed in FY 1996 and is required to evaluate technical site suitability with respect to tectonic hazards.

1.2.3.2.8.4.1	Historical and Current Seismicity	Evaluate the potential for excavation induced seismic activity. Complete an evaluation of the implications for seismic hazard of precariously balanced rocks in the vicinity of Yucca Mountain. These data will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.4.3	Quaternary Faulting within 100 km of Yucca Mountain	Evaluate suspected Quaternary faults in the Amargosa Valley. Carry out reconnaissance studies of regional faults that might produce ground accelerations at Yucca Mountain of 0.1 g or higher. Complete trench studies of the Bare Mountain fault. Conduct detailed studies of the Death Valley - Furnace Creek fault system. These data will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.4.4	Quaternary Faulting within Northeast-Trending Zones	Carry out fault trench studies of the Rock Valley fault system. Compile and synthesize data on the Mine Mountain fault system. Carry out reconnaissance studies of the Cane Spring fault system. These results will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.4.5	Detachment Faults	Complete studies of suspected detachment faulting within the Calico Hills and prepare a final report. These results will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.4.6	Quaternary Faulting within the Site Area	Complete trench logging activities on the Solitario Canyon, Fatigue Wash, Windy Wash, Ghost Dance, Bow Ridge, Paintbrush Canyon, and Stagecoach Road faults. Analyze and interpret data and prepare a final reports. Evaluate the postulated Fortymile Wash fault. These results will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.

1.2.3.2.8.4.8	Stress Field within and Proximal to the Site Area	Prepare a study plan for this activity. Data collected under this study will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.4.10	Geodetic Leveling	Resurvey the level line and interpret results gathered over the last decade. These results will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.2.8.4.12	Tectonic Modeling and Synthesis	Compile and synthesize data and results to develop and evaluate tectonic models for the Yucca Mountain vicinity. These results will support the evaluation of seismic sources for the probabilistic seismic hazards assessment which is required to evaluate technical site suitability with respect to tectonic hazards.
1.2.3.3.1.1.3	Regional Ground Water Flow System	A compilation and assessment of data collected to feed regional modeling efforts will be done for hydrologic and hydrochemical data collected through FY 94. Reports will be made on improved understanding of: (1) recharge rates in Fortymile Wash; (2) potentiometric levels in (1) North Crater Flat, (b) northern Yucca Mountain, and (c) east flank of Funeral Mountains; and (3) nature of large hydraulic gradient on north end of Yucca Mountain.
1.2.3.3.1.1.4	Regional Hydrologic System Synthesis and Modeling	The regional model will be calibrated and a sensitivity analysis will be preformed. An Analytic Element Model will be constructed, and an interpretive report, with data sets to be included, will be written to support other modeling efforts. In addition, a hydrostratigraphic map will be generated, and colleague and QA reviews completed.

1.2.3.3.1.2.1	Unsaturated Zone Infiltration	Field and laboratory measurements of the hydrologic properties of surficial materials and fracture/fault properties will be collected, and the information used to generate the following maps: (1)net infiltration flux map, (2)fast pathways flux map, and (3)surficial materials properties map. An infiltration model linking precipitation, evapotranspiration, infiltration, and runoff to provide estimates of spatial distribution of flux through the upper boundary layer of Yucca Mountain will be developed.
1.2.3.3.1.2.2	Water Movement Tracer Tests	Cuttings from surface-based boreholes and the ESF will be analyzed to determine the depth of penetration of bomb pulse ^{36}Cl , estimate the average residence time of infiltrating water, and validate hydrologic and solute transport modeling scenarios.
1.2.3.3.1.2.3	Percolation in the Unsaturated Zone - Surface Based Study	Laboratory measurements of rock properties, state variables, and matrix flow properties will be made on core from surface and ESF based boreholes; the results will be used to refine hydrologic units for modeling. Air permeability testing will be conducted in boreholes NRG-6, SD-12, and UZ-7; other boreholes may be tested depending on availability. Vertical Seismic Profiling will be used to obtain information on key subsurface features, and surface based boreholes NRG-6, NRG-7a, UZ-7, SRG-3, SD-12, and SD-7 will be instrumented and monitored to provide in-situ data on pneumatic pressure, temperature, and water potential to site-scale modeling efforts.
1.2.3.3.1.2.4	Percolation in the Unsaturated Zone - ESF Based Study	Air permeability testing in up to five alcoves in the North Ramp will be conducted subject to alcove availability. Hydrochemical samples of pore water and gas samples will be analyzed for major ions, isotopes, and tritium. These tests are intended to produce data on hydrologic properties and processes in the deep unsaturated zone.
1.2.3.3.1.2.7	Unsaturated Zone Hydrochemistry	Gas- and aqueous-phase hydrochemical samples will be obtained and analyzed for major ion chemistries, stable isotopes, tritium and carbon-14. The results of the analyses will be used to validate conceptual and numerical flow models of the Yucca Mountain site.

1.2.3.3.1.2.8	Fluid Flow in UZ Fractured Rock	UZ fracture flow models will be developed for the North Portal of the ESF, and Tiva Canyon units. 3-D fracture network models and 2-phase flow codes will be coupled with the FracMan code to investigate 2-phase flow in partly saturated, fractured rock. The results will support site-scale UZ modeling.
1.2.3.3.1.2.9	Site Unsaturated Zone Modeling and Synthesis	Gas flow, temperature, and heat flow analyses will be incorporated into the Site-Scale Model, and the model will be calibrated against available saturation and capillary pressure data from cores in boreholes UZ-4,5,6s,7,13,14 and UZ-16, and temperature measurement data from UZ-1. The model will be verified using environmental isotope data, and predictions will be made of state variables (i.e., liquid saturations, moisture tensions, gas pressure and temperature, occurrence of perched water zones) for all wells to be drilled in FY 95, and the ESF.
1.2.3.3.1.3.1	Site Saturated Zone Ground-Water Flow System	Conduct hydrologic testing at the c-wells complex, and at selected WT and G wells. Hydraulic properties information developed through pump tests will support saturated zone modeling efforts.
1.2.3.3.1.3.2	Saturated Zone Hydrochemistry	Collect site and regional saturated zone hydrochemistry samples. These activities will be coordinated with 1.2.13 (Environment, Safety and Health) groundwater sampling program to ensure maximum benefits from common work and capital equipment.
1.2.3.3.1.3.3	Saturated Zone Hydrologic System Synthesis and Modeling	A 3-D site-scale framework model will be constructed from available information, and its development will be coordinated with GSP branch of USGS to ensure continuity between models. The framework model will be compatible with the updated SZ conceptual model, and will be linked with the SZ flow code FEHMN, in coordination with Los Alamos National Labs (FEHMN developers).
1.2.3.4.1.1	Ground-Water Chemistry Model	Modeling and limited experiments are planned to support a conceptual model of ground-water chemistry that describes the origin and variability of water composition in time and space. Mathematical models will support transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue.

1.2.3.4.1.2.1	Batch Sorption Studies	Data will be collected on Pu and Np in support of transport process models (WBS 1.2.3.4.1.5.1) and TSPA to address the geohydrology/transport suitability issue.
1.2.3.4.1.2.2	Biological Sorption and Transport	Data will be collected immediately behind the TBM to quantify and characterize the ambient microbe population in the host rock at Yucca Mountain to identify whether that population could provide a meaningful contribution to radionuclide transport or to microbial induced corrosion in the EBS.
1.2.3.4.1.2.3	Sorption Models	This work will employ recent advances in mineral surface science to understand the mechanism by which Np and Pu sorb to Yucca Mountain tuffs. At this point, the mechanism by which these elements are believe to sorb do not agree well with experimental data. This work contributes to transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue.
1.2.3.4.1.3.1	Dissolved Species Concentration Limits	Modeling and experimental work primarily on Np and Pu will define the maximum amount of these elements that can be dissolved in site-relevant waters as upper limit values to what can be transported. These data are input to TSPA and contributes to transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue.
1.2.3.4.1.4.1	Dynamic Transport Column Experiments	This study will evaluate the movement of radionuclides under dynamic conditions relevant to Yucca Mountain. Such experiments provide validation of the batch sorption experiments as well. Transport of Np, Se, Cs will be evaluated, and a major purchase of capital equipment will be made to enable dynamic retardation experiments to be conducted for radionuclides in unsaturated tuff. These data contribute to transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue.

1.2.3.4.1.4.2	Diffusion	Techniques will be developed and experiments begun to measure the diffusion of conservative and non-conservative radionuclides into the rock matrix. This study will provide data for which additional retardation credit may be taken which is especially important for poorly or non-sorbing radionuclides. These data are input to TSPA and contribute to transport process models (WBS 1.2.3.4.1.5.1) to address the geohydrology/transport suitability issue.
1.2.3.4.1.5.1	Retardation Sensitivity Analysis	This study evaluates which processes have the greatest effect on radionuclide transport. Integrated transport calculations will be conducted along with code development to increase the realism of the simulations. These studies provide a check on PA models and work performed in this study will provide much of the basis for evaluating the geohydrology/transport suitability of the site.
1.2.3.4.1.5.2	Demonstration of Applicability of Laboratory Data	This study is designed to ensure that data acquired in the laboratory are relevant to field-scale processes. Work will begin in P-tunnel where a vitric to zeolitic transition in unwelded tuff (much like the Calico Hills Tuff) is exposed that will be used to conduct field-scale migration tests. This study is aimed at evaluating the hydrologic and geochemical barrier that the Calico Hills Tuff may be expected to provide. These data contribute to the geohydrology/transport suitability issue.
1.2.3.4.2	Geochemical Modeling	This WBS includes all work on the EQ3/6 geochemical modeling code. This WBS does not produce deliverables directly related to suitability or licensing, but enables geochemical modeling in other WBS elements that do use it for those purposes. FY 1995 efforts will concentrate on inclusion of a boiling sub-model, code maintenance, and software verification of selected components of the code.
1.2.3.4.x	Geologic and Engineering Materials Bibliography of Chemical Species (GEMBOCHS)	This WBS incorporates database development and maintenance for WBS 1.2.3.4.2 Geochemical Modeling

1.2.3.10.1	Characterization Techniques for the Altered Zone	This WBS includes work in hydrology, geochemistry, and geomechanics of the site under potential repository thermal loads. Work will concentrate on coupled processes between these areas as applied to the Large Block Test and laboratory experiments on Yucca Mountain samples. Additional modeling will attempt to bound the range of changes that might occur due to the thermal load of the potential repository. This work contributes to the post closure geochemistry and rock characteristics qualifying conditions as well as the postclosure geohydrology disqualifying condition.
1.2.3.10.2	Characterization of Thermal Effects on the Altered Zone Performance	Measure changes in hydrological parameters, water chemistry and mineral assemblages in response to thermal perturbations. This work contributes to the post closure geochemistry and rock characteristics qualifying conditions as well as the postclosure geohydrology disqualifying condition.
1.2.3.10.3.1	Integrated Radionuclide Release: Tests and Models	Perform field and laboratory test to characterize interactions between the waste form, waste package, and surrounding rock. Work in FY 1995 will concentrate on developing a strategy for testing releases and retardation in the presence of EBS/Near Field materials, obtain sorption data for canister corrosion products, and investigate radionuclide retardation in clinoptilolite and in tuff at elevated temperature. Mechanistic transport models will be used to evaluate laboratory results. This work is directly related to the suitability issues of EBS releases as well as the post closure rock characteristics and geochemistry qualifying conditions.

1.2.3.10.3.2	Thermodynamic Data Determination	This WBS provides thermodynamic data required for the Integrated Testing, Spent Fuel Testing, Glass Waste Form, and Waste Package Environment tasks. Work for FY 1995 will concentrate on review of the Nuclear Energy Agency (NEA) volumes for thermodynamic data of aqueous radionuclides, determination of additional Project thermodynamic data needs (Ni and Zr), the solubility of U(VI) at high temperature, the solubility product of AmOHCO_3 , and formation constants (hydrolysis and carbonate species) for U(VI) and Pu(V). This work is directly related to the suitability issues of EBS releases and source term development.
1.2.3.12.1	Chemical and Mineralogic Properties of the Waste Package Environment	This study provides information on probable mineralogic and chemical changes in the Near Field. FY 1995 will focus on the New Zealand hydrothermal analog where geochemical modeling will attempt to validate EQ3/6. The accuracy of thermodynamic data in GEMBOCHS will be evaluated as well as the appropriateness of reaction kinetic models. This work is directly related to the suitability issues of EBS releases, substantially complete containment, and source term development. This work also addresses the postclosure geochemistry and rock characteristics qualifying conditions.
1.2.3.12.2	Hydrologic Properties of the Waste Package Environment	This WBS attempts to predict the changes in the hydrologic system in the Near Field Environment. FY 1995 testing will include laboratory experiments on hydrologic changes on small blocks of tuff do to the circulation of hot fluids, modeling of the thermohydrologic system, and code maintenance and development. This work is key to thermal loading decisions, and supports the postclosure rock characteristics qualifying condition and the postclosure geohydrology disqualifying condition.

1.2.3.12.3	Mechanical Attributes of the Waste Package Environment	This WBS investigates perturbations in the mechanical properties of the Near Field Environment. FY 1995 work will concentrate on radiolysis effects, numeric models to predict geomechanical behavior over time, and test of the thermomechanical properties of the rock at Fran Ridge to support the Large Block Test. This work is key to thermal loading decisions, and supports the postclosure rock characteristics qualifying condition and the postclosure geohydrology disqualifying condition.
1.2.3.12.4	Engineered Barrier System Field Tests	Field-scale and laboratory-scale heater tests will be conducted to predict the coupled response of Yucca Mountain to potential repository thermal loads. Work in FY 1995 will focus almost exclusively on the Large Block Test, with some planning activities for underground tests to be conducted as well. This work is key to thermal loading decisions, and supports the postclosure rock characteristics and geochemistry qualifying conditions and the postclosure geohydrology disqualifying condition.
1.2.3.12.5	Characterization of the Effects of Man-Made Materials on the Chemical and Mineralogic Changes in the Post-Emplacement Environment	Man-made materials have the potential for significantly perturbing the geochemistry of the potential repository. This study evaluates these materials and will focus in FY 1995 on modeling and experimental work on the effects of organic and cementitious materials, evaluate the effects of diesel exhaust emissions in the ESF, investigate anthropogenic analogs of man-made materials, and develop a database from pertinent literature. This work supports decisions related to the postclosure rock characteristics and geochemistry qualifying conditions.

Table 4-2
Site Investigations Activities Supporting Repository Licensing

WBS	Title	Contribution in FY 1995 to the Goal of Repository Licensing
1.2.3.2.1.1.1	Mineralogy, Petrology, and Rock Chemistry of Transport Pathways	This work determines the distribution of sorptive phases along flow paths to the accessible environment. X-ray diffraction, x-ray fluorescence, electron microprobe, and scanning electron microscopy will be used to analyze bulk-rock and fracture mineralogy from new and existing drill core from the site. This will provide information needed to address retardation for transport process models (WBS 1.2.3.4.1.5.1) and, indirectly, to TSPA. This information is also required for a complete description and understanding of the site, 3-D mineralogic model, and possible hazards to worker health and safety from fibrous minerals.
1.2.3.2.1.1.2	Mineralogic and Geochemical Alteration	The alteration of Yucca Mountain will be examined as a self-analog to repository-induced thermal perturbations and to the paleohydrologic system. Experiments will be conducted to determine the stability of clays, zeolites, and glass in the presence of potential repository thermal loads. Additional licensing information will be gleaned from calcite-silica studies as they relate to paleohydrology, and laboratory testing will provide a basis for predicting mineralogical changes in response to thermal perturbations of the potential repository.
1.2.3.2.1.2.2	Kinetics and Thermodynamics of Mineral Evolution	This study supports the development of conceptual model to predict mineralogic changes in Yucca Mountain due to the potential repository thermal load. Kinetic and thermodynamic data will be gathered on zeolites to support numeric modeling. These activities affect licensing by the evaluation of the effects of thermal loading and determining the possible formation or destruction of sorptive phases.

1.2.3.2.5.2	Tectonics Effects: Evaluations of Changes in the Natural and Engineered Barrier Systems Resulting from Tectonic Processes	Incorporate geophysical data into an assessment of structural controls on basaltic volcanism. Begin development of a hydrologic model to serve as a baseline for evaluation of tectonic effects on the hydrologic regime at Yucca Mountain. Provide Performance Assessment groups with input on tectonic scenarios. The long-term goal of this activity is to provide input to performance assessment groups on how tectonic processes might effect the hydrological, geochemical, or structural state of the repository.
1.2.3.2.7.3.1	Excavations Investigations	Investigate the feasibility of measuring rock mass compliance by monitoring the force and displacement at the TBM gripper pad- tunnel wall contact.
1.2.3.2.7.3.2	In-situ Thermal/ Mechanical Properties Tests	Perform all activities necessary to complete Study Plan 8.3.1.15.1.6 for submission to NRC. This Study Plan is needed to conduct in-situ coupled thermal/mechanical tests in the ESF. For each type of test, perform detailed test planning involving development of test-configuration including location of instrumentation holes, selection of heaters and instruments/probes, selection of potential sites in the ESF for the test and analysis to support the design of the test and delineate its zone of influence(interference).
1.2.3.2.7.3.3	In-situ Mechanical Properties Tests	Perform all activities necessary to prepare Study Plan 8.3.1.15.1.7 for sub mission to YMSCO. This Study Plan is needed to conduct in-situ mechanical properties tests in the ESF. For each type of test, perform test planning involving development of test configuration and test procedures, selection of hardware and potential test sites in the ESF and interfacing with the ESF test coordination office.

1.2.3.2.7.3.4	In-situ Design Verification	Measure far-field peak particle velocities due to blasting for the construction of alcoves using portable seismographs. Measure near-field peak particle velocities due to blasting using accelerometers emplaced in boreholes. Compile data on alcove construction including blast design, actual blast and post-blast conditions. Measure the in situ stress at increasing distances from alcove wall. Visually inspect pre-drilled monitoring holes to identify fractures caused by blasting. Make convergence measurements in the North Ramp and the alcoves. Install instrumentation on selected ground supports and monitor the response of the supports.
1.2.3.2.7.3.4	In-Situ Design Verification (Monitor Ventilation System in the North Ramp)	Monitor the ventilation system to measure levels of CO, NOx, O ₂ , hydrocarbons/particulates and humidity. Data will be acquired using a combination of direct read-out instrumentation and wet chemistry analysis.
1.2.3.2.7.3.4	In-Situ Design Verification (Prepare Starter Tunnel Data Report)	Prepare report summarizing instrument installation and data collection activities in the starter tunnel. Report will include seismic monitoring, blast damage assessment, drift convergence, and ground support performance data collected till march 31, 1994.
1.2.3.2.7.3.4	In-Situ Design Verification (Management, Planning, Reporting)	Prepare detailed plans for ESF test activities in FY 96 for in-situ design verification. Detailed FY 96 test plans will be prepared with input from ESF and Repository Designers for monitoring mining methods, ground supports, drift stability and ventilation. These plans will be used by ESF test coordination office for preparing test planning package, job package and work package which are the vehicles of interface between ESF testing and ESF Design and Construction activities.
1.2.3.2.7.3.4	In-Situ Design Verification (Classify Rock Quality in the North Ramp)	Rock quality assessment will be performed from the forward most platform of the TBM whenever the TBM is in operation during North Ramp construction. Preliminary assessment of the rock mass quality indices will be generated and empirical descriptions of the characteristics of the structural features will be recorded to develop a data base about joint and fracture conditions to be used by ESF designers in design verification analyses.

1.2.3.2.7.4	Rock Mass Analysis (Lab-scale experiments on models of jointed rock)	Perform experiments in the laboratory on physical models of jointed rock mass made from synthetic material to help develop phenomenological understanding of the mechanical behavior of jointed rock mass
1.2.3.2.7.4	Rock Mass Analysis (Confirm rock mass modeling techniques)	Perform calculations using mathematical models based on both continuum joint concept and discrete element concept to predict experimental observation of the response of physical models of jointed rock mass built from layered synthetic polycarbonate.
1.2.3.2.7.4	Rock Mass Analysis (Develop a true triaxial testing capability) ¹	Provide 15% of the resources toward the design and building of a true rock testing apparatus.
1.2.3.2.7.4	Rock Mass Analysis (Evaluate rock mass properties models)	Review published literature
1.2.3.2.8.4.1	Historical and Current Seismicity	Continue to monitor seismicity in the southern Great Basin. Continue to upgrade the seismic network to digital recording and transmission. Initiate installation of a strong-motion monitoring array. Information gathered by the seismic monitoring effort will support the site description in the license application.
1.2.3.3.1.1.1	Precipitation and Meteorological Monitoring for Regional Hydrology	Daily synoptic weather patterns for data collected FY 92 to FY 94 will be analyzed to determine the frequency of various types of precipitation events. The analysis will be used to determine the most appropriate type of stochastic rainfall model for input to near-surface infiltration and UZ Site-Scale models.
1.2.3.3.1.1.2	Runoff and Streamflow	Install and maintain network of stream gaging sites; compute daily discharges and times of zero flow. The information developed will be used to support estimates of amounts and processes of infiltration.

1.2.3.3.1.1.3	Regional Ground-Water Flow System	Testing and analysis of borehole G-2 will be preformed to obtain information relevant to questions on the large hydraulic gradient and perched water in the northern section of the proposed repository. Ponding and artificial infiltration testing in Fortymile wash is also planned to determine amounts and importance of infiltration fluxes to the hydraulic system.
1.2.3.3.1.1.4	Regional Hydrologic System Synthesis and Modeling	Interpretive regional framework data sets will be assembled for construction of regional hydrogeologic framework (Stratamodel) model. Data to be included consists of: a potentiometric surface map, a recharge distribution map, a map of discharge areas, a regional springs map and a regional vegetation map.
1.2.3.3.1.2.1	Unsaturated Zone Infiltration	Field and laboratory measurements of the hydrologic properties of surficial materials and fracture/fault properties will be collected and used to generate surficial materials properties and flux maps.
1.2.3.3.1.2.3	Percolation in the Unsaturated Zone-Surface Based Study	Instrument and monitor boreholes to provide in-situ measurements of properties relevant to flow and transport modeling. Conduct laboratory testing of matrix flow properties and state variables to support site-scale UZ modeling. Perform air permeability testing. Use VSP to examine key structural features affecting the hydrologic flow regime.
1.2.3.3.1.2.4	Percolation in the Unsaturated Zone-ESF Based Study	Design, document and opportunistically sample perched water in the ESF. Plan and design percolation tests for North Ramp alcoves #3 and #4. Conduct lab-scale axial intact fracture tests, hydrochemical and air permeability testing in North Ramp alcoves.
1.2.3.3.1.2.5	Diffusion Testing in the ESF	Revise study plan.
1.2.3.3.1.2.6	Gaseous Phase Movement in the Unsaturated Zone	Conduct gas-phase geochemical sampling and monitor borehole pressures for evidence of barometric pumping and gas-phase movement through the unsaturated zone. Conduct gas-phase testing and tracer testing in surface based boreholes to establish pre-ESF excavation ambient conditions and monitor possible changes resulting from ESF North Ramp excavation.

1.2.3.3.1.2.7	Unsaturated Zone Hydrochemistry	Sample and analyze gas- and aqueous-phase fluid for evidence of porous media heterogeneity. The results of the analyses will be used to validate conceptual and numerical flow models of the Yucca Mountain site, and to obtain evidence in support of fast flow and transport pathways through the unsaturated zone.
1.2.3.3.1.2.8	Fluid Flow in UZ Fractured Rock	UZ fracture flow models will be developed for the North Portal of the ESF, and Tiva Canyon units. 3-D fracture network models and 2-phase flow codes will be coupled with the FracMan code to investigate 2-phase flow in partly saturated, fractured rock. The results will support site-scale UZ modeling.
1.2.3.3.1.2.9	Site Unsaturated Zone Modeling and Synthesis	Gas flow, temperature, and heat flow analyses will be incorporated into the Site-Scale Model, and the model will be calibrated against available saturation and capillary pressure data from UZ borehole cores. Sensitivity studies will be conducted to determine the sensitivity of the model to variability of individual parameters. The results of the sensitivity studies will be used to prioritize data collection activities in support of license application.
1.2.3.3.1.3.1	Site Saturated Zone Ground-Water Flow System	Hydrologic testing will be conducted at the c-wells complex, and selected WT and G wells to determine hydrologic properties of the saturated zone. Potentiometric level information will be collected across the site to evaluate assumptions of steady-state system behavior.
1.2.3.3.1.3.2	Saturated Zone Hydrochemistry	Collect site and regional saturated zone hydrochemistry samples. The results of analyses will be used to identify and/or quantify ground-water travel times, climatic conditions during periods of recharge, flow paths, and fluxes within the saturated zone ground-water system.
1.2.3.3.1.3.3	Saturated Zone Hydrologic System Synthesis and Modeling	A 3-D site-scale framework model will be constructed from available information, and its development will be coordinated with GSP branch of USGS to ensure continuity between models. The framework model will be compatible with the updated SZ conceptual model, and will be linked with the SZ flow code FEHMN, in coordination with Los Alamos National Labs (FEHMN developers).

1.2.3.4.1.1	Ground-Water Chemistry Model	Modeling and limited experiments are planned to support a conceptual model of ground-water chemistry that describes the origin and variability of water composition in time and space. Mathematical models will support transport process models (WBS 1.2.3.4.1.5.1), and the entire suite of retardation tasks (all of the remainder of WBS 1.2.3.4.1) as they provide information to be used in TSPA to demonstrate compliance with 40CFR191.
1.2.3.4.1.2.1	Batch Sorption Studies	Data will be collected on Pu and Np in support of transport process models (WBS 1.2.3.4.1.5.1) and TSPA to demonstrate compliance with 40CFR191.
1.2.3.4.1.2.2	Biological Sorption and Transport	Data will be collected immediately behind the TBM to quantify and characterize the ambient microbe population in the host rock at Yucca Mountain to identify whether that population could provide a meaningful contribution to radionuclide transport in compliance with 40CFR191 or to microbial induced corrosion in the EBS
1.2.3.4.1.2.3	Sorption Models	This work will employ recent advances in mineral surface science to understand the mechanism by which Np and Pu sorb to Yucca Mountain tuffs. At this point, the mechanism by which these elements are believed to sorb do not agree well with experimental data. This work is needed for licensing in order to apply retardation parameters with confidence to demonstrate compliance with 40CFR191.
1.2.3.4.1.3.1	Dissolved Species Concentration Limits	Modeling and experimental work primarily on Np and Pu will define the maximum amount of these elements that can be dissolved in site-relevant waters as upper limit values to what can be transported. These data are input to TSPA and contribute to transport process models (WBS 1.2.3.4.1.5.1) and to demonstrate compliance with 40CFR191.

1.2.3.4.1.4.1	Dynamic Transport Column Experiments	This study will evaluate the movement of radionuclides under dynamic conditions relevant to Yucca Mountain. Such experiments provide validation of the batch sorption experiments as well. Transport of Np, Se, Cs will be evaluated, and a major purchase of capital equipment will be made to enable dynamic retardation experiments to be conducted for radionuclides in unsaturated tuff. These data contribute to transport process models (WBS 1.2.3.4.1.5.1) and to demonstrate compliance with 40CFR191.
1.2.3.4.1.4.2	Diffusion	Techniques will be developed and experiments begun to measure the diffusion of conservative and non-conservative radionuclides into the rock matrix. This study will provide data for which additional retardation credit may be taken which is especially important for poorly or non-sorbing radionuclides. These data are input to TSPA and contribute to transport process models (WBS 1.2.3.4.1.5.1) and to demonstrate compliance with 40CFR191.
1.2.3.4.1.5.1	Retardation Sensitivity Analysis	This study evaluates which processes have the greatest effect on radionuclide transport. Integrated transport calculations will be conducted along with code development to increase the realism of the simulations. These studies provide a check on PA models and to demonstrate compliance with 40CFR191.
1.2.3.4.1.5.2	Demonstration of Applicability of Laboratory Data	This study is designed to ensure that data acquired in the laboratory are relevant to field-scale processes. Work will begin in P-tunnel where a vitric to zeolitic transition in unwelded tuff (much like the Calico Hills Tuff) is exposed that will be used to conduct field-scale migration tests. This study is aimed at evaluating the hydrologic and geochemical barrier that the Calico Hills Tuff may be expected to provide. It is expected that actual migration experiments will be conducted in the Calico Hills Tuff in support of the licensing cycles. These data contribute confidence to transport process models (WBS 1.2.3.4.1.5.1) and to demonstrate compliance with 40CFR191.

1.2.3.4.2	Geochemical Modeling	This WBS includes all work on the EQ3/6 geochemical modeling code. This WBS does not produce deliverables directly related to suitability or licensing, but enables geochemical modeling in other WBS elements that do use it for those purposes. FY 1995 efforts will concentrate on inclusion of a boiling sub-model, code maintenance, and software verification of selected components of the code.
1.2.3.4.x	Geologic and Engineering Materials Bibliography of Chemical Species (GEMBOCHS)	This WBS incorporates database development and maintenance for WBS 1.2.3.4.2 Geochemical Modeling.
1.2.3.6.2.1.1	Isotopic Analysis of Modern Precipitation	Develop isotopic baseline for modern precipitation, to be compared with isotopic data from UZ fracture fills, to assess association with ground flow in UZ with paleoclimatic parameters.
1.2.3.6.2.1.2	Paleoclimate Study of Lake, Playa and Marsh Deposits	Interpret, and develop a chronologic framework for, the magnitude and rapidity of past climate changes from the chemistry, fauna, flora, and sedimentary character of fine grain Quaternary deposits. Synthesis of these and other paleoclimate data occurs in 1.2.3.6.2.1.5.
1.2.3.6.2.1.3	Climatic Implications of Terrestrial Paleoecology	Characterize past vegetation change. Utilize these changes to assess magnitude (quantitative estimates) of climate change. Synthesis of these and other paleoclimate data occurs in 1.2.3.6.2.1.5.
1.2.3.6.2.1.4	Paleoenvironmental History of Yucca Mountain	Assess the age of deposits significant to seismic hazard assessment. Determine the distribution, age, genesis, soil properties, and physical properties of surficial deposits. Interpret paleoclimate conditions and chronology from character of deposits
1.2.3.6.2.1.5	Paleoclimate-Paleoenvironmental Analysis	Synthesize data from the above studies to interpret climate and resulting landscape changes that may impact infiltration flux, amount of available water flow to the UZ, and ground water discharge.

1.2.3.6.2.1.6	Future Regional Climate and Environments	Identify impact of global climate drivers on the regional and local scale of Yucca Mountain, utilizing current climate and paleoclimate data to validate the regional and global models. Define possible reasonable and extreme climate scenarios that may occur during lifetime of the repository.
1.2.3.6.2.2.1	Quaternary Regional Hydrology	Analyze isotopic composition of, and date secondary silicates and calcites sampled from ESF, trenches, and core. Date past discharge deposits. Develop baseline isotopic data of soil fluids and gases, for comparison against isotopic data from UZ samples. Interpret data with regard to present and past geohydrology.
1.2.3.7.1	Natural Phenomenon that Might Degrade Surface Markers	The purpose of this work is to provide an evaluation on the occurrence and consequences of natural phenomenon that could degrade, disrupt, or destroy a surface marker system. The FY 95 work will evaluate the materials, costs, locations, size and shapes of possible surface marker systems in the Yucca Mountain area.
1.2.3.7.2.1	Natural Resource Assessment	The purpose of this work is to provide information for the evaluation of possible inadvertent human interference with the intended functioning of a high-level waste repository. The work will evaluate the present and foreseeable future resource potential of the controlled area in comparison to the surrounding region. For FY 95 this includes work planned to provide an evaluation for the potential of geothermal resources, industrial minerals and rocks, and continue work intended to evaluate the metallic resource potential of the site.
1.2.3.10.1	Characterization Techniques for the Altered Zone	This WBS includes work in hydrology, geochemistry, and geomechanics of the site under potential repository thermal loads. Work will concentrate on coupled processes between these areas as applied to the Large Block Test and laboratory experiments on Yucca Mountain samples. Additional modeling will attempt to bound the range of changes that might occur due to the thermal load of the potential repository. This work contributes a long-term understanding of the performance of the proposed repository for licensing purposes.

1.2.3.10.2	Characterization of Thermal Effects on the Altered Zone Performance	Measure changes in hydrological parameters, water chemistry and mineral assemblages in response to thermal perturbations. This work contributes a long-term understanding of the performance of the proposed repository for licensing purposes.
1.2.3.10.3.1	Integrated Radionuclide Release: Tests and Models	Perform field and laboratory test to characterize interactions between the waste form, waste package, and surrounding rock. Work in FY 1995 will concentrate on developing a strategy for testing releases and retardation in the presence of EBS/Near Field materials, obtain sorption data for canister corrosion products, and investigate radionuclide retardation in clinoptilolite and in tuff at elevated temperature. Mechanistic transport models will be used to evaluate laboratory results. This work is directly related to licensing by addressing EBS releases, near-field chemical perturbations, and near-field retardation.
1.2.3.10.3.2	Thermodynamic Data Determination	This WBS provides thermodynamic data required for the Integrated Testing, Spent Fuel Testing, Glass Waste Form, and Waste Package Environment tasks. Work for FY 1995 will concentrate on review of the Nuclear Energy Agency (NEA) volumes for thermodynamic data of aqueous radionuclides, determination of additional Project thermodynamic data needs (Ni and Zr), the solubility of U(VI) at high temperature, the solubility product of AmOHCO_3 , and formation constants (hydrolysis and carbonate species) for U(VI) and Pu(V). This work is directly related to the licensing issues of EBS release limits and source term development.
1.2.3.12.1	Chemical and Mineralogic Properties of the Waste Package Environment	This study provides information on probable mineralogic and chemical changes in the Near Field. FY 1995 will focus on the New Zealand hydrothermal analog where geochemical modeling will attempt to validate EQ3/6. The accuracy of thermodynamic data in GEMBOCHS will be evaluated as well as the appropriateness of reaction kinetic models. This work is directly related to predicting near-field geochemistry, substantially complete containment, and source term development.

1.2.3.12.2	Hydrologic Properties of the Waste Package Environment	This WBS attempts to predict the changes in the hydrologic system in the Near Field Environment. FY 1995 testing will include laboratory experiments on hydrologic changes on small blocks of tuff due to the circulation of hot fluids, modeling of the thermohydrologic system, and code maintenance and development. This work is key to thermal loading decisions, and supports long-term prediction of repository performance.
1.2.3.12.3	Mechanical Attributes of the Waste Package Environment	This WBS investigates perturbations in the mechanical properties of the Near Field Environment. FY 1995 work will concentrate on radiolysis effects, numeric models to predict geomechanical behavior over time, and test of the thermomechanical properties of the rock at Fran Ridge to support the Large Block Test. This work is key to thermal loading decisions, and supports long-term prediction of repository performance.
1.2.3.12.4	Engineered Barrier System Field Tests	Field-scale and laboratory-scale heater tests will be conducted to predict the coupled response of Yucca Mountain to potential repository thermal loads. Work in FY 1995 will focus almost exclusively on the Large Block Test, with some planning activities for underground tests to be conducted as well. This work is key to thermal loading decisions, and supports long-term prediction of repository performance.
1.2.3.12.5	Characterization of the Effects of Man-Made Materials on the Chemical and Mineralogic Changes in the Post-Emplacement Environment	Man-made materials have the potential for significantly perturbing the geochemistry of the potential repository. This study evaluates these materials and will focus in FY 1995 on modeling and experimental work on the effects of organic and cementitious materials, evaluate the effects of diesel exhaust emissions in the ESF, investigate anthropogenic analogs of man-made materials, and develop a database from pertinent literature. This work supports evaluation of chemical perturbations which may affect transport and waste package degradation rates.

5. DESCRIPTION OF FY 1995 TESTING PROGRAMS AND ACTIVITIES

In Section 4, site investigation activities planned for Fiscal Year (FY) 1995 were described in terms of the support they provide for Program priorities. In this section, the focus is on technical programs and their planned accomplishments for FY 1995. First, key activities and deliverables, as presented in the FY 1995 Annual Work Plan (DOE, 17 November 1994), are summarized. Next, FY 1995 activities within selected technical programs are discussed in terms of their contribution to reaching the overall goals for each technical program area. Detailed information on the scope, budget, deliverables, and past history of each WBS element are found in Appendix A. Surface-based testing activities for FY 1995 are summarized in Table 5-1 and listed in more detail on Table 5-2a (Drilling), Table 5-2b (Trenches, Test Pits, Outcrop and Pavement Studies), Table 5-2c (Geophysical Surveys), and Table 5-2d (Hydrologic Studies). ESF testing activities are summarized in Table 5-3.

5.1 Key Activities and Deliverables for FY 1995

An overview of the site investigations program for FY 1995 was presented in the FY 1995 Annual Work Plan (DOE, 17 November 1994). Key activities identified within WBS 1.2.3 are summarized below:

GEOLOGY

- Carry out ESF mapping and construction monitoring to collect irretrievable data and gather information for design verification
- Develop a preliminary 3-D geologic framework model for the site synthesizing available laboratory thermal and mechanical properties and all surface geologic data
- Complete an analysis of all seismic sources as the basis for seismic hazard analysis
- Conduct data needs workshops for probabilistic seismic hazard analysis
- Conduct geochronology studies to support tectonics programs
- Drill deep boreholes in support of repository design and performance assessment (SD-7 phase 1; complete SD-12)
- Complete geophysical logging of 11 boreholes to provide qualified stratigraphic and hydrologic data
- Complete data collection and provisional analysis for regional geophysics program

GEOCHEMISTRY

- Develop a site integrated transport model
- Conduct thermal effects studies including altered zone studies and near-field environment studies
- Acquire and model thermodynamic data
- Conduct P-tunnel experiment on Calico Hills non-welded type materials to provide the only field radionuclide transport experiment of the primary repository barrier
- Prepare a preliminary model of the vitric-zeolitic transition in the Calico Hills type formation in P-tunnel
- Conduct laboratory experiments on solubility, sorption and retardation

- Conduct the Large Block Test to provide field scale thermal data that will be the only field scale thermal test information available for evaluation of technical site suitability
- Conduct natural analog studies to test coupled process models

HYDROLOGY

- Develop a saturated zone model (software) for use by TSPA in FY 1996
- Develop an interim unsaturated zone model (software) for use by TSPA in FY 1996
- Develop a preliminary fracture-flow model of Yucca Mountain
- Validate the nested global/regional future climate model
- Prepare a preliminary regional 3-D hydrologic model
- Conduct testing of ambient pneumatic conditions at Yucca Mountain prior to excavation of the ESF
- Conduct tests in ESF alcoves at the Bow Ridge fault and at contacts above and below the Paintbrush Tuff non-welded unit
- Sample and analyze hydrochemical and geochemical properties in surface boreholes and ESF alcove boreholes
- Conduct C-well testing to determine ground water travel time and hydrologic transport parameters
- Drill borehole WT-24 to evaluate the large hydraulic gradient near Yucca Mountain

In support of the key activities identified, the following key milestones were identified:

- Report on the Ages of Surficial Soil Deposits
- Extended Site Geologic Framework Model
- Main Drift Geotechnical Report
- Report on Bounding Conditions for Future Climate
- Update of the Extended Site Model
- Seismic Reflection Profiles
- Tectonic Model(s) Report
- Paleodischarge Deposits Report
- Preliminary 3-D Saturated Zone Flow Model Progress Report
- Gravity and Magnetics Data on Regional Seismic Lines Report
- Thermal/Mechanical Material Property Model
- Analysis of the Impact of Heterogeneity
- Analysis of the Large Block Test
- Preliminary Report Synthesizing Geology, Geophysics, and Seismic Reflection Data
- Climate Model Validation Report
- Report on Confining Pressure and Thermal Expansion Experiments
- Report on the Effect of Sample Saturation on Measured Thermal Conductivity
- Report on Strategies for Integrated Testing
- Test Plans for Transport Studies in Unsaturated Materials
- Report on Mechanical Property Experiments
- Report on Time-Dependent Properties of Fractures in Welded Tuff
- Preliminary Paleoclimate Synthesis
- Update of Extended Site Model

- Interpretation of Multiple Geophysical Surveys
- Synthesis of Geophysics Data for East-West and North-South Alignments
- Report on Time-Dependent Mechanical Properties of Intact Welded Tuff at Elevated Temperatures
- Report on Mechanical Properties of Fractures on Samples from ESF and Boreholes
- Distribution of CL36 in UZ-16 and UZ-14
- Progress Report on P-Tunnel Experiments
- Report on Site-Scale Integrated Transport
- Intermediate Unsaturated Zone Hydrologic Framework Model

5.2 Technical Program Plans for FY 1995

In this section, selected technical programs are described in terms of their overall goals and the relation of FY 1995 activities to achieving those goals. Details of work scope, budget, and deliverables for each activity funded in FY 1995, are found in Appendix A. Figure 5-1 shows planned boreholes for FY 1995. Figures 5-2 and 5-3 show planned trenches in the site area and associated with regional studies, respectively.

5.2.1 Preclosure Tectonics

The purpose of the activities within the preclosure tectonics program is threefold: 1) provide the information required to evaluate the suitability of the site with respect to tectonic hazards, 2) provide seismic design inputs for Advanced Conceptual Design, and 3) provide information on tectonics to support a license application. The program consists of two components-- data collection and analysis. Data collection has been ongoing for several years and includes geologic mapping, fault trench studies, seismic monitoring, and geodetic monitoring. Geophysical data collected under other programs also contributes to evaluation of tectonics issues. Data analysis includes studies to identify and characterize seismic sources (WBS 1.2.3.2.8.3.1), to evaluate fault displacement (WBS 1.2.3.2.8.3.6) and ground motion relations (WBS 1.2.3.2.8.3.3), to develop and evaluate tectonic models (WBS 1.2.3.2.8.4.12), to assess seismic hazards (WBS 1.2.3.2.8.3.6), and to develop seismic design inputs (WBS 1.2.3.2.8.3.5). On the basis of previous work, volcanic hazards are considered negligible during the preclosure time frame.

During fiscal year 1995, fault data collection studies will in large part be completed (WBS elements 1.2.3.2.8.4.3 through 1.2.3.2.8.4.6). Results of these studies, along with information on seismicity (WBS 1.2.3.2.8.4.1) and tectonic models (WBS 1.2.3.2.8.4.12), will form the database that geologic and seismologic experts will interpret to develop inputs for the probabilistic seismic hazards assessment. Also in fiscal year 1995, the planning for the probabilistic seismic hazard assessment (WBS 1.2.3.2.8.3.6) will be carried out. A workshop to assess the state of the database and to identify additional analyses required to support the expert interpretations will be held in mid-fiscal year 1995. Within the ground motion program (WBS 1.2.3.2.8.3.3), analyses will be carried out to develop an empirical ground motion attenuation relation that is appropriate for Yucca Mountain and a ground motion workshop will be held to examine different approaches to ground motion modeling at Yucca Mountain. The results of these analyses will support the development of ground motion inputs to the probabilistic seismic hazards assessment that will be carried out in fiscal year 1996.

Related efforts will also be carried out in Work Breakdown Structure element 1.2.5. A series of three topical reports describing the seismic design process for Yucca Mountain are planned. The first topical report, "Methodology to Assess Fault Displacement and Vibratory Ground Motion Hazards at Yucca Mountain" was completed in fiscal year 1994. A second topical report, "Seismic Design Methodology for Yucca Mountain," was initiated in fiscal year 1994 and will be completed this fiscal year. A third topical report describing the results of the probabilistic seismic hazard assessment and the development of seismic design inputs will be initiated in fiscal year 1996.

Using the seismic design methodology and the results of the probabilistic seismic hazards assessment, seismic design inputs for fault displacement and vibratory ground motion will be developed in fiscal year 1996. These inputs will form the basis for evaluating whether a repository can be designed for appropriate seismic hazards using reasonably available technology. This evaluation will support the development of a Technical Basis Report on Tectonic Hazards.

With respect to preparation of a license application, activities within the preclosure tectonics program are to provide the necessary information to describe the tectonic setting of the site, to evaluate potentially adverse conditions, and to determine appropriately conservative seismic design inputs. The FY 1995 activities that support the site suitability evaluation, also support preparation of the license application. In addition, seismic monitoring will continue during fiscal year 1995 to provide an up-to-date catalog of earthquakes in the southern Great Basin and detailed information on any significant events that occur. Also, a study plan will be prepared for the collection of in-situ stress data. These data, to be collected in future years, will be used to confirm the conclusions on state of stress in the vicinity of Yucca Mountain based on previous results and analysis of seismic data.

5.2.2 Postclosure Tectonics

The purpose of the activities within the postclosure tectonics program is twofold: 1) provide the information required to evaluate the suitability of the site with respect to total system performance, and 2) provide information on postclosure tectonics to support a license application. The program consists of two components-- volcanism effects and effects of other tectonic processes on waste packages and the hydrology and geochemistry of the site.

During fiscal year 1995, refined volcanism probability calculations for renewed volcanism in the Yucca Mountain region (E1) and disruption of the repository (E2) will be carried out. Dating, geochemical analysis, and mapping of Sleeping Butte and Crater Flat volcanic centers will also be accomplished. The intrusive and extrusive effects of volcanism on repository performance will receive much of the emphasis in this fiscal year. In addition, within WBS 1.2.5, an expert elicitation will be held on the E1 and E2 figures and the methodology employed to reach those results. The panel will consist of experts external to the project.

Tectonic effects (WBS 1.2.3.2.5.2) will be examined with respect to two issues during FY 1995: 1) structural controls on basaltic volcanism near Yucca Mountain and 2) tectonic effects on hydrology. To address the first issue, the sensitivity of geophysical data in identifying and modeling basaltic structures will be studied. For tectonic effects on hydrology, hydrologic models will be developed and used to assess the perturbations that might be imposed by tectonic

processes such as fault displacement. This information will be used to provide performance assessment with scenarios for tectonic effects on the hydrologic regime at Yucca Mountain. This will, therefore, support the effort to evaluate the suitability of the site with respect to total system performance assessment.

With respect to preparation of the license application, activities within the Postclosure Tectonics program aim to provide the necessary information to describe the effects of volcanism and other tectonic processes on the emplaced waste canisters, the hydrologic regime, or the geochemical regime. This information will be taken into account in carrying out total system performance assessment to demonstrate that the potential repository meets the requirements of Title 10, Code of Federal Regulations, Part 60. Activities within this program carried out in fiscal year 1995 to support the evaluation of site suitability also support preparation of the license application.

5.2.3 Regional Hydrology

The main contribution of the regional hydrology program to support technical site suitability findings is to provide boundary conditions for TSPA modeling. In the FY 1995 time frame these boundary conditions will come from the Analytic Element Model (AEM) currently being constructed. The AEM will also provide second-model confirmation and further insights into regional hydrologic processes as elucidated by the MODFLOW model.

In addition, reports will be issued discussing improved understanding of several key hydrologic issues, including: recharge rates in Fortymile Wash, nature of the large hydraulic gradient north of Yucca Mountain, and potentiometric surface level measurements in North Crater Flat, Northern Yucca Mountain, and the east flank of the Funeral Mountains.

Monitoring of regional weather patterns, precipitation, and runoff and streamflow will provide regional and site-scale models with input for surface flux. The most appropriate type of stochastic rainfall simulator will be determined by analyzing the frequency of types of precipitation events. Information on infiltration flux from natural sources will be augmented by ponding and artificial infiltration experiments in Fortymile Wash.

Other regional activities which contribute to license application include testing and analysis of G-2 to gain information on the large hydraulic gradient. An interpretive regional framework data set will be assembled as a basis for a regional hydrogeologic framework model. Data sets to be included consist of: a potentiometric surface map, a recharge distribution map, a map of discharge areas, a regional springs map and a regional vegetation map.

5.2.4 Unsaturated Zone (UZ) Hydrology

In FY 95, UZ hydrology support to TSS will include improved modeling capabilities, instrumentation of existing holes, and synthesis of existing data. UZ hydrochemistry studies will provide data to validate UZ flow models.

Fracture flow models will be developed for the North Portal of the ESF and Tiva Canyon units. These models will be coupled with the FracMan code to investigate 2-phase flow in fractured, unsaturated rock to provide a better understanding of UZ flow processes, and improved support to UZ Site-Scale Modeling.

Boreholes to be instrumented in FY 95 include NRG-6, NRG-7a, UZ-7, SD-12, and SD-7. Each hole will be instrumented and monitored for in-situ pneumatic pressure, temperature, and water potential. Prior to instrumentation, each borehole will be tested for air-permeability and the results used to augment lab core data to support UZ Site-Scale modeling.

The Site-Scale UZ Flow Model will be modified to include the effects of gas flow, temperature, heat flow, and the effects of the ESF. The model will be calibrated against saturation and capillary head pressures from cores and instrumented holes.

UZ hydrology's FY 95 contributions to repository licensing include the generation of surficial materials properties and flux maps, lab core and in-situ testing for hydrologic properties, and collection and analysis of UZ hydrochemical data for UZ flow model validation and fast-path transport analysis. These studies all provide information to be used in the construction, validation, and application of the 3-D UZ Site-Scale Model.

The UZ Site-Scale Model will be used to conduct sensitivity studies to determine the sensitivity of model parameters to uncertainty. The results of these studies will be used to prioritize data collection activities in support of license application.

5.2.5 Saturated Zone (SZ) Hydrology

Saturated Zone studies in FY 1995 will test flow parameters in saturated, fractured rock through single- and multiple-well hydraulic testing. Initiation of multiple-well testing at the C-wells complex in early FY 1995 will be augmented by single-well tests at selected WT and G holes. Approximately three existing WT holes and one G hole (G-2) are scheduled for single-well testing. One additional WT hole (WT-24) will be drilled and tested in FY 95 to increase available information on the large hydraulic gradient north of Yucca Mountain.

A 3-D saturated zone framework model will be constructed so as to be compatible with the 3-D geologic framework model. In coordination with Los Alamos National Labs the SZ framework model will be linked with the SZ flow code FEHMN.

Saturated zone hydrochemistry studies will be coordinated with WBS 1.2.13 (Environment, Safety and Health) groundwater sampling program. WBS 1.2.3.3 coordination with WBS 1.2.13 is essential to realize maximum benefits from common work and capital equipment.

Potentiometric level information will be collected and analyzed to evaluate assumptions of steady-state system behavior. Hydrologic testing performed in support of technical site suitability (C-wells testing, WT- and G-hole testing) will also provide hydrologic parameters for support of a license application. The construction of the 3-D site-scale framework model will provide the necessary background for development of the Site-Scale SZ Model.

The purchase of the saturated zone hydrochemistry tool and support equipment, which will take place in FY 1995, is the first step towards obtaining saturated zone chemistry data needed for license application. Although of limited usefulness, hydrochemical samples taken during WT- and G-hole cleanouts will be used to compare with chemistry samples taken during "out-year" sampling.

5.2.6 Mineralogy/Petrology

Mineralogy/petrology work will continue in FY 1995 by quantification of bulk and fracture mineralogy in core and from ESF samples. Much of the effort in this area is intended to support development of a 3-D mineralogic model to support radionuclide transport, as it describes the distribution of mineral phases that sorb radionuclides. Studies of the origin of calcite-silica, including deep-seated (as opposed to near-surface trench 14 deposits) calcite, will continue to constrain the paleohydrologic system. Fibrous mineral studies will contribute to the understanding of potential risks to worker health and safety. Mineral stability experiments will contribute data needed to build a conceptual understanding of the mineralogic response of Yucca Mountain to a repository-induced thermal load. Studies will also continue to evaluate Yucca Mountain as a self analog to repository-induced conditions.

5.2.7 Geochemistry

Studies in geochemistry involve investigations into the following topics: a) factors that affect radionuclide transport in the far-field, b) factors that affect radionuclide transport in the near-field, c) evaluation of whether data gathered in the laboratory are applicable at the field-scale, d) modeling of site-scale radionuclide transport, and e) code and database development and maintenance for geochemical modeling. In FY 1995, far-field transport studies will concentrate on the solubility limits, sorption, and diffusion of radionuclides--especially Np, Pu, and to a lesser extent Se and Tc. These radionuclides have been identified by TSPA as important contributors to cumulative and dose-based releases. A conceptual groundwater chemistry model designed to describe the variability and reactions that control the variability in Yucca Mountain ground waters through space and time. Other studies will begin to focus on the synergistic effects of the host rock, waste package degradation materials, and other man-made materials on near-field retardation and transport. Field-scale experiments will begin in P-tunnel at Rainier Mesa on the Nevada Test Site where an unwelded tuff similar to the Calico Hills Formation is exposed. Initially, the rock will be characterized for bulk mineralogy and hydrologic properties prior to migration tests. This test serves two purposes: to investigate the efficacy of the Calico Hills Formation as a barrier to transport, and to evaluate the applicability of laboratory data. Integrated transport process models will be carried out by the Retardation Sensitivity Analysis task. The FEHM code, used to conduct these calculations, will be enhanced, as well as EQ3/6, a widely used geochemical code within the project and in the academic community at large.

5.2.8 Near-Field and Altered Zone Studies

The Altered Zone can be understood as the region of the mountain where elevated temperature may significantly alter hydrologic, geochemical or geomechanical properties of the rock, whereas the Near-Field is limited to the immediate vicinity of the Engineered Barrier System (EBS). Altered-Zone studies, including modeling, laboratory measurements and experiments, and field-scale tests, will be conducted to evaluate coupled thermal-mechanical-hydrologic processes. Similar studies will be conducted to evaluate coupled processes in the near field environment. Near-field studies are important to help determine near-field releases and waste-package degradation. Both Near-Field and Altered-Zone studies are closely tied to the Large Block Test, a field-scale heater test designed to measure coupled processes and prototype large underground field tests. Both are also closely linked to thermal management strategies by predicting the response of Yucca Mountain to different thermal loads.

5.2.9 Climatology

The overall function of climate studies in FY 1995 is to collect data to develop empirical models of paleoclimate and paleohydrologic conditions in the Yucca Mountain region, and a numerical model to predict future climate conditions. The numerical climate model links a global atmospheric circulation model with a regional scale model, and uses modern climate data for calibration. Samples from late Quaternary lake, playa, and marsh deposits, and packrat middens will be acquired and evaluated for paleontologic and isotopic analysis. These data will provide a characterization of the precipitation amounts, temperature, and duration of past climate extremes, and to validate the numerical future climate model. Geochemical and isotopic analyses will be conducted of calcite and silica deposits in boreholes, trenches, underground and surface exposures. These data, coupled with the paleoclimate studies, will be used in developing a model of the history of groundwater flow at Yucca Mountain.

5.2.10 Inadvertent Human Interference

The FY 95 work under the inadvertent human interference program is planned to aid in addressing the technical site suitability of the site and be applied in the licensing strategy. This work is aimed at evaluating a site for the possible development of natural resources. A site with a high potential for natural resource could lead to inadvertent human interference (e.g., drilling, creation of water impoundments, etc.) with the intended functioning of a high-level waste repository, thus, a site with a low potential for natural resources is desirable. In addition, the inadvertent human interference issue is intended to evaluate the feasibility of a surface marker system that would warn future generations of a hazard and prevent inadvertent human interference with the functioning of a repository.

The FY 95 work is intended to provide an evaluation for the potential of geothermal resources, industrial minerals and rocks, and continue work intended to evaluate the metallic resource potential of the site (WBS 1.2.3.2.1). Other FY 95 work (WBS 1.2.3.7.1) is intended to provide recommendations on possible surface marker systems including location, size, shape, materials, and configuration specifically tailored for the Yucca Mountain site.

6. SCHEDULE OF SITE INVESTIGATION MILESTONES AND DELIVERABLES

Within the project management structure applied to the Yucca Mountain Project (YMP), progress is measured through the achievement of milestones and deliverables. A milestone is generally defined as the completion of some specified task or series of related tasks, whereas a deliverable is typically defined as the submittal of a completed work product (e.g., report, map). Milestones and deliverables are established within a hierarchy of importance and responsibility.

Level 1 milestones represent major Program accomplishments and are the responsibility of the DOE's Office of Civilian Radioactive Waste Management (OCRWM). Level 2 milestones are significant Project achievements associated with evaluation of site suitability and preparation of a license application, and are the responsibility of the Yucca Mountain Site Characterization Office (YMSCO). Level 3 milestones or deliverables represent the completion tasks by the Participants and are associated with the submittal of a product to the YMSCO. Internal Participant products are Level 4 deliverables or milestones.

Typically, a milestone or deliverable at one level results from the successful completion of several milestones and deliverables at a lower level (higher level number) within the system. By following this inter-relationship among milestones up through the system (to lower level numbers), one can understand how the accomplishment of major Program goals derives from the accomplishment of many smaller, but related tasks along the way.

Since Program and Project progress are measured through the achievement of milestones and deliverables, it is important to have a clear understanding of what action is required to fulfill a milestone or deliverable. Consequently, each Level 3 deliverable has an associated Deliverable Criteria Statement that describes the objective, content, expected completion date, and acceptance criteria for the deliverable. This information is now included as part of the Project and Control System (PACS) and is found on PACS Summary Account sheets. For convenience, the deliverable criteria for FY 1995 deliverables within WBS 1.2.3 are compiled in Appendix B. Deliverables are also listed in Table 6-1 by scheduled completion date and in Table 6-2 by WBS element.

For Site Investigations activities to be carried out in FY 1995, an integrated baseline schedule of milestones and deliverables is presented in Figure 6-1. This schedule is internally integrated through the inclusion of logical ties among the activities. It forms the basis for integration among other WBS elements such as WBS 1.2.2 Waste Package, WBS 1.2.4 Repository, WBS 1.2.5 Regulatory and Licensing, and WBS 1.2.6 ESF Design and Construction. To show the relation of FY 1995 activities to the Long-Range Plan, Figure 6-2 shows the integrated schedule for the WBS 1.2.3 Long-Range Plan.

7. LONG RANGE PLAN AND DISCUSSION OF VARIANCE OF FY 1994 ACTIVITIES

Planning for a given fiscal year takes place within the framework of a long-range plan. The deliverables and milestones achieved in each fiscal year represent, in many cases, steps towards some larger and longer-term goal. Thus, changes in the long-range plan and variances from it affect the work that is planned in subsequent years. This section addresses the relation of Fiscal Year (FY) 1995 planned activities to the Long-Range Plan (LRP) for WBS 1.2.3 (Site Investigations) with an emphasis on the impacts of strategic changes to the LRP and of variances related to FY 1994 work.

The LRP for WBS 1.2.3 derives from the Project LRP. During FY 1994, the Project LRP was significantly revised to implement the Program Approach. This approach is summarized at the Project level in the Yucca Mountain Project 5-Year Plan (DOE, 1994). In response to this new long-range Project Plan, the LRP for WBS 1.2.3 was updated to take into account the Program Approach. These plans represent a new baseline against which future cost and schedule variances and impacts can be measured. The FY 1995 plan, however, was developed concurrently with the Project and WBS 1.2.3 LRP's and takes into account accomplishments of prior years, including FY 1994. Thus, there are no impacts on FY 1995 planned activities due to changes in the LRP or variances from the LRP because the Program Approach represents the new LRP baseline.

To provide a brief summary of the LRP framework for WBS 1.2.3, Table 7-1 presents the schedule of Level 2 milestones within WBS 1.2.3. This list identifies the major Project accomplishments within the Site Investigations area that will lead to an evaluation of technical site suitability and the preparation of a license application, if the site is found suitable. The description of each of these milestones is presented in the LRP for WBS 1.2.3; descriptions for those milestones planned for FY 1995 are presented in Appendix B.

8. MANAGEMENT AND COORDINATION OF SITE INVESTIGATIONS ACTIVITIES

Management and coordination for WBS 1.2.3 includes the planning, implementation, and monitoring of site investigations activities. Planning is made up of defining and prioritizing work activities that result in required products leading to the achievement of project goals. This function also involves establishing schedules and budgets. Implementation encompasses those activities that facilitate the initiation and accomplishment of the planned tasks within a quality assurance environment. Monitoring involves tracking task progress against a baseline such that variances can be identified and addressed. Monitoring also includes review of results obtained, determination that milestones and deliverables meet their acceptance criteria, and evaluation of results for implications to future work.

For all these functions, integration of site investigations activities with other WBS elements is also an important role of management. The results of site investigations activities ultimately support goals and objectives outside of WBS 1.2.3 (e.g., design, performance assessment, regulatory interaction, site suitability evaluation, preparation of a license application). Integration is accomplished largely through interactions during the planning process. Short- and long-term requirements from other WBS elements are checked against the annual and long-range plans for WBS 1.2.3 to determine that the correct activities are being carried out. Site investigations activities that are not required either internally or by other WBS elements are eliminated from the plan. Integration also includes soliciting and considering advice from various advisory groups, both within and external to the Project. Internal advisory groups include the Technical Advisory Group (TAG), the Sample Oversight Committee (SOC), and the various technical integration groups.

Aspects of management and coordination for site investigations are addressed in several project documents. The Test and Evaluation Plan provides the framework for the development of Study Plans and test-control documents, the handling of samples, the implementation of tests including necessary facilities construction, and the evaluation of data derived from tests. The coordination, monitoring, and reporting of surface-based testing (SBT) activities are discussed in the Surface-Based Test Coordination Management Plan (YMP 92-27). A similar document for testing in the Exploratory Studies Facility is in preparation. The goal of these management and coordination activities is to implement successfully the testing program outlined in this annual plan and in the long-range plan.

Prior to FY 1992, planning and scheduling activities were the responsibility of several groups. These included management personnel, facilitators, implementors, and archivists. As the work volume and complexity of the program expanded, these activities were consolidated under the current management organization consisting of the Department Of Energy (DOE) / Project Management Organization (PMO) and Civilian Radioactive Waste Management Systems Management and Operations (M&O) contractor personnel. This organization is led by the DOE Assistant Manager of Scientific Programs (AMSP) and includes all WBS managers and their M&O counterparts.

In the following sections, the management and coordination functions for site investigations are examined in more detail.

8.1 Planning

The planning process defines a sequence and schedule for activities to achieve products that support project objectives and goals. Ancillary support activities and the logical dependence of activities upon one another also are specified. Finally, resources are allocated to carry out the identified activities.

For Site Investigations, the planning process flows down from the Project 5-Year Plan to the Long-Range Plan for WBS 1.2.3 and then to the annual Technical Implementation Plan for WBS 1.2.3. Other factors that influence the planning process are Program guidance on annual priorities and budget allocations. Within WBS 1.2.3, the first step is to update the Long-Range Plan (LRP) consistent with current Program and Project strategies, and taking into account accomplishments and variances during the preceding year. Based on the updated LRP, the activities to be carried out in the subsequent fiscal year and the products to be delivered are identified and defined. Next, interactions are held with other WBS elements to provide for integration. Costing for the prospective activities is then carried out by the Participants. Following this, budget constraints are examined and adjustments are made to planned activities. Once agreement is reached on work scope, budget and schedule, the plan is baselined.

During the planning process for FY 1995, the Program Approach was developed. This approach, as described in the Project 5-Year Plan, served as the basis for updating the LRP for WBS 1.2.3. The 5-Year Plan provides an integrated overview of activities, work products, and the sequence and schedule for site investigations testing and analyses that coherently ties to design, regulatory, and performance assessment programs. The LRP describes higher level activities and goals for Site Investigations. The updated LRP, along with FY 1995 budget allocations, were translated into the Technical Implementation Plan (TIP) for FY 1995 by the AMSP management team with input from various advisory sources.

Another aspect of planning for Site Investigations is the preparation of Study Plans. Coordination of Study Plan preparation and review was transferred from WBS 1.2.5 to WBS 1.2.3 beginning in FY 1995. Study Plans provide a more detailed explanation of activities to be carried out than is available in the Site Characterization Plan and are a prerequisite to carrying out any site characterization activities. Study plan preparation and revision are included as activities in the FY 1995 TIP and are summarized in Table 8-1. In addition, a schedule for sequencing the production of Study Plans has been established that is consistent with the updated LRP.

8.2 Implementation

Management and coordination of the implementation of WBS 1.2.3 activities involves several related efforts. Often, planned field activities support multiple objectives within the site investigations program. These objectives must be prioritized such that activities to achieve secondary objectives do not compromise the primary objective. In addition, some activities are carried out under the Yucca Mountain Project quality assurance and environmental programs. Prerequisites to carrying out such activities must be accomplished and documented. Within the implementation function, the management organization sees that these requirements are met.

One of the roles of management within the implementation function is to identify and resolve conflicts among competing objectives in carrying out field activities. Many planned field

activities support multiple technical programs. This is encouraged in order to achieve cost efficiencies, but must be carefully managed to provide that technical objectives, planned sequencing of activities, and schedules are not unduly compromised. As part of the Test Coordination effort, this role is accomplished through structured "work scope consolidation." Work scope consolidation is a process in which input is solicited from principal investigators, and personnel carrying out support activities, on the technical objectives supported by an activity and the logistical constraints associated with it. The management organization, in consultation with the technical community, establishes the primary objective of the activity and a sequence and schedule of activities to support it. Secondary objectives that can be supported without compromising the primary one are then accommodated.

The result of this effort takes the form of test-specific design requirements that describe the activity to be performed in sufficient detail for implementation. These requirements incorporate Program requirements and, to the degree possible, the scientific needs of all test participants and constructors, commensurate with general requirements associated with obtaining the various permits and environmental clearances. They represent the requirements to be met in the implementation of the test activity and provide the test specific description of the work scope for subsequent inclusion in Test Planning Packages/Job Packages (TPP/JPs) as required by existing procedures. The process and responsibilities of Test Coordination functions are described in respective management plans for Surface-Based and ESF Test Coordination.

Upon completion of the work consolidation effort, TPPs and JPs are compiled by the Test Coordination Office in accordance with appropriate project procedures. These packages serve to document that all prerequisites to field activities have been completed. Prerequisites include test interference analyses, analyses of potential impacts to waste isolation, compliance with necessary environmental regulations and policies, compliance with various permitting requirements, and the establishment of test controls.

Work authorization documents are required for all field construction activities. These documents govern the commitment of construction resources ancillary to the conduct of field testing.

The actual conduct of field testing is monitored by the Field Test Coordinator and to a lesser degree by the Test Coordination Office. The Field Test Coordinator is responsible for determining that the test is conducted in accordance with the implementation plan established and documented in the TPP. All changes that could substantially affect the technical goals of the test are brought to the attention of management and the appropriate Test Coordination office for action, simultaneously with the notice given to the field change control board. Management and the appropriate Test Coordination office carry the responsibility of resolving required changes in the technical conduct of the test.

8.3 Monitoring

Progress towards achieving WBS 1.2.3 goals for a given fiscal year is tracked through monthly examination of cost and schedule variances. Participants provide cost and schedule status for each funded Planning and Scheduling Account to the PACS on the ninth working day of each month. Technical progress is reported in monthly reports and in regular meetings with members of the AMSP management team. Reporting on progress is accomplished monthly in project management meetings held by the YMSCO Project Manager and in periodic meetings with the Program Director. To support these meetings, comprehensive status reports for WBS 1.2.3

including technical, cost and schedule variance information are compiled by the AMSP/PMO with assistance from the M&O Site Investigations Planning Group.

Deliverables and milestones are the concrete evidence of progress and thus are the focus of the monitoring effort. To facilitate the management of Level 3 (Participant) deliverables that support Level 2 (YMSCO) milestones, each has been given a unique identifier in the PACS. To track receipt and initiate the review and acceptance of deliverables, formal notification of the deliverable submittal to the YMSCO is required. Submittals for WBS 1.2.3 deliverables are made to the Assistant Manager for Scientific Programs (AMSP), with copies going to the WBS managers sponsoring the work and to the M&O Site Investigations Manager. The submittal should be accompanied by a letter that references the deliverable by its unique identifier.

Once a deliverable is received, the AMSP or a designated WBS manager acknowledges receipt to the Participant and initiates an acceptance review. The acceptance review will examine the deliverable in terms of its deliverable criteria statement to determine that it meets its intended purpose. Following acceptance, the information will be archived in the Project Data Base. In addition, the information will be incorporated into management documents described in Test Coordination Management Plans (e.g., the Borehole/Drilling Catalog, the Geophysics Catalog, the Trench and Test Pit Catalog). Incorporation of information into these documents is the responsibility of the M&O and the appropriate Test Coordination office.

Prior to the submittal of deliverables, Participants provide the status of deliverables in their monthly input to the PACS. TIP data sheets and deliverable tables will also be updated with status information in the draft and final versions of the next year's TIP.

At the end of the fiscal year, the status of milestones and deliverables is summarized. The impacts of uncompleted deliverables and studies are assessed and schedules for their completion established prior to initiation of follow-on work. Impacts on the LRP are evaluated, submitted to management, and accommodated in the annual update of the LRP as required.

As part of the monitoring function, it is also necessary at times to re-allocate resources during the fiscal year. Results from completed or ongoing activities, changed conditions, or unanticipated circumstances can motivate or require that the original plan be adjusted. This re-planning is initiated by Participants or the DOE WBS Managers with appropriate input and assistance from M&O WBS counterparts and other affected Participants. Cost/Schedule Change Requests (C/SCRs) are required to revise the Project Baseline formally. Depending on the magnitude of the proposed changes different levels of approval are required. Impacts of revised funding, work scopes, and schedules are articulated in the C/SCRs. Documentation of the revised plans, including impacts on ongoing site investigations activities, will be included in the annual Technical Implementation Plan and, if appropriate, in the Site Investigations LRP.

TABLE 8-1: Estimated Schedule for Submission of Study Plans to the NRC for FY 1995

Submitted:
<p>September 1994: Ground Motion from Underground Nuclear Explosions</p> <p>October 1994: None</p> <p>November 1994: Historical and Current Seismicity (R1) Tectonic Models and Synthesis</p>
To be Submitted:
<p>Early FY 1995 Three Dimensional Rock Characteristics Model Laboratory Determination of the Mechanical Properties of Fractures</p> <p>Mid FY 1995 Characterization of Yucca Mountain Unsaturated Zone-ESF Investigations (R3) Kinetics and Thermodynamics of Mineral Evolution Analysis of Waste Package Rupture due to Tectonic Processes and Events (R1) Relevant Earthquake Sources (R1) Ground Motion from Regional Earthquakes (R1) Characterization of Chemical and Mineralogic Changes in the Post Emplacement Environment Engineered Barreier System Field Tests</p> <p>Late FY 1995 Dynamic Transport Column Experiments Laboratory Determination of the Mechanical Properties of Intact Rock (R1) Probabilistic Seismic Hazard Analyses In Situ Testing of Seal Components Hydrologic Properties of the Waste Package Environment Effects of Man-Made Materials on Water Chemistry</p>

9. SITE INVESTIGATIONS INTERFACE WITH OTHER YMP ELEMENTS

The site investigations program is designed to provide information on the geologic, hydrologic, geomechanical, and geochemical characteristics of the site. Information is gathered using a variety of field and laboratory techniques. These include surface-based drilling and *in situ* testing at depth within the ESF. In the near-term, this information is primarily used as inputs for development of Technical Basis Reports in support of Site Suitability findings, and as inputs to design and performance assessment (PA) evaluations. In addition, data from site characterization activities is used for testing predictions made by design and performance assessment calculations. In the longer-term, this information will be used to prepare a license application if the site is suitable and to demonstrate compliance with post-closure regulatory requirements.

In this section, necessary interfaces with other WBS elements are highlighted from the WBS 1.2.3 viewpoint. Additional information regarding the other third-level WBS elements can be found in their respective annual TIPS. An overview of all Project element interfaces is contained in the FY 1995 Yucca Mountain Project TIP.

9.1 Site Investigations Interface with Systems Engineering (WBS 1.2.1)

Systems Engineering evaluates compatibility of systems and subsystems associated with the waste package, repository layout and design. Structural and stratigraphic data being collected in the site investigations studies are important for subsystems design and thus integral parts of the compatibility analyses. Systems engineering analyses of thermal loading specifically evaluate impacts of conceptual repository designs on the natural system. Geochemical and hydrologic systems data collected in the site investigation program are required to estimate flux in both quantity and character for both the natural and perturbed systems. Site data and systems analyses provide necessary information for evaluation of total system performance.

A systems evaluation of the need for and optimum approach to access to the Calico Hills unit beneath the potential repository block is being conducted in FY 1995. Questions regarding methods of data collection and confidence in the scientific knowledge base with respect to flow and transport of radionuclides in and through the Calico Hills unit will be addressed by Site Investigations in support of this study.

Another effort the systems engineering activities encompass is the development and maintenance of system requirements documents. These include definition of relevant requirements governing site investigation activities, e.g., Site Design and Test Requirements Document, ESF Design Requirements Document and the Surface Based Test Facilities Requirements Document.

Systems Engineering will perform safety analyses of the ESF in FY 1995 to demonstrate that the construction effort at the Yucca Mountain site is carried out in a safe and efficient manner. In order to perform the safety analyses, Systems Engineering requires site geotechnical data gathered in support of the design effort.

9.2 Site Investigations Interface with Waste Package (WBS 1.2.2)

Waste Package design and selection of materials is sensitive not only to emplacement mode but also to the quantity and chemistry of flux. Climatology, infiltration, and other unsaturated zone

studies provide specific information required for design of the waste package. The contribution to water chemistry of the mineralogic character of the near-field environment is evaluated by the site investigation program and the waste package program. In addition, the effects of heat on the physical behavior of rock, on the chemical constituency of the water, and on matrix and fracture flow in potential host rock are provided by the site investigation program for consideration in waste package design. Data obtained during the Large Block testing program is the product of both site investigations testing and waste package design needs.

9.3 Site Investigations Interface with Repository (WBS 1.2.4)

Repository design is sensitive to and dependent on the three-dimensional structural and stratigraphic characteristics of the potential repository block. These data are collected and synthesized in the site investigations program. Specific faults within the repository block system are being studied in detail for purposes of input to the conceptual repository layout. Data defining the anticipated rock characteristics of the Topopah Spring are being specifically collected for their utilization in Advanced Conceptual Design of the repository. In addition, tectonics studies provide the basis for establishing seismic design parameters for use in the development of the Advanced Conceptual Design.

9.4 Site Investigations Interface With Regulatory (WBS 1.2.5)

The primary interface with Regulatory and Licensing (WBS 1.2.5) derives from the Program Approach and its stepwise approach to the evaluation of Site Suitability. Site Investigations products to support the Technical Basis Reports (TBR) are planned for seven identified topical areas. Interactions during FY 1995 planning identified the information and schedule required by the site suitability evaluation process and served as a primary basis for selection and scoping of site investigations activities. This interface will be further exercised through the support required to assemble the TBR's and address review comments.

Other Site Investigations interfaces with Regulatory (WBS 1.2.5) include: coordination of NRC review of Study Plans; contributions to and review of the Semi-Annual Progress Report to the NRC; data input to the Technical Data Base; data analyses contributing to preparation of the Annotated Outline; support of various issue resolution initiatives; and data analysis and response to Site Characterization Analysis (SCA) Open Items.

9.5 Site Investigations Interface with Performance Assessment (WBS 1.2.5)

Performance assessment is the set of activities needed to define and perform quantitative evaluations of repository-system performance to evaluate the suitability of a site, to assess compliance with regulations, and to support the development of a geologic repository. Performance Assessment uses computational models consisting of a hierarchy of computer models that address basic physical processes and mechanisms controlling the behavior of the repository (termed "process codes"), address components or subsystems of the repository (termed "subsystems codes"), and address the total repository system (termed "total system codes"). These codes are interrelated and interdependent, with the process codes and the site characterization conceptual models upon which they are based providing the foundation for the subsystem and system codes. The subsystem and system codes in turn are used for assessing regulatory compliance and for providing input to support repository development.

The computational models (the process- and subsystem codes from the site investigations program, and total systems codes from the performance assessment program) are used to prioritize the types of information and data required from site characterization, to evaluate and optimize repository design options relative to performance, to evaluate the impacts of repository operations on the ability of the site to isolate waste, and to provide input on strategic programmatic decisions that involve one or more components of the total system. Sensitivity and uncertainty analyses are an integral part of the entire performance assessment program, providing insight into those parameters and assumptions most critical to an assessment of performance. This insight is routinely factored back into the design and site characterization planning process.

Iterative Total System Performance Assessments (TSPA's) using roll-ups of evolving process models will be conducted as site characterization and design progress. The goals of these TSPA's are: to evaluate the characteristics of the site and preliminarily determine whether any of these characteristics could be detrimental to repository performance, to evaluate the impact of the design configuration, and to provide input to other major programmatic decisions. At the end of site characterization, a comprehensive performance assessment will be conducted to determine overall site suitability: if the site is found to have appropriate characteristics and if appropriate performance is predicted, this determination will form part of the basis for the Secretary of Energy's recommendation of the site to the President of the United States.

The interface between site investigations and performance assessment has an informal and a formal element. The informal element consists of the ongoing transfer of data and insights from the site investigations program to performance assessment, and the transfer of analysis results back to the site program. The formal interface between site and performance assessment is the transfer of products specified in the "Modeling and Synthesis" Study Plans of the site investigations program. These products are the three-dimensional physical and geochemical site description models and the process level hydrologic flow models for the saturated and unsaturated zones. These products will be rolled up, through a systematic abstraction process, into more defensible and more site-specific subsystem or system level models. Without the input of these site models, those higher level performance assessment models are based only on general scientific principles linked with a simplified, incomplete knowledge of the site.

9.6 Site Investigations Interface with the Exploratory Studies Facility (ESF) (WBS 1.2.6)

Site investigations geotechnical studies have been coordinated with the construction schedule anticipated for the development of the ESF. The details of the construction schedule are presented in the WBS 1.2.6 TIP. Data obtained are transmitted to ESF design as they are acquired, typically in the form of work products such as geologic maps, cross sections, or topical reports on subjects such as rock characteristics.

Geotechnical data are provided from boreholes drilled along the expected alignment of the ESF. The geotechnical properties of the rock determined from the boreholes are used to aid in the design of the ESF tunnels, including rock support methods required after the tunnel is excavated. Other information required for the ESF design development and evaluation of its compatibility with the Advanced Conceptual Design include seismic hazard assessments and development of seismic design criteria.

The site investigations element also interfaces with ESF design through consideration of potential impacts of construction activities on the planned testing. These considerations influence ESF design and construction planning through design controls included in the relevant Determination of Importance Evaluations (DIEs) prepared under WBS 1.2.1. A DIE is required for design package development. Site investigations supports evaluations of test-to-test and/or construction-to-test interference carried out within WBS 1.2.5. These evaluations allow planned site testing activities to be included in determining the impacts of and controls on construction activities.

An example of this interface is the control on penetration of the Paintbrush Tuff non-welded unit by the ESF in the north ramp that is related to the sequencing and schedule for pneumatic pathways testing. In this instance, prior to disturbing the mountain it was necessary to collect baseline information on *in situ* gas pressure changes that occur in response to natural barometric pressure changes. Coordination of this sequence was accomplished through the establishment of controls transmitted through the DIE process.

Similar consideration was given to the sequence requirements for development of the 33 planned test alcoves within the ESF. Twenty-six of the planned alcoves were not considered time-critical in terms of the testing activities to be conducted, and as a consequence were deferred until after completion of the south ramp. Seven of the alcoves were found to have time-critical testing needs, either in terms critical data being gathered for suitability evaluations, or in terms of potentially altered conditions after ESF development. Controls are being established in the construction schedule to provide for the timely development of these alcoves.

9.7 Site Investigations Interface with Test Facilities (WBS 1.2.7)

The Test Facilities function provides the on-site infrastructure, (e.g., communication systems, transportation, and medical services facilities) for the conduct of surface-based testing at the Yucca Mountain site. The Field Operations Center provides a focal point for scientists to stage their field operations.

9.8 Site Investigations Interface with Project Control (WBS 1.2.9)

The interface of Site Investigations with Project Control is focused on the planning and monitoring aspects of WBS 1.2.3 management. The Project Accounting and Control System (PACS) contains the work scope, budget, schedule, and deliverables associated with the plan for the current fiscal year. The PACS receives input from Participants and provides summaries according to WBS element that facilitate the finalization of the plan. Project Control also supports the integration of schedules within each WBS element and among elements. They also assist Site Investigations in developing functional schedules that show how multiple tasks by different Participants support a single activity (e.g., borehole drilling and testing).

In support of the monitoring function, Project Control compiles status information from each Participant and provides Site Investigations management with variance reports. These reports provide the basis from which analysis is developed in support of periodic YMSCO Management Meetings and Director's Program Reviews to examine Project status. Interface with the Project Control function also provides for the financial tracking and management of resources, and is the mechanism for providing input to Internal Review Board and the Office of Management and Budget forecast planning.

9.9 Site Investigations Interface with Information Management (WBS 1.2.12)

The Information Management function is a focal point for all participants to identify their near- and long-term automatic data collection and processing needs. The records management function within WBS 1.2.12 provides for archiving of all site investigation documents.

9.10 Site Investigations Interface with Environmental (WBS 1.2.13)

The Environmental Program obtains requisite permits from various Federal and State agencies prior to the conduct of site investigations field activities. Field activities include all surface-based site characterization activities needed to evaluate the suitability of the Yucca Mountain site as the potential location of a repository. Included in the definition of field activities are site preparation, access road construction and borrow pit excavation, exploratory drilling and testing, geophysical surveys, and geologic mapping, among other related activities. Prior to commencement of any surface-disturbing work at the Yucca Mountain site, a key prerequisite is a request for an environmental survey. These pre-activity surveys include evaluation of the following environmental elements: biological, archaeological, land access, environmental compliance, radiological, and environmental monitoring and mitigation.

9.11 Site Investigations Interface with Safety and Health (WBS 1.2.13)

The Safety and Health Function interfaces with Site Investigations field activities through the inspection and monitoring of compliance with various DOE, Federal, State and local requirements.

9.12 Site Investigations Interface with Institutional (WBS 1.2.14)

The Institutional function interfaces with Site Investigations when data are released or when there is an issue that stimulates focused governmental or public interest. In the case of focused public or governmental interest in a given topic, the Institutional and External Affairs organization may conduct a campaign to introduce and educate the public in relation to the topic prior to data being released. There is currently no formal requirement for site investigations to hand data to institutional prior to publication, however the integration function provides that interface. Site Investigations personnel regularly participate in institutional outreach presentations, tours, and exhibits as required.

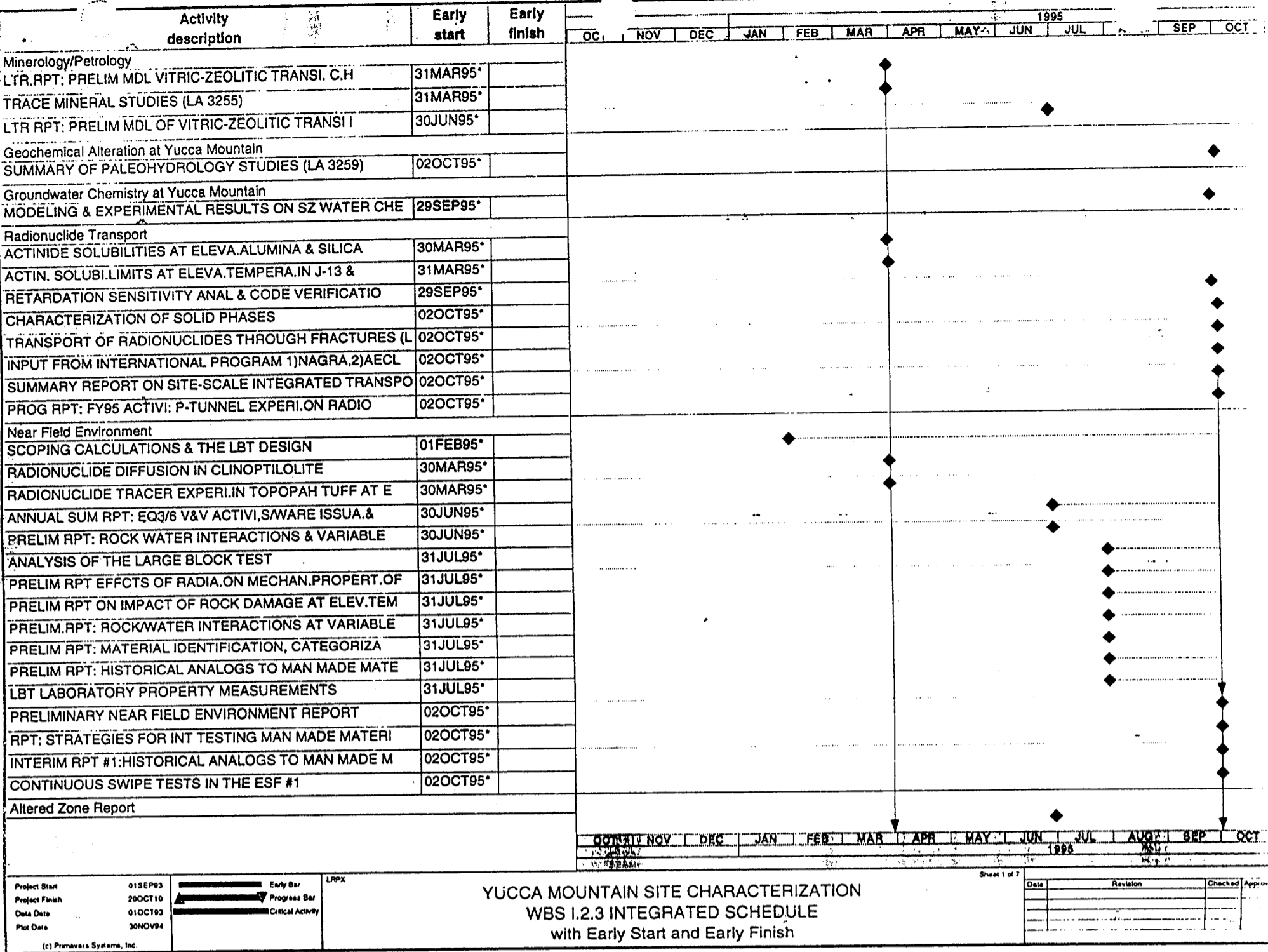


FIGURE 6.1

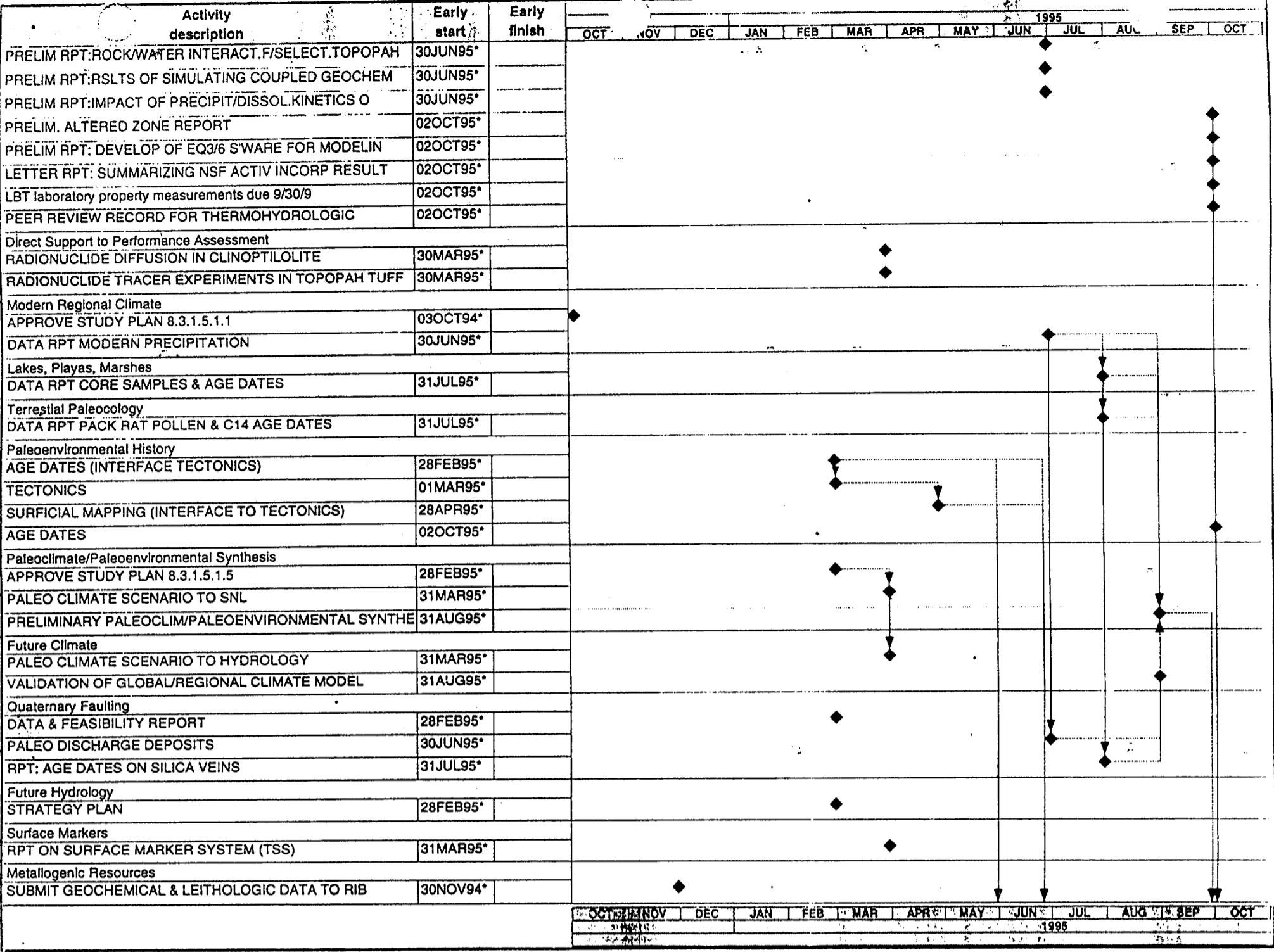
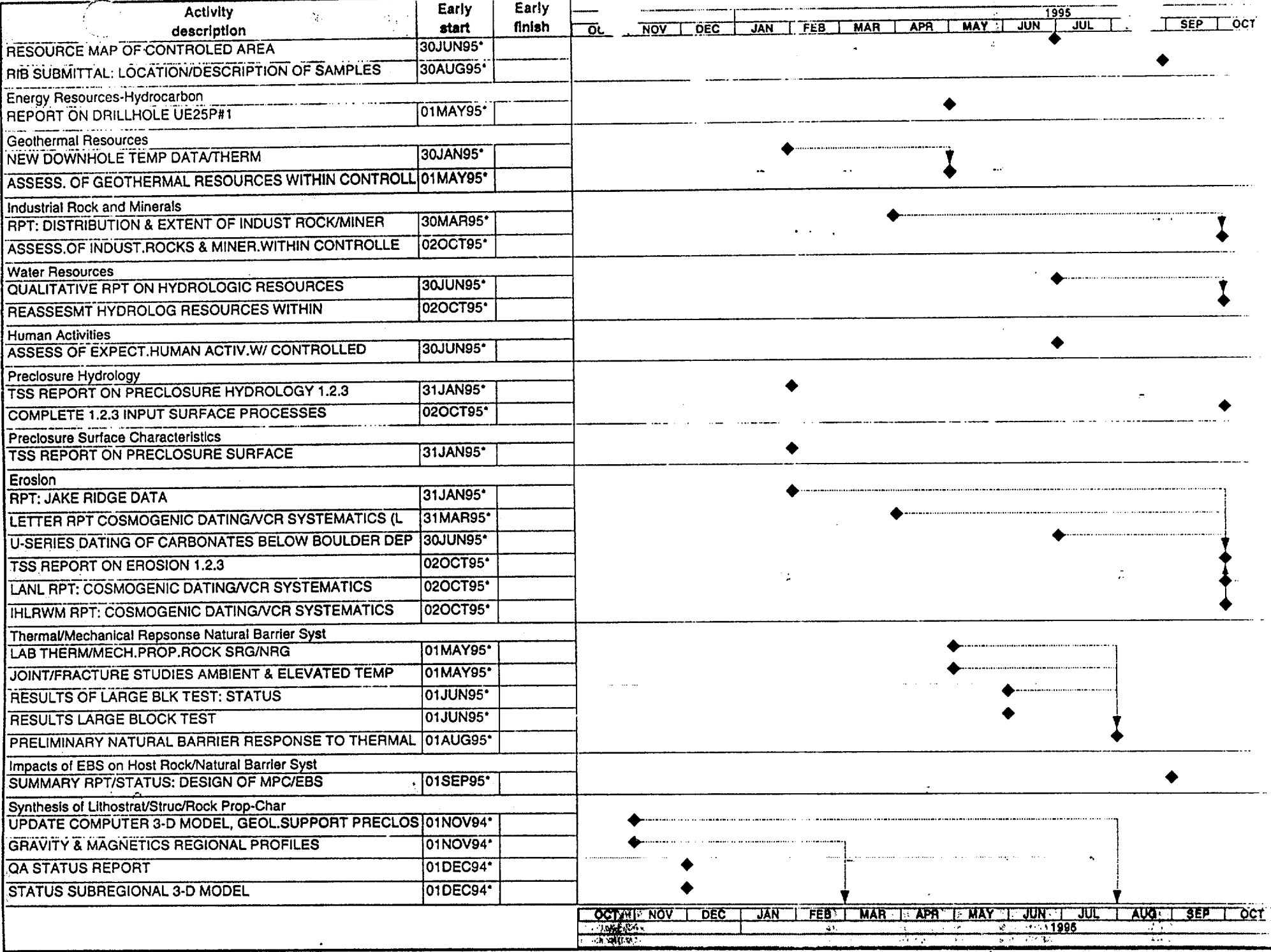


FIGURE 6.1



Sheet 3 of 7

FIGURE 6.1

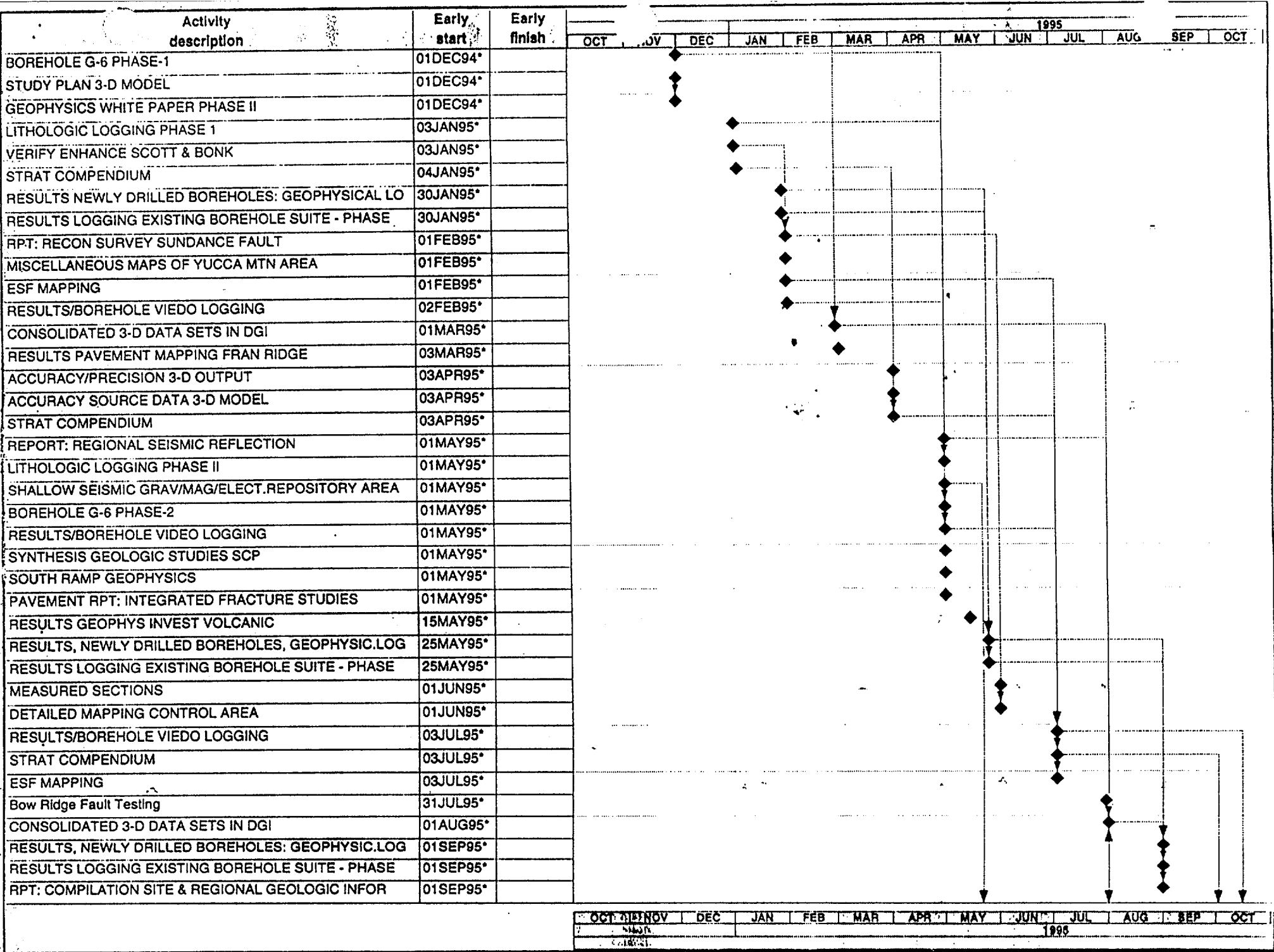


FIGURE 6.1

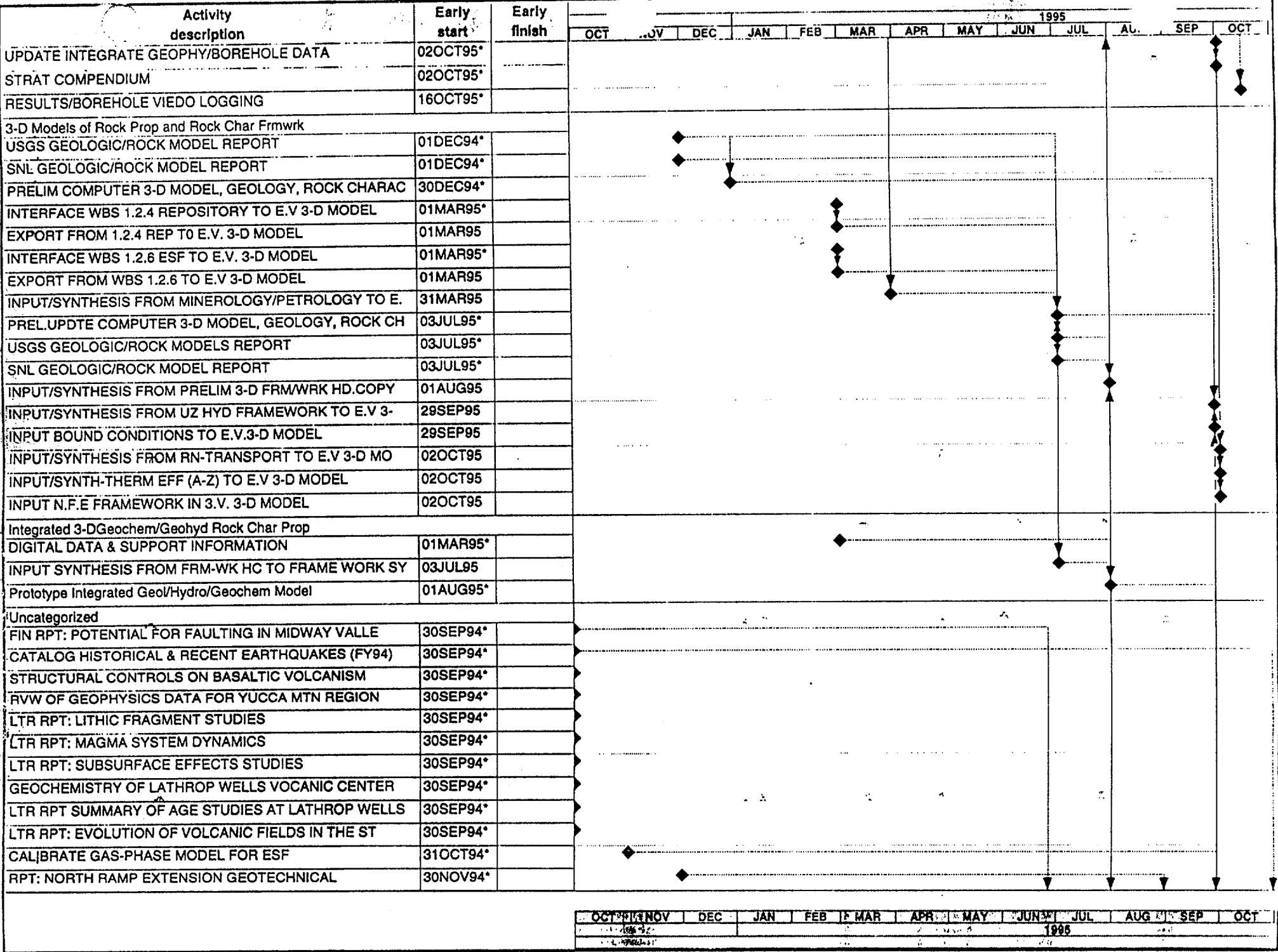


FIGURE 6.1

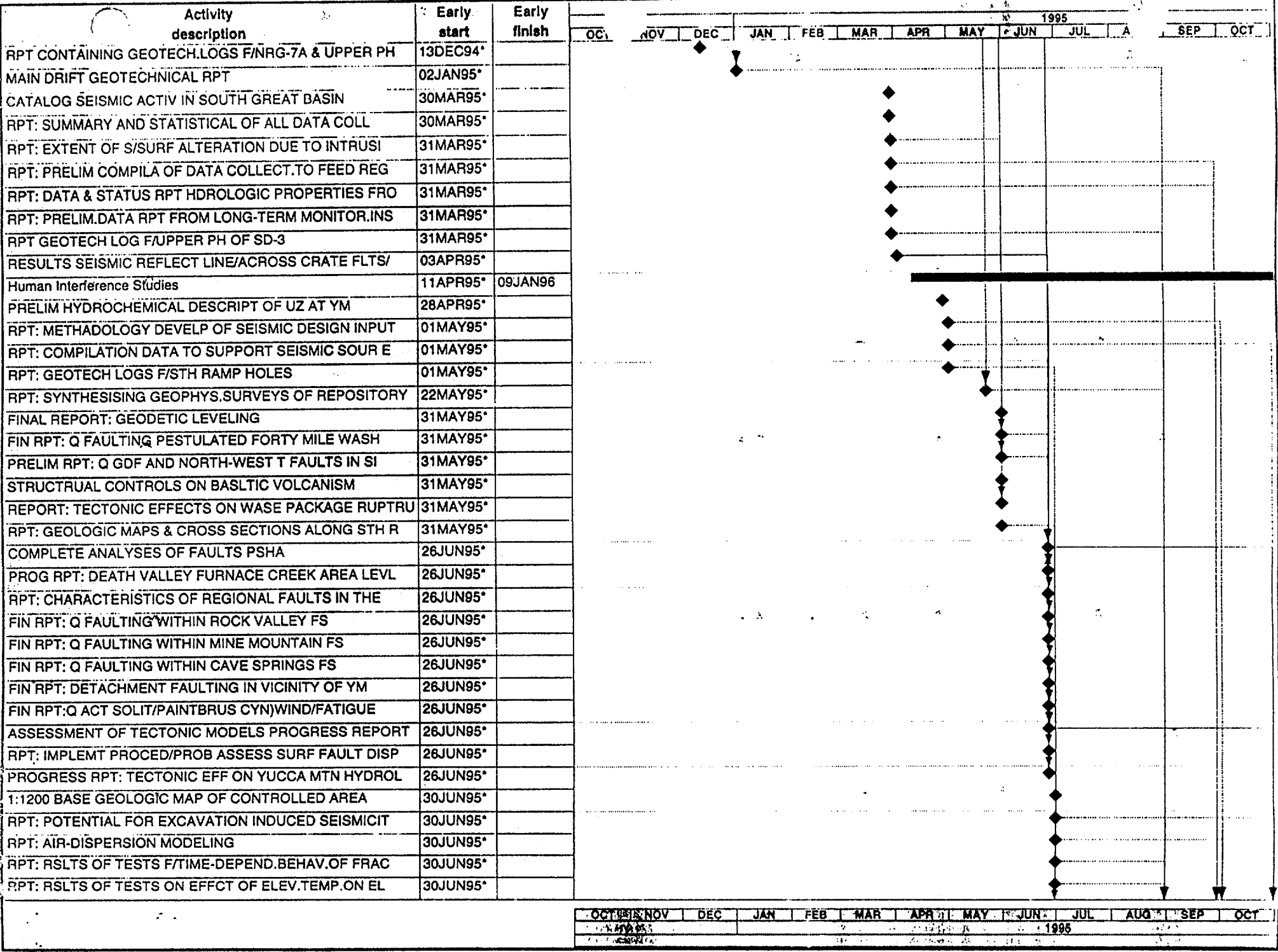


FIGURE 6.1

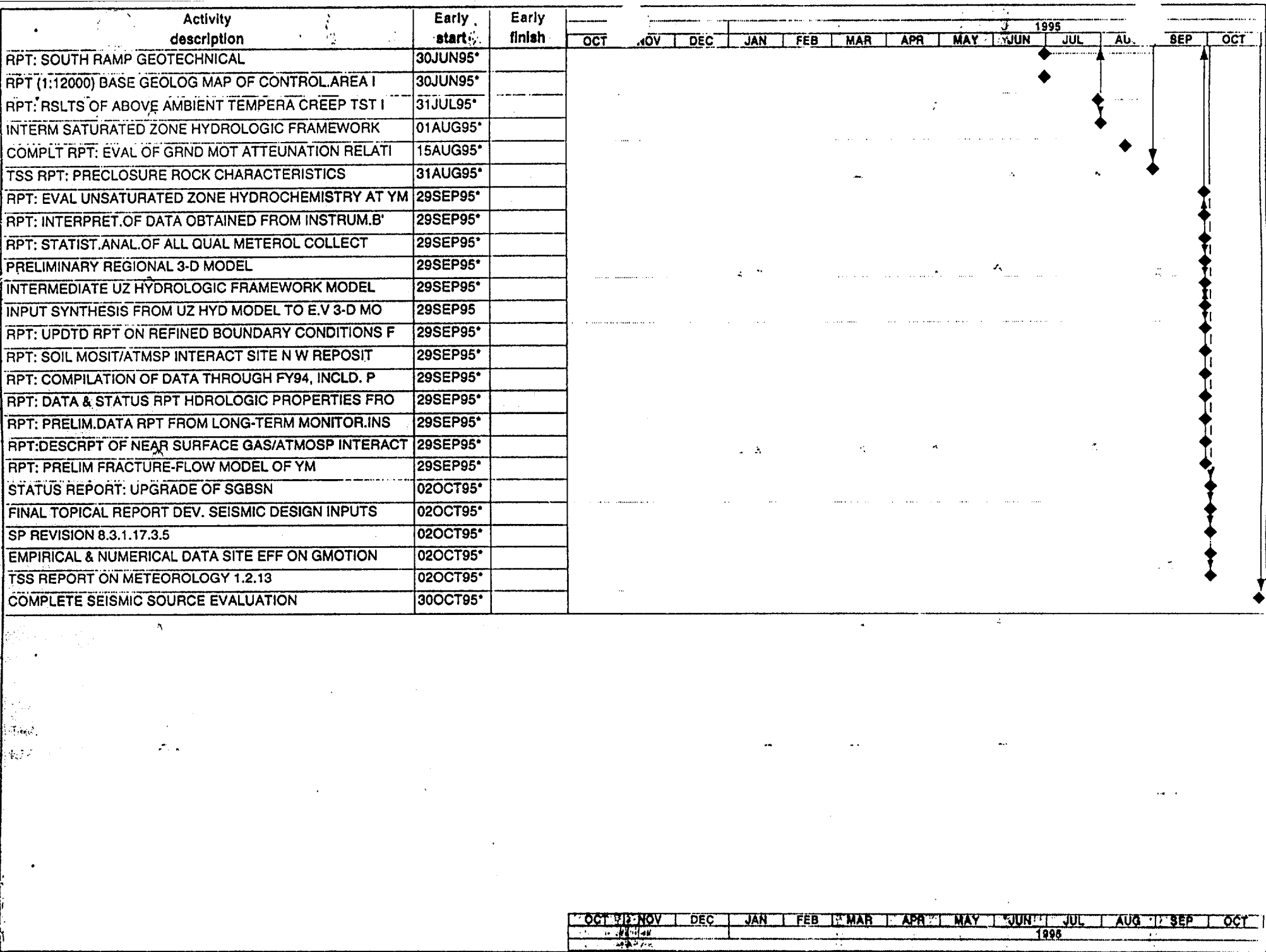


FIGURE 6.1

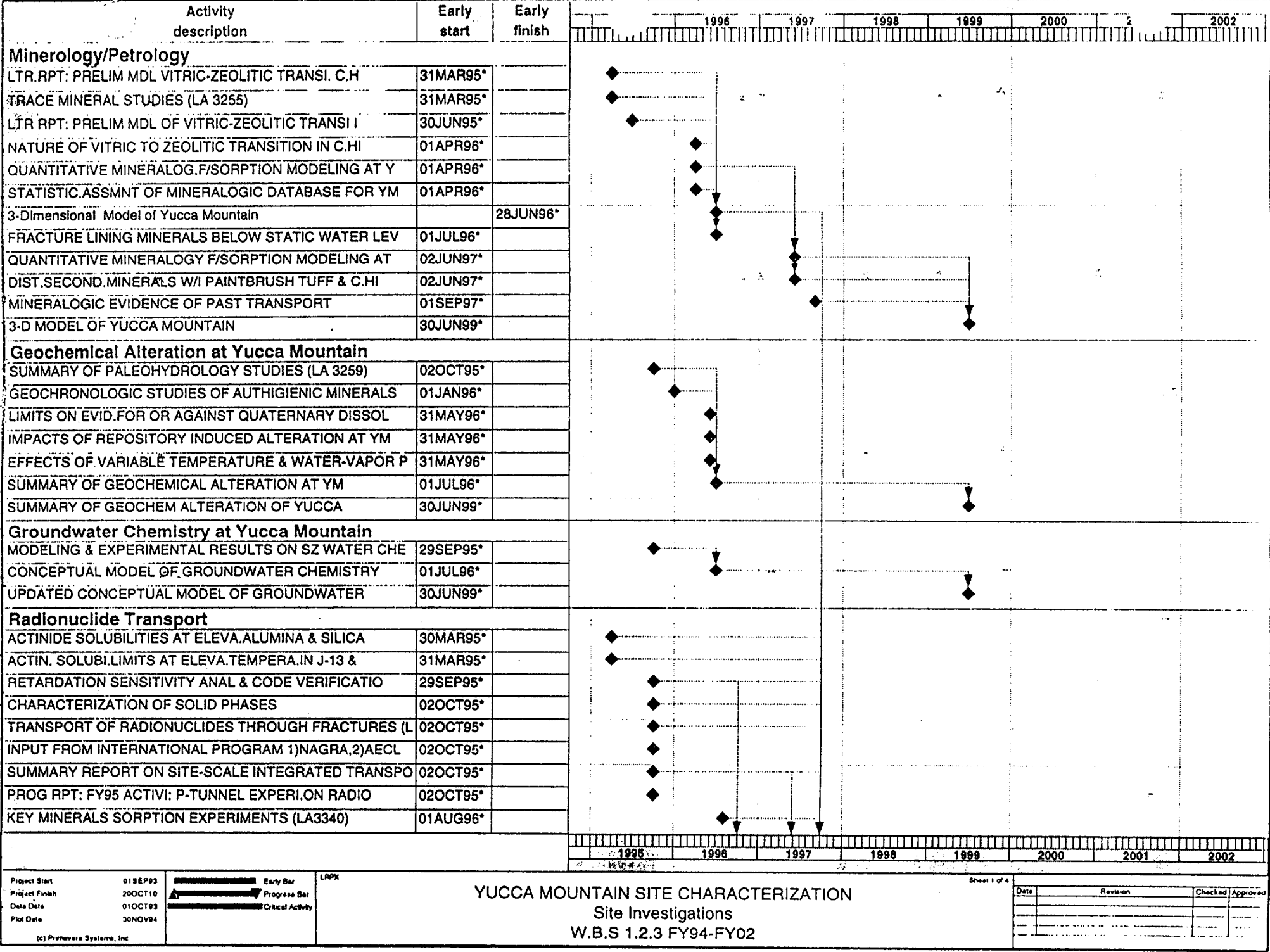


FIGURE 6.2

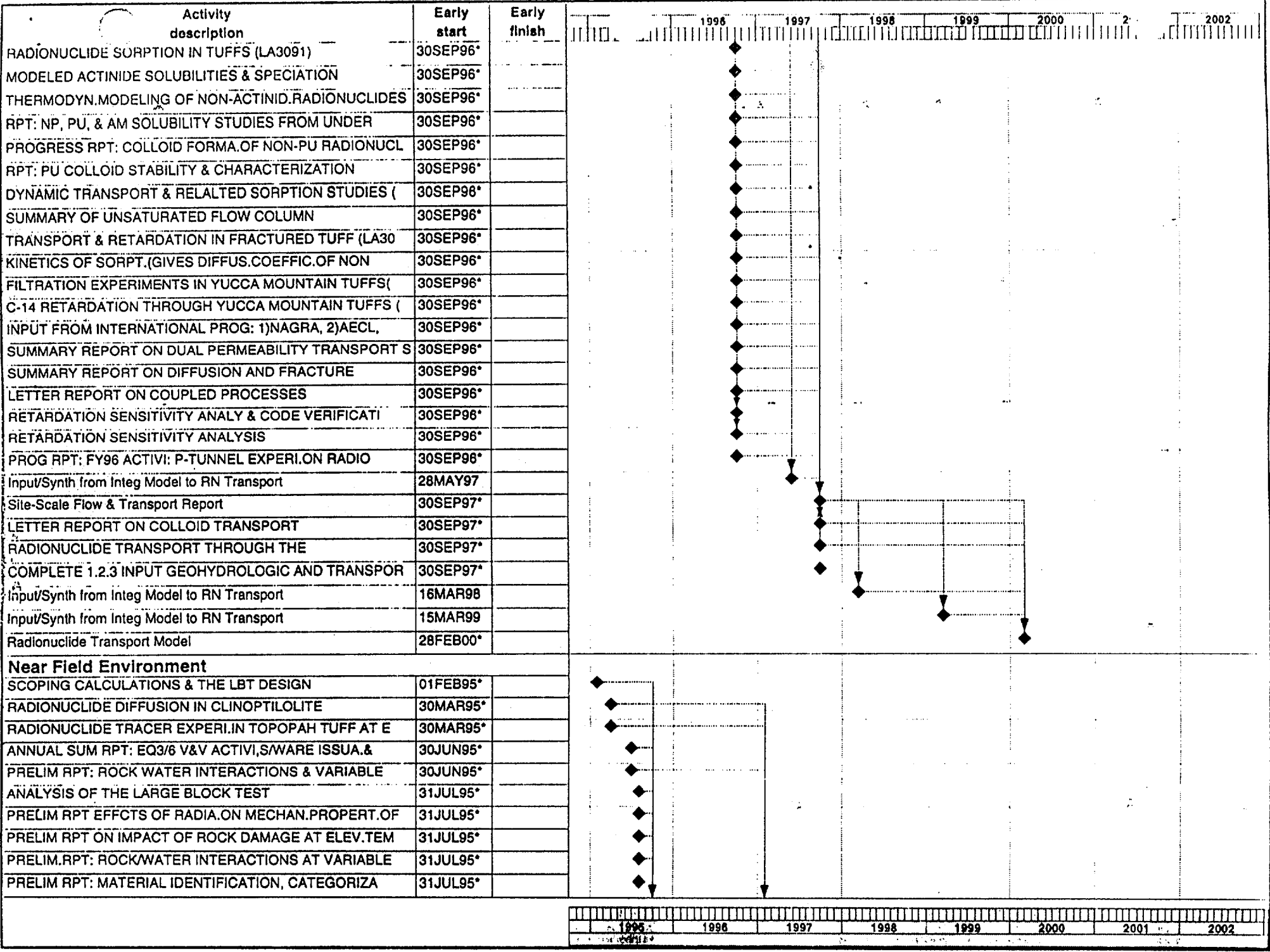


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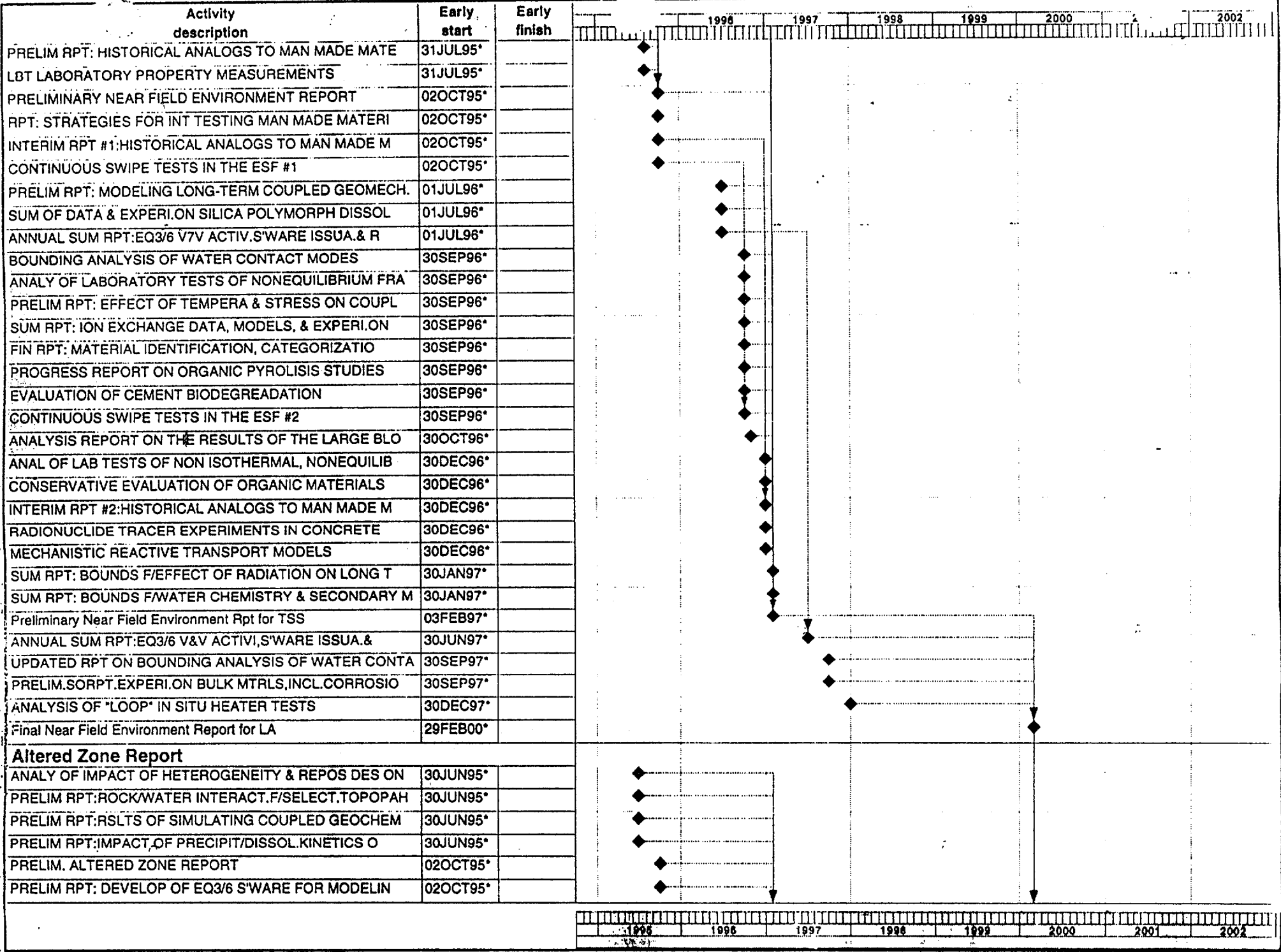


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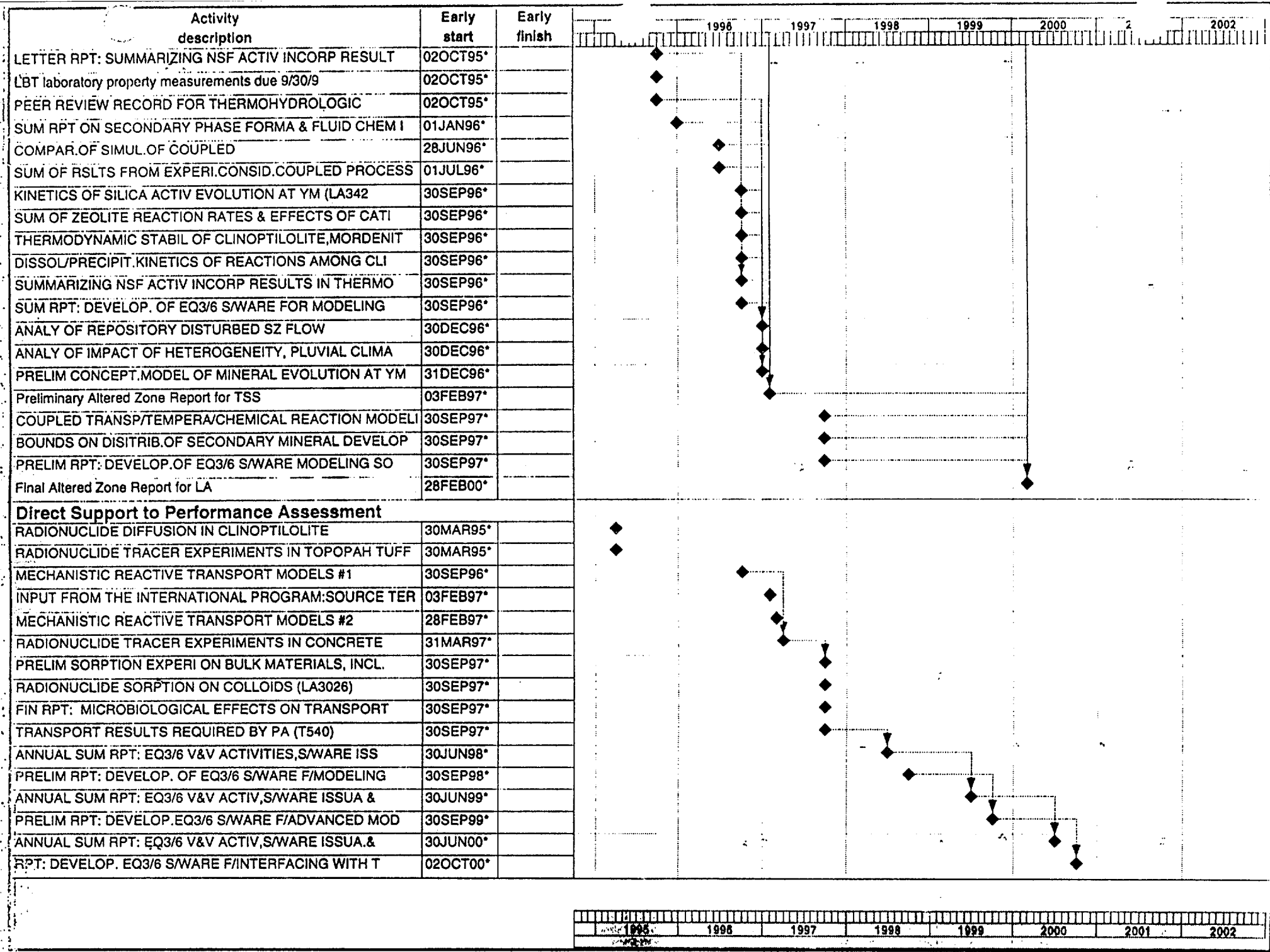


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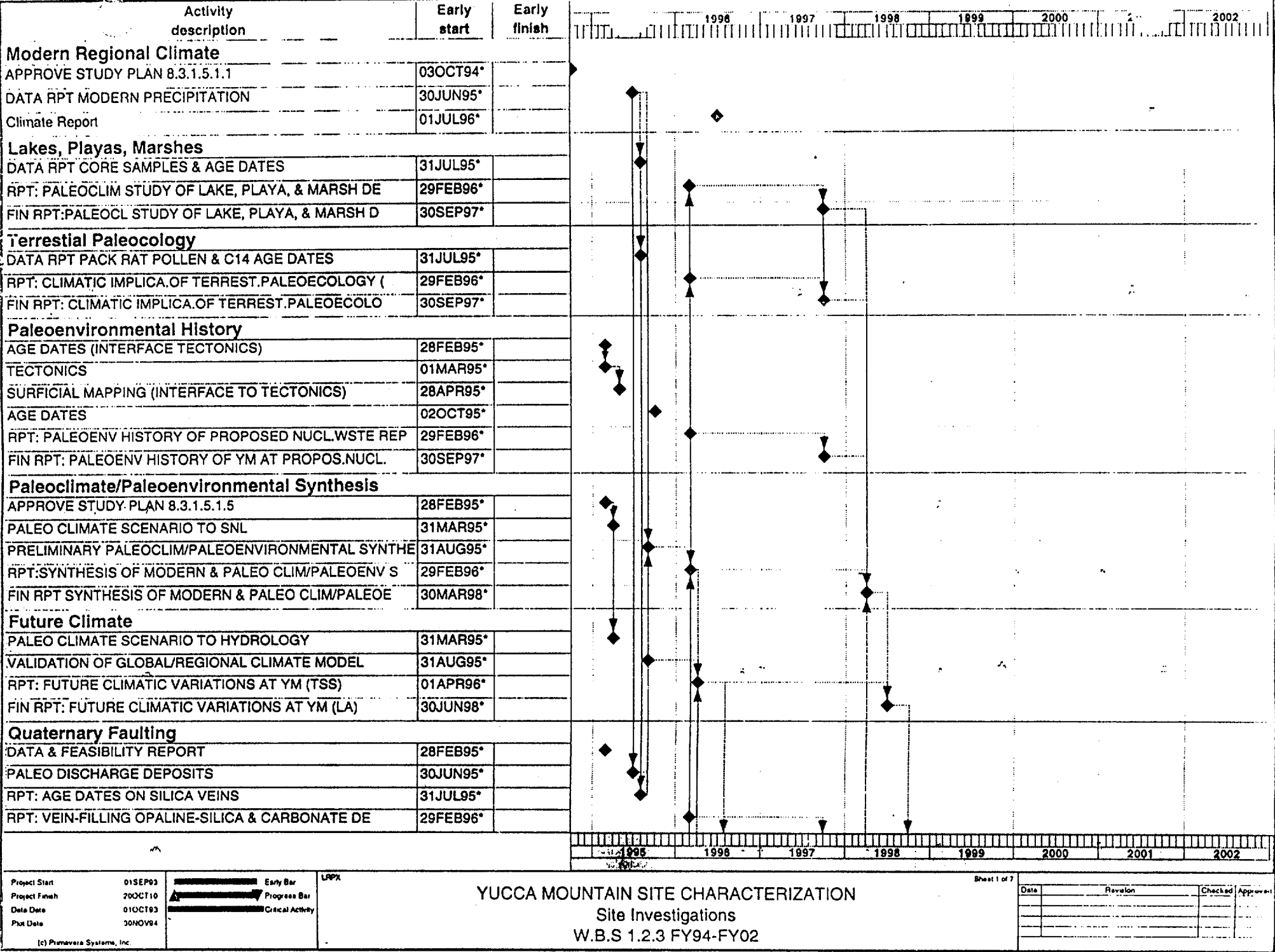


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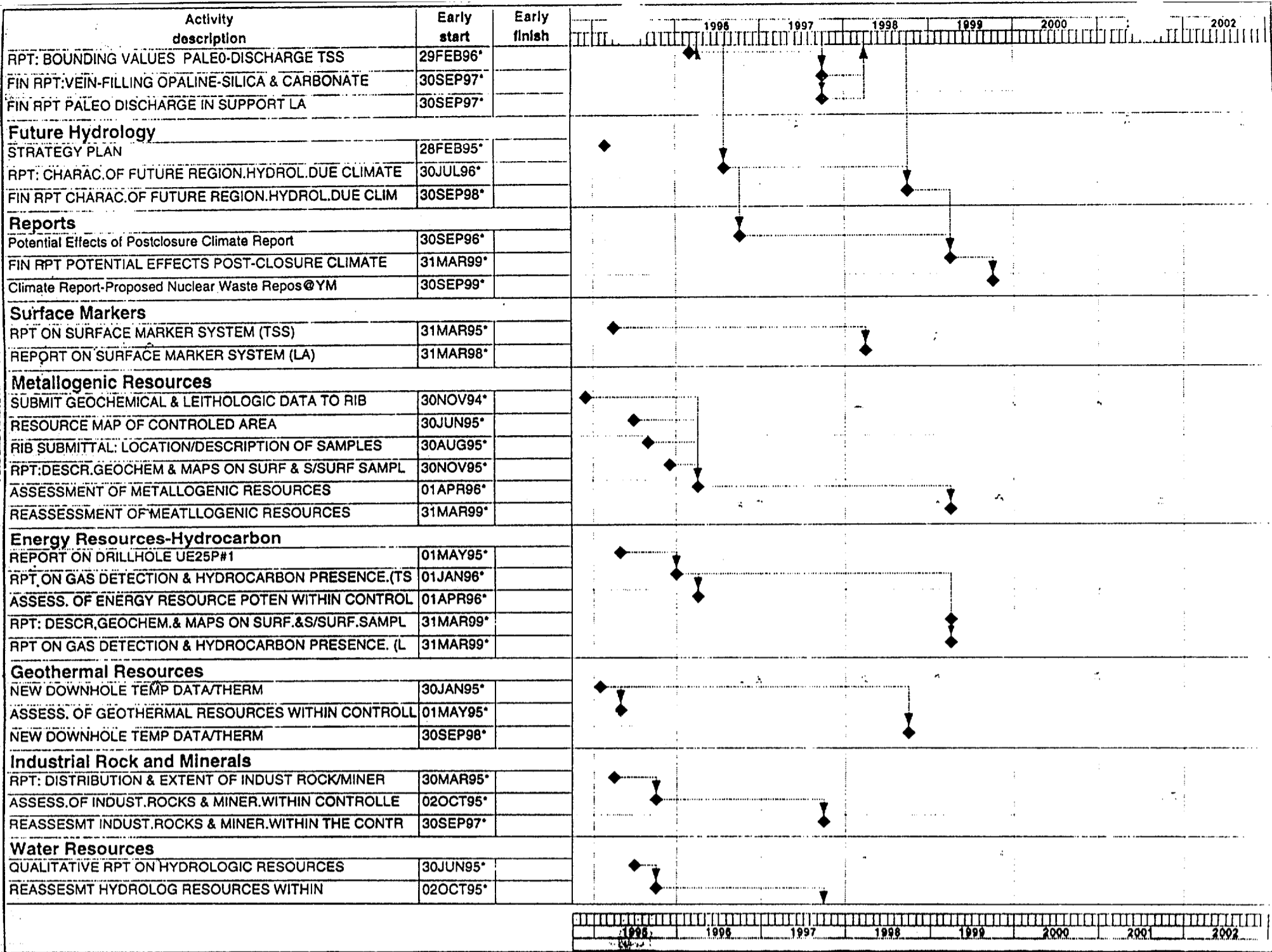


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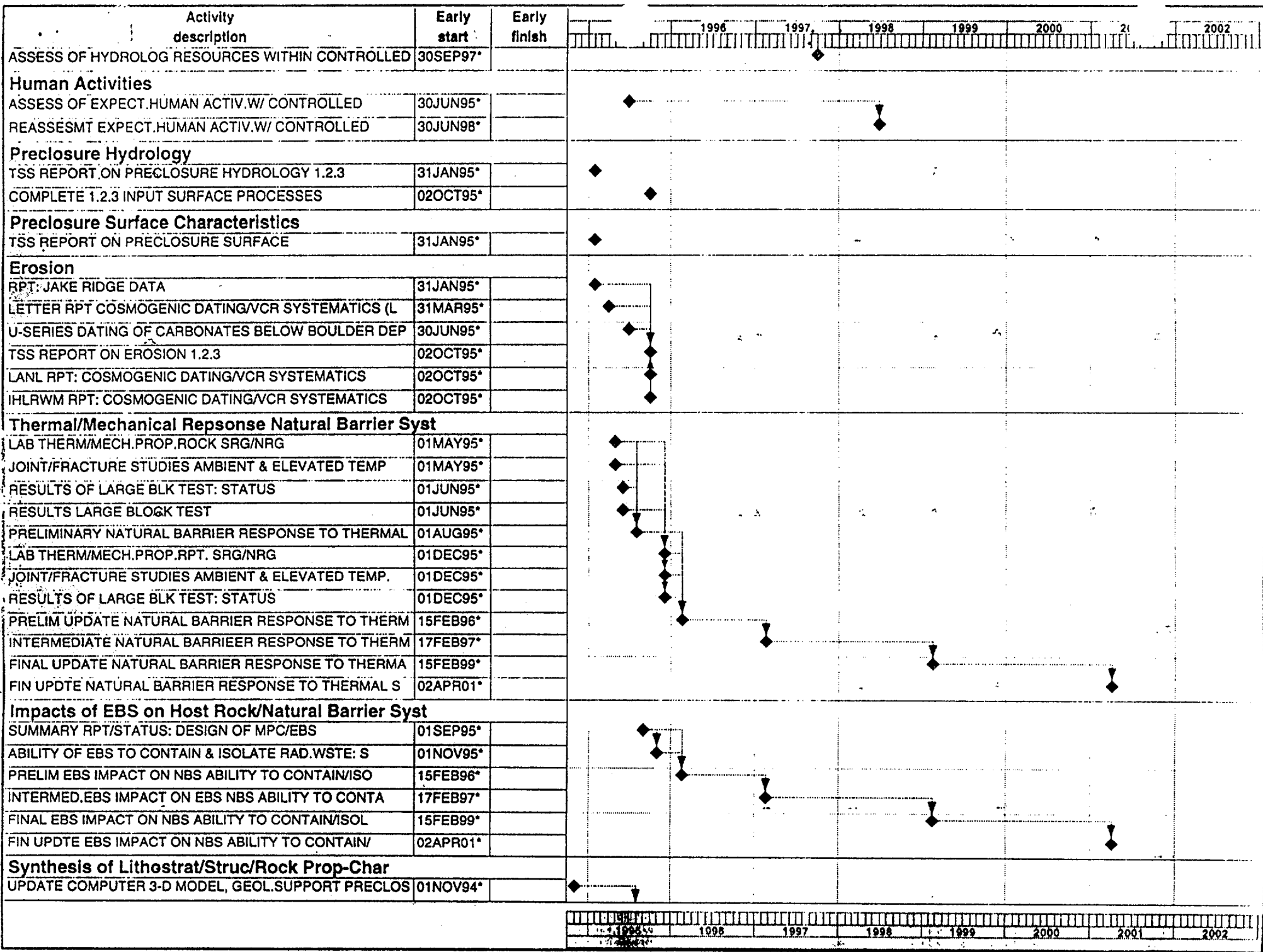


FIGURE 6.2

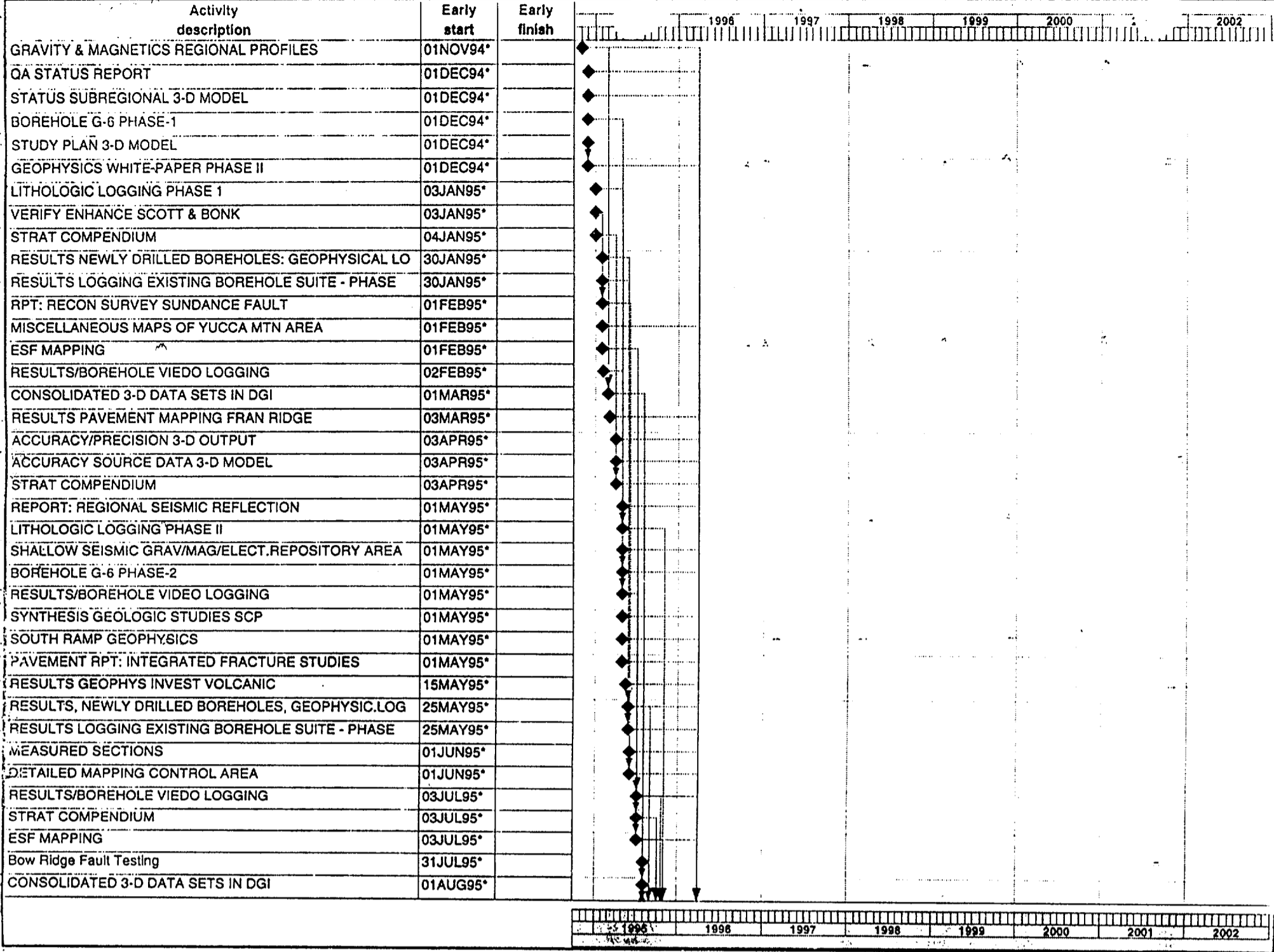


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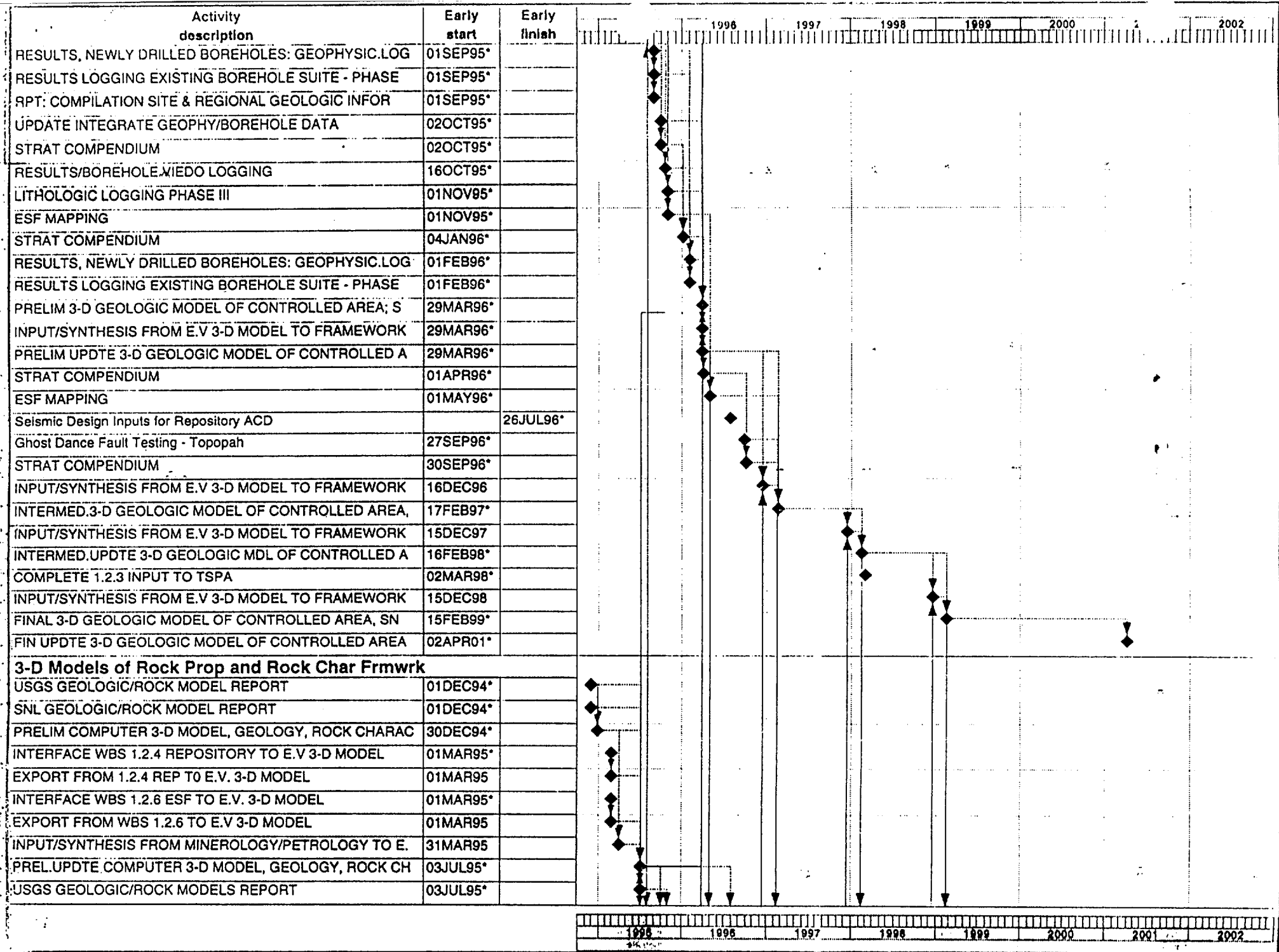


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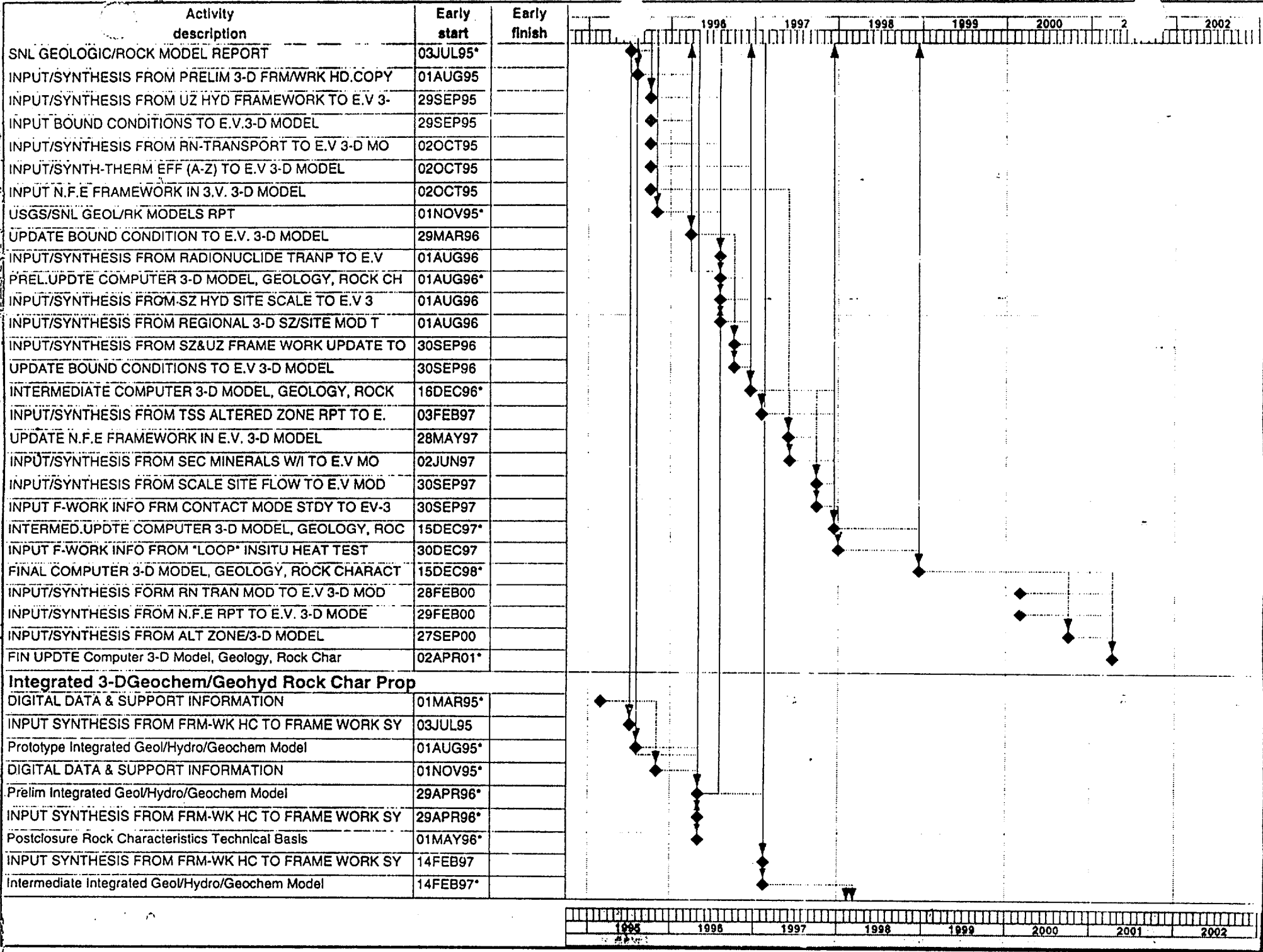


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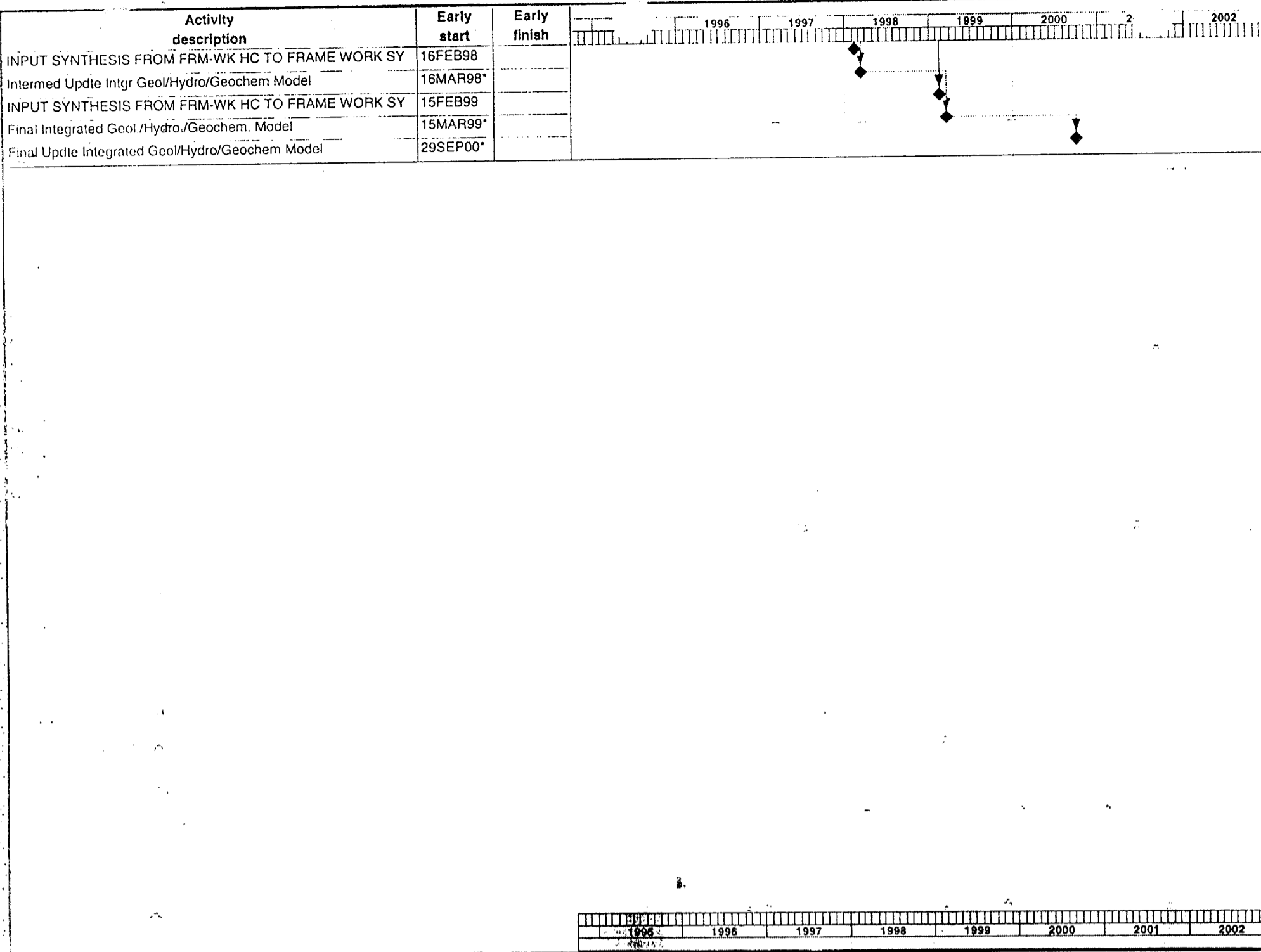


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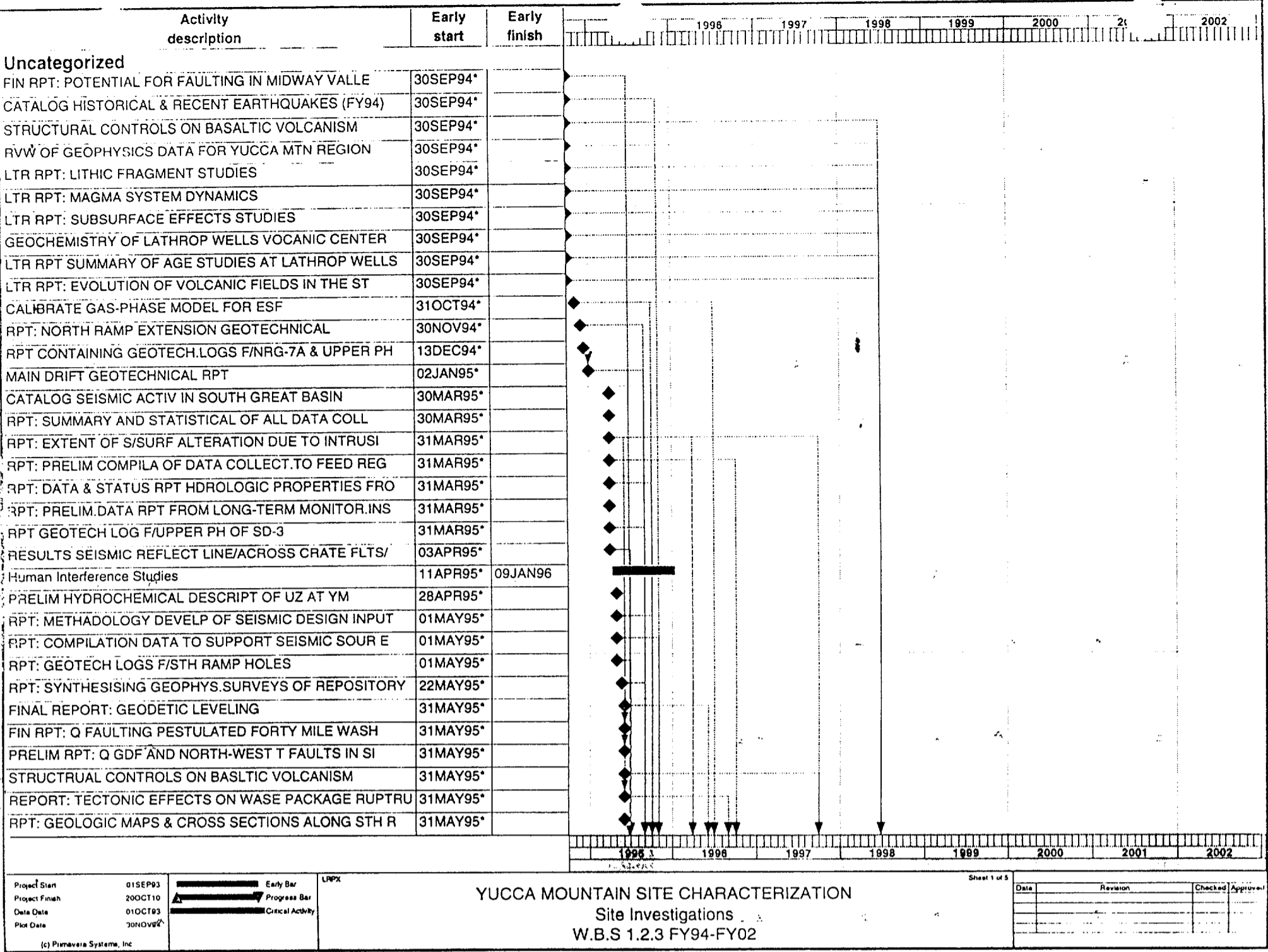


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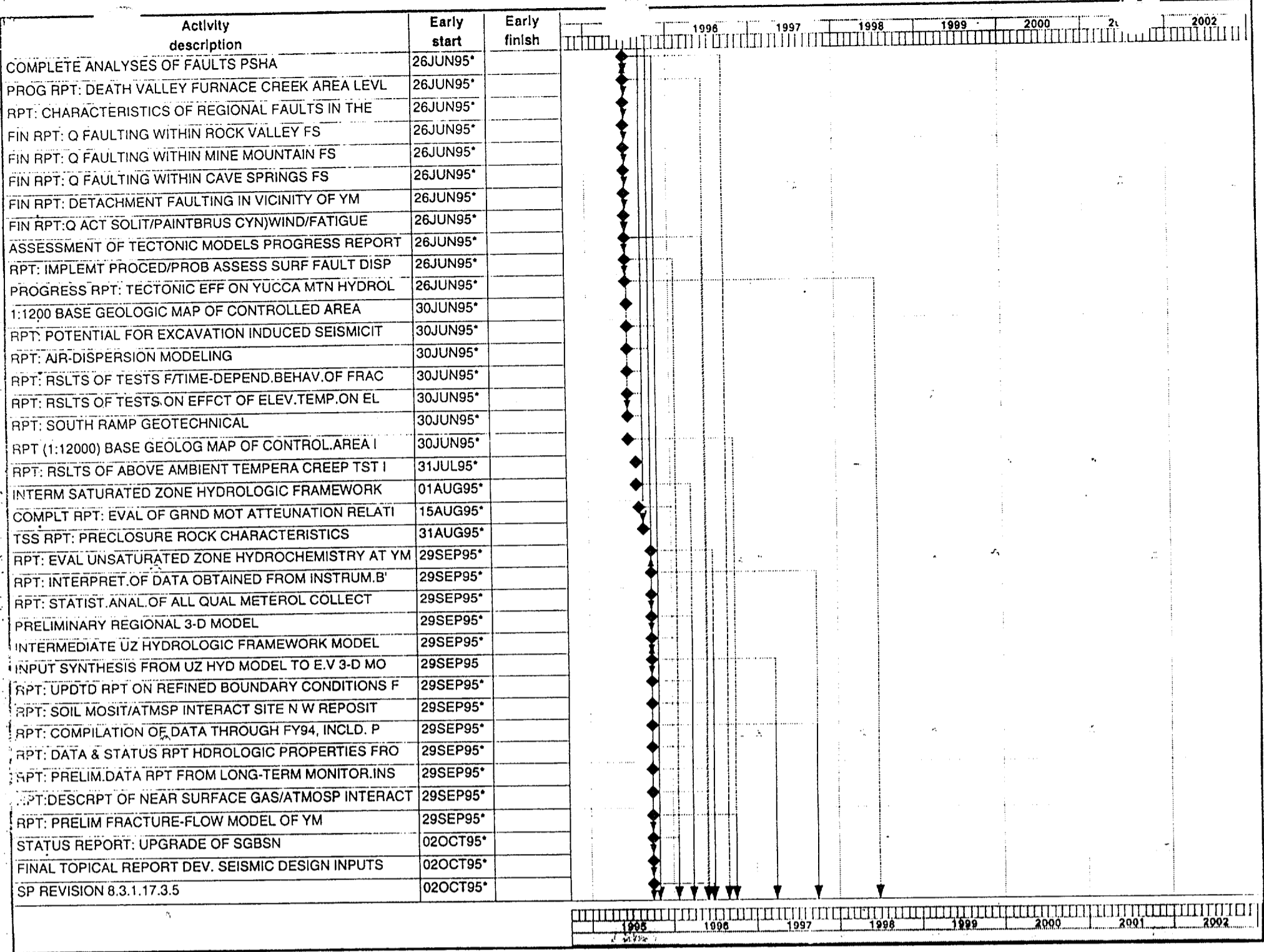


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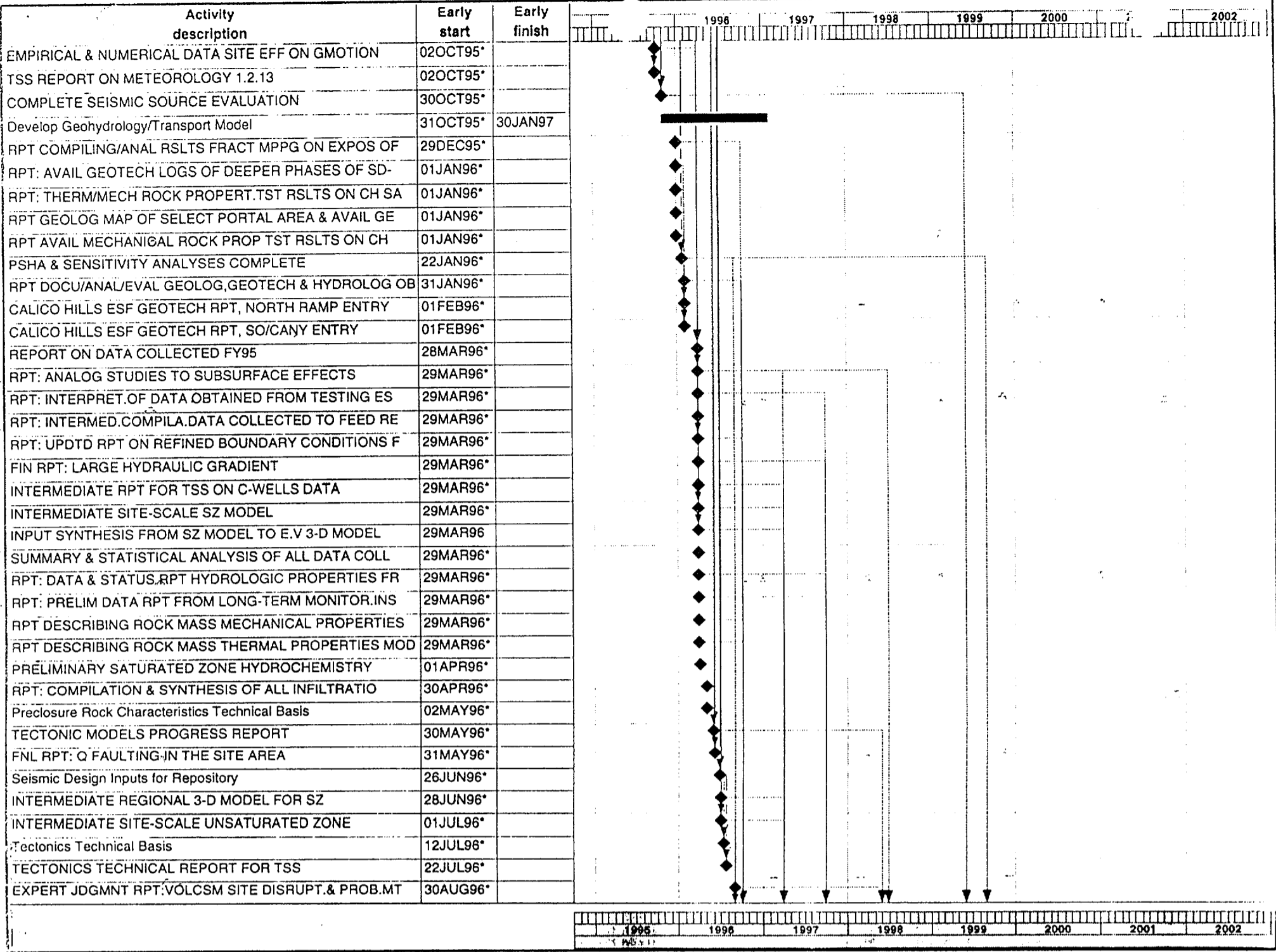


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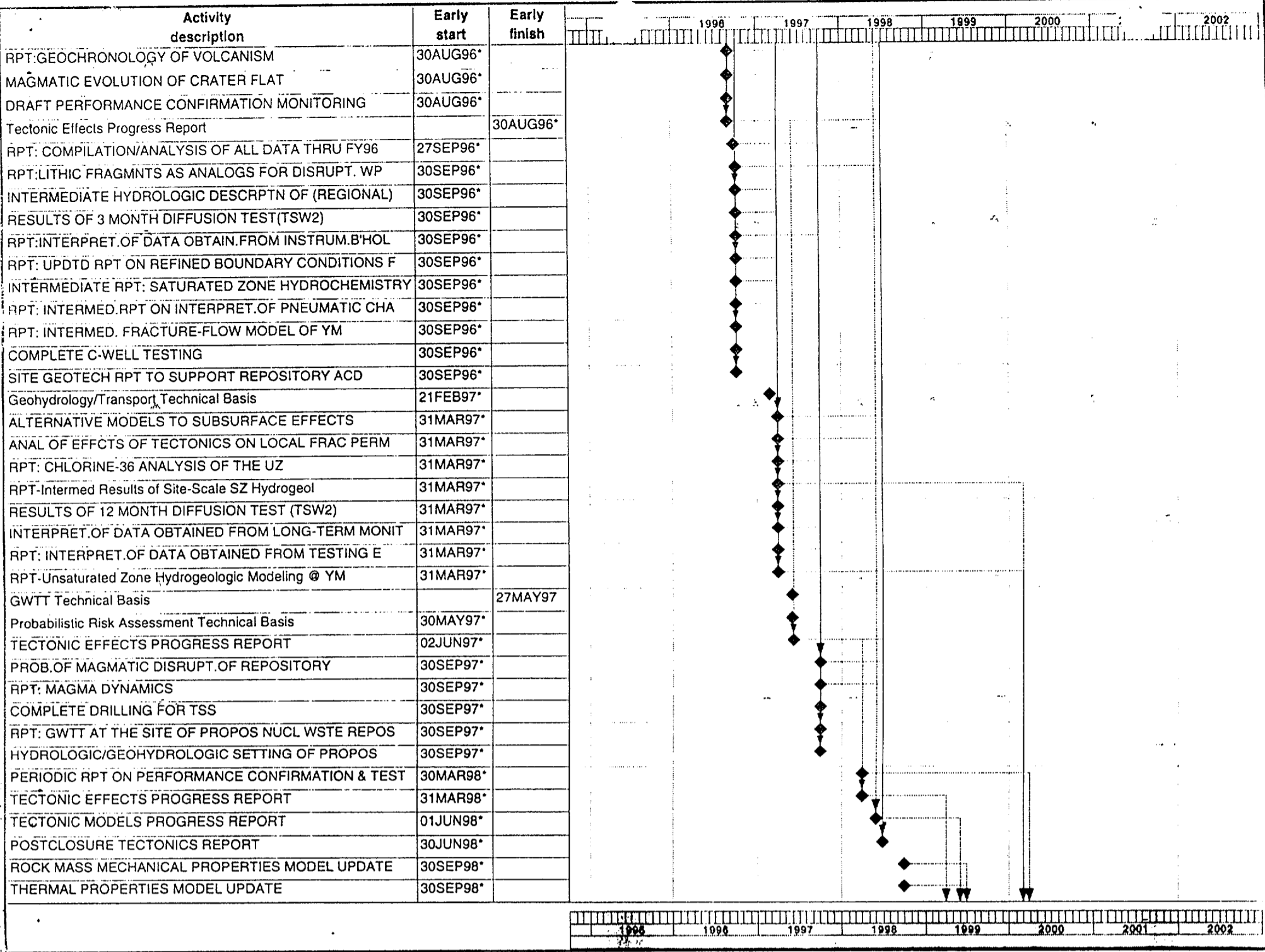


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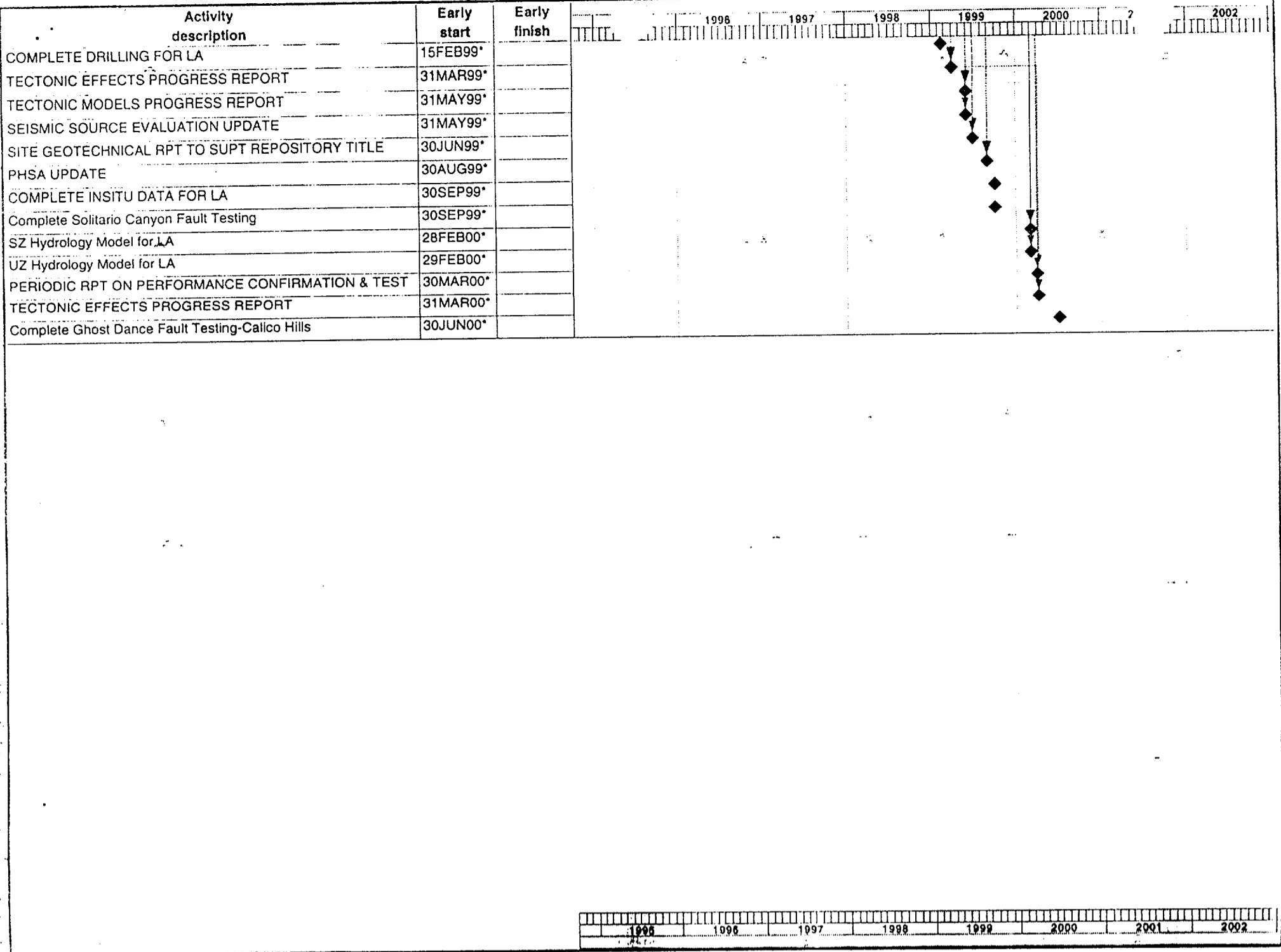


FIGURE 6.2

TABLES

Table 4-3 FY 1995 Budget Allocation for Site Investigations by WBS Element

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3 SITE INVESTIGATIONS			Total:	85,782
1.2.3.X Management Reserve				0
1.2.3.1 Coordination and Planning			Subtotal:	6,264
1.2.3.1.1		Coordination and Planning	EPA	15
1.2.3.1.1		Coordination and Planning	LANL	864
1.2.3.1.1		Coordination and Planning	LBL	165
1.2.3.1.1		Coordination and Planning	LLNL	275
1.2.3.1.1		Coordination and Planning	M&O	1,658
1.2.3.1.1		Coordination and Planning	T&MSS	342
1.2.3.1.1		Coordination and Planning	SNL	182
1.2.3.1.2		Participant Management & Integration	SNL	575
1.2.3.1.1		Coordination and Planning	USGS	2,188
1.2.3.2 Geology			Subtotal:	21,227
1.2.3.2.1.1.1	8.3.1.3.2.1	Min, Petrol. & Rock Chemistry of Transp. Pathways	LANL	1,014
1.2.3.2.1.1.2	8.3.1.3.2.2	Mineralogic & Geochemical Alteration	LANL	475
1.2.3.2.1.2.1	8.3.1.3.3.1	Natural Analog of Hydrothermal Systems in Tuff	LBL	0
1.2.3.2.1.2.2	8.3.1.3.3.2	Kinetics and Thermodynamics of Mineral Evolution	LANL	377
1.2.3.2.1.2.3	8.3.1.3.3.3	Conceptual Model of Mineral Evolution	LANL	0
1.2.3.2.2.1.1	8.3.1.4.2.1	Vert. and Lat. Dist. of Strat. Units in Site Area	USGS	2,263
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	USGS	2,887
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	LBL	0
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	REECo	730
1.2.3.2.2.1.3	8.3.1.4.2.3	Three-Dimensional Geologic Model	USGS	0
1.2.3.2.2.2.1	8.3.1.4.3.1	Systematic Acq. of Site Specific Subsurface Info.	SNL	413
1.2.3.2.2.2.2	8.3.1.4.3.2	3-D Rock Charact. Models	SNL	681
1.2.3.2.3.1	8.3.1.6.1	Present Location & Rates of Surface Erosion	USGS	0
1.2.3.2.3.2	8.3.1.6.2	Effects of Future Climate Conditions on Erosion	USGS	0
1.2.3.2.3.3	8.3.1.6.3	Effects of Future Tectonic Activity on Erosion	USGS	0
1.2.3.2.3.4	8.3.1.6.4	Effects of Erosion on Hydrol., Geochem. & Rock Charact.	USGS	0
1.2.3.2.4	8.3.1.7	Rock Dissolution	(TBD)	0
1.2.3.2.5.1.1	8.3.1.8.1.1	Probability of Volcanic Eruption	LANL	195
1.2.3.2.5.1.2	8.3.1.8.1.2	Effects of a Volc. Erupt. Penetrating the Repos.	LANL	730
1.2.3.2.5.2	8.3.1.8.2	Tectonics Effects: Evaluations of Changes in the Natural and Engineered Barrier Systems Resulting from Tectonic Processes and Events	USGS	265
1.2.3.2.5.4	8.3.1.8.4	Chgs. in Rock Geochem. Prop. Resulting from Tect. Proc.	T&MSS	0
1.2.3.2.5.5.1	8.3.1.8.5.1	Charact. of Volcanic Features	LANL	410
1.2.3.2.5.5.2	8.3.1.8.5.2	Charact. of Igneous Intrusive Features	USGS	0
1.2.3.2.6.X		TSS Preclosure Char. Report	(TBD)	0
1.2.3.2.6.1	8.3.1.14.1	Topographic Char. of Potent. Locations of Surface Facilities	USGS	0
1.2.3.2.6.2.1	8.3.1.14.2.1	Surf. & Subsurf. Fac. Explor. Program	SNL	283
1.2.3.2.6.2.1	8.3.1.14.2.1	Surf. & Subsurf. Fac. Explor. Program	USGS	0

Table 4-3 FY 1995 Budget Allocation for Site Investigations by WBS Element

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.2.6.2.2	8.3.1.14.2.2	Surf. & Subsurf. Fac. Lab Tests & Mat'l. Prop. Meas.	SNL	137
1.2.3.2.6.2.2	8.3.1.14.2.2	Surf. & Subsurf. Fac. Lab Tests & Mat'l. Prop. Meas.	USGS	0
1.2.3.2.6.2.3	8.3.1.14.2.3	Surf. & Subsurf. Fac. Field Tests & Char. Meas.	RSN	0
1.2.3.2.6.2.3	8.3.1.14.2.3	Surf. & Subsurf. Fac. Field Tests & Char. Meas.	SNL	332
1.2.3.2.6.2.3	8.3.1.14.2.3	Surf. & Subsurf. Fac. Field Tests & Char. Meas.	USGS	34
1.2.3.2.7.1.1	8.3.1.15.1.1	Lab. Thermal Properties	SNL	520
1.2.3.2.7.1.2	8.3.1.15.1.2	Lab. Thermal Expansion Testing	SNL	340
1.2.3.2.7.1.3	8.3.1.15.1.3	Lab. Determin. of Mech. Prop. of Intact Rock	SNL	400
1.2.3.2.7.1.4	8.3.1.15.1.4	Lab. Determin. of the Mech. Prop. of Fractures	SNL	400
1.2.3.2.7.2.1	8.3.1.15.2.1	Site Ambient Stress Conditions	REECo	0
1.2.3.2.7.2.2	8.3.1.15.2.2	Site Ambient Thermal Conditions	USGS	161
1.2.3.2.7.3.1		Excavation Investigations	SNL	63
1.2.3.2.7.3.2		In-Situ Thermomechanical	SNL	533
1.2.3.2.7.3.3		In-Situ Mechanical	SNL	188
1.2.3.2.7.3.4		In-Situ Design Ver	SNL	1,496
1.2.3.2.7.4		Rock Mass Analysis	SNL	368
1.2.3.2.8.1	8.3.1.17.1	Potential for Ash Fall at Site	LANL	0
1.2.3.2.8.2	8.3.1.17.2	Faulting Potential at Repository	USGS	0
1.2.3.2.8.3.X		Technical Report - Final Preclosure Tectonics	(TBD)	0
1.2.3.2.8.3.1	8.3.1.17.3.1	Relevant EQ Sources	USGS	182
1.2.3.2.8.3.2	8.3.1.17.3.2	U/G Nuclear Explosion Sources	USGS	0
1.2.3.2.8.3.3	8.3.1.17.3.3	Grd. Mot. from Region. EQ & U/G Nuc. Exp.	USGS	700
1.2.3.2.8.3.3	8.3.1.17.3.3	Grd. Mot. from Region. EQ & U/G Nuc. Exp.	SNL	65
1.2.3.2.8.3.4	8.3.1.17.3.4	Eff. of Loc. Site Geo. on Surf. & Subsurf. Motions	USGS	0
1.2.3.2.8.3.5	8.3.1.17.3.5	Ground Motion at Site from Controlling Seismic Events	USGS	0
1.2.3.2.8.3.6	8.3.1.17.3.6	Probabilistic Seismic Hazards Analyses	USGS	708
1.2.3.2.8.4.1	8.3.1.17.4.1	Historical and Current Seismicity	USGS	1,601
1.2.3.2.8.4.2	8.3.1.17.4.2	Loc. & Rec. of Falt. Near Prosp. Surf. Facil.	USGS	0
1.2.3.2.8.4.3	8.3.1.17.4.3	Quat. Faulting w/in 100 km of Yucca Mtn.	USGS	766
1.2.3.2.8.4.4	8.3.1.17.4.4	Quat. Faulting in NE- Trending Fault Zones	USGS	370
1.2.3.2.8.4.5	8.3.1.17.4.5	Detachment Faults	USGS	230
1.2.3.2.8.4.6	8.3.1.17.4.6	Quat. Faulting W/in the Site Area	USGS	475
1.2.3.2.8.4.6	8.3.1.17.4.6	Quat. Faulting W/in the Site Area	LANL	0
1.2.3.2.8.4.7	8.3.1.17.4.7	Subsurf. Geom. & Concealed Extensions of Quat. Faults	USGS	0
1.2.3.2.8.4.8	8.3.1.17.4.8	Stress Field Within and Proximal to Site Area	USGS	0
1.2.3.2.8.4.9	8.3.1.17.4.9	Tect. Geomorph. of YM Region	USGS	0
1.2.3.2.8.4.10	8.3.1.17.4.10	Geodetic Leveling	USGS	200
1.2.3.2.8.4.11	8.3.1.17.4.11	Reg. Lat. Crustal Movement	USGS	0
1.2.3.2.8.4.12	8.3.1.17.4.12	Tectonic Models & Synthesis	USGS	235
1.2.3.3 Hydrology				
			Subtotal:	15,776
1.2.3.3.1.1.1	8.3.1.2.1.1	Precip. & Meteor. Monitor. for Region. Hydrology	USGS	320
1.2.3.3.1.1.2	8.3.1.2.1.2	Runoff & Streamflow	USGS	399
1.2.3.3.1.1.2	8.3.1.2.1.2	Runoff & Streamflow	REECo	0
1.2.3.3.1.1.3	8.3.1.2.1.3	Reg. Ground-water Flow System	USGS	250
1.2.3.3.1.1.4	8.3.1.2.1.4	Regional Hydro. Sys. Synth. & Modeling	USGS	400
1.2.3.3.1.2.1	8.3.1.2.2.1	UZ Infiltration	USGS	1,330
1.2.3.3.1.2.1	8.3.1.2.2.1	UZ Infiltration	LANL	200
1.2.3.3.1.2.2	8.3.1.2.2.2	Water Movement Tracer Tests	LANL	600
1.2.3.3.1.2.2	8.3.1.2.2.2	Water Movement Tracer Tests	REECo	0
1.2.3.3.1.2.3	8.3.1.2.2.3	Perc. in the UZ - Surf. Based Study	USGS	2,997

Table 4-3 FY 1995 Budget Allocation for Site Investigations by WBS Element

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.3.1.2.3	8.3.1.2.2.3	Perc. in the UZ - Surf. Based Study	REECo	115
1.2.3.3.1.2.4	8.3.1.2.2.4	Perc. in the UZ - ESF Study	USGS	1,303
1.2.3.3.1.2.4	8.3.1.2.2.4	Perc. in the UZ - ESF Study (radial boreholes)	REECo	725
1.2.3.3.1.2.5	8.3.1.2.2.5	Diffusion Tests in the ESF	LANL	100
1.2.3.3.1.2.5	8.3.1.2.2.5	Diffusion Tests in the ESF	REECo	0
1.2.3.3.1.2.6	8.3.1.2.2.6	Gaseous-Phase Movement in UZ	USGS	289
1.2.3.3.1.2.6	8.3.1.2.2.6	Gaseous-Phase Movement in UZ	LANL	300
1.2.3.3.1.2.7	8.3.1.2.2.7	UZ Hydrochemistry	USGS	905
1.2.3.3.1.2.8	8.3.1.2.2.8	Fluid Flow in UZ Fractured Rock	USGS	185
1.2.3.3.1.2.8	8.3.1.2.2.8	Fluid Flow in UZ Fractured Rock	LBL	300
1.2.3.3.1.2.9	8.3.1.2.2.9	Site UZ Modeling & Synthesis	USGS	250
1.2.3.3.1.2.9	8.3.1.2.2.9	Site UZ Modeling & Synthesis	LBL	775
1.2.3.3.1.2.10		Prototype Hydrol. Tests that Support Multiple Site Char. Activities	USGS	0
1.2.3.3.1.3.1	8.3.1.2.3.1	Site SZ Ground-water Flow System	USGS	1,200
1.2.3.3.1.3.1	8.3.1.2.3.1	Site SZ Ground-water Flow System	LANL	300
1.2.3.3.1.3.1	8.3.1.2.3.1	Site SZ Ground-water Flow System	REECo	0
1.2.3.3.1.3.2	8.3.1.2.3.2	SZ Hydrochemistry	USGS	420
1.2.3.3.1.3.2	8.3.1.2.3.2	SZ Hydrochemistry	REECo	1,240
1.2.3.3.1.3.3	8.3.1.2.3.3	SZ Hydro. Sys. Synthesis & Modeling	USGS	573
1.2.3.3.1.3.3	8.3.1.2.3.3	SZ Hydro. Sys. Synthesis & Modeling	LBL	300
1.2.3.3.2.1	8.3.1.16.1	Flood Recurrence Intervals & Lvl's at Pot. Loc. of Surf. Facil. (completed)	(none)	0
1.2.3.3.2.2	8.3.1.16.2	Location of Adequate Water Supplies	USGS	0
2.3.3.2.3	8.3.1.16.3	Ground-Water Conditions w/ in & above Potent. Host Rock	USGS	0
1.2.3.4 Geochemistry				
			Subtotal:	7,532
1.2.3.4.1.1	8.3.1.3.1	Groundwater Chemistry Model	LANL	371
1.2.3.4.1.2.1	8.3.1.3.4.1	Batch Sorption Studies	LANL	850
1.2.3.4.1.2.2	8.3.1.3.4.2	Biological Sorption & Transport	LANL	628
1.2.3.4.1.2.3	8.3.1.3.4.3	Sorption Models	LANL	100
1.2.3.4.1.3.1	8.3.1.3.5.1	Dissolved Species Concentration Limits	LANL	975
1.2.3.4.1.3.2	8.3.1.3.5.2	Colloid Behavior	LANL	0
1.2.3.4.1.4.1	8.3.1.3.6.1	Dynamic Transport Column Exp.	LANL	883
1.2.3.4.1.4.2	8.3.1.3.6.2	Diffusion	LANL	705
1.2.3.4.1.5.1	8.3.1.3.7.1	Retardation Sensitivity Analysis	LANL	750
1.2.3.4.1.5.1	8.3.1.3.7.1	Retardation Sensitivity Analysis	SNL	60
1.2.3.4.1.5.2	8.3.1.3.7.2	Demo. of Application Lab. Data	LANL	150
1.2.3.4.1.5.2	8.3.1.3.7.2	Demo. of Application Lab. Data	LBL	800
1.2.3.4.1.5.2	8.3.1.3.7.2	Demo. of Application Lab. Data	REECo	400
1.2.3.4.1.6	8.3.1.3.8	Retardation of Gaseous Radionuclides	LANL	0
1.2.3.4.2		Geochemical Modeling	LLNL	565
1.2.5.3.4		GEMBOCHS	LLNL	295
1.2.3.5 Drilling				
			Subtotal:	13,796
1.2.3.5.1		Sample Management Facility	REECo	500
1.2.3.5.1		Sample Management Facility (760K=lith. logging; 4900K=oper.; 155K=cap.)	T&MSS	3,418
2.3.5.2.1	8.3.1	Common-to-Drilling Support (C-To-D = 7500K, incl. 1500K cap.)	REECo	4,116
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support	JC	0

Table 4-3 FY 1995 Budget Allocation for Site Investigations by WBS Element

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.5.2.2	8.3.1	Engrg., Desgn & Drilling Supt. (trenching)	REECo	0
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support (SBT=5100K, ESF=1400K)	RSN	0
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support	LLNL	0
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support	T&MSS	1,859
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support (borehole security)	REECo	0
1.2.3.5.2.3	8.3.1.2.2.3.2	Integ. Data Acq. Syst. (IDAS)	REECo	0
1.2.3.5.2.4		Title III Engineering For SBT	M&O	30
1.2.3.5.3.1	8.3.1.2.3.1	Water Table Drillholes	REECo	1,004
1.2.3.5.3.2	8.3.1.2.1.3.3	Fortymile Wash Drillholes & Pond Construction	REECo	0
1.2.3.5.3.3	8.3.1.2.2.1.2	Natural Infiltration Drillholes & Construction	REECo	0
1.2.3.5.3.4	8.3.1.2.2.1.3	Rainfall Sim./Artif. Infiltr. Drillholes & Plot Construction	REECo	0
1.2.3.5.3.5	8.3.1.2.2.3.2	UZ, Vert. and Seis. Prof., & Prot. Drllhs. & Tsts.	REECo	1,102
1.2.3.5.3.6	8.3.1.2.2.3.3	Solitario Canyon Horiz. Drillhole & Tests in UZ	REECo	0
1.2.3.5.3.7	8.3.1.2.2.4	Multipurpose Boreholes	REECo	0
1.2.3.5.3.8	8.3.1.2.2.7.1	Gas-Phase Circulation Tests in UZ Drillholes	REECo	0
1.2.3.5.3.9	8.3.1.2.2.8.1	Gas-Phase Chemical Tests in UZ Drillholes	REECo	0
1.2.3.5.3.10	8.3.1.2.3.1.1	Solitario Canyon Fault Drillholes & Tests in SZ	REECo	0
1.2.3.5.3.11	8.3.1.2.3.1.2	Multiple Well Interference Tests at C-Hole Complex	REECo	756
1.2.3.5.3.12	8.3.1.2.3.1	Conservative Tracer Tests	REECo	0
1.2.3.5.3.13	8.3.1.2.3.1	Reactive Tracer Tests	REECo	0
1.2.3.5.3.14	8.3.1.2.3.2	SZ Hydrochemistry Tests	REECo	0
1.2.3.5.3.15	8.3.1.4.2.1	Geologic Drillholes	REECo	0
2.3.5.3.16	8.3.1.4.2.2	Geologic Pavements	REECo	0
2.3.5.3.17	8.3.1.4.3.1	Geostatistical Drillholes	REECo	601
1.2.3.5.3.18	8.3.1.5.2.1	Calcite-Silica Drillholes & Trenches	REECo	0
1.2.3.5.3.19	8.3.1.8.5.1.1	Volcanic Drillholes	REECo	0
1.2.3.5.3.20	8.3.1.14.2.1	Surface Facilities Drillholes	REECo	0
1.2.3.5.3.21	8.3.1.16.2.1	Water Supply Drillholes & Tests	REECo	0
1.2.3.5.3.22	8.3.1.17.4.8	In Situ Strs. Drllhle. & Tsts., & Qua. Flt. Trnchs.	REECo	180
1.2.3.5.3.23		Access and Pad Construction	REECo	200
1.2.3.5.3.24	8.3.1.4.2.1	Drilling / Drilling Engrg. of Surf.-Based Geophys. Testing	REECo	30
1.2.3.5.3.24	8.3.1.4.2.1	Drilling / Drilling Engrg. of Surf.-Based Geophys. Testing	RSN	0
1.2.3.6 Climatology				
			Subtotal:	3,160
1.2.3.6.2.1.1	8.3.1.5.1.1	Modern Regional Climate	USGS	45
1.2.3.6.2.1.2	8.3.1.5.1.2	Paleoclim. Study of Lake, Playa, & Marsh Deposits	USGS	400
1.2.3.6.2.1.3	8.3.1.5.1.3	Climatic Implications of Terrestrial Paleoecology	USGS	200
1.2.3.6.2.1.4	8.3.1.5.1.4	Paleoenviron. History of YM	USGS	910
1.2.3.6.2.1.4	8.3.1.5.1.4	Paleoenviron. History of YM	LANL	175
1.2.3.6.2.1.5	8.3.1.5.1.5	Paleoclimate-Paleoenviron. Analysis	USGS	90
1.2.3.6.2.1.6	8.3.1.5.1.6	Future Regional Climate and Environments	SNL	620
1.2.3.6.2.2.1	8.3.1.5.2.1	Quaternary Regional Hydrology	USGS	720
1.2.3.6.2.2.2	8.3.1.5.2.2	Future Reg. Hydrology due to Climate Change	USGS	0

Table 4-3 FY 1995 Budget Allocation for Site Investigations by WBS Element

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.7 Resource Potential				
			Subtotal:	150
1.2.3.7.1	8.3.1.9.1	Natl. Phen. & Human Activ. that Might Degrade Surf. Mrkrs. & Monuments	PMO	0
1.2.3.7.1	8.3.1.9.1	Natl. Phen. & Human Activ. that Might Degrade Surf. Mrkrs. & Monuments	LANL	0
1.2.3.7.1	8.3.1.9.1	Natl. Phen. & Human Activ. that Might Degrade Surf. Mrkrs. & Monuments	SNL	0
1.2.3.7.2.1	8.3.1.9.2.1	Natural Resource Assessment	USGS	150
1.2.3.7.2.1	8.3.1.9.2.1	Natural Resource Assessment	UNLV/HRC	0
1.2.3.7.2.2	8.3.1.9.2.2	Water Resource Assessment	T&MSS	0
1.2.3.7.2.2	8.3.1.9.2.2	Water Resource Assessment	(TBD)	0
1.2.3.7.3.X	8.3.1.9.3.X	Human Activities	(TBD)	0
1.2.3.7.3.1	8.3.1.9.3.1	Future Inadvertent Human Intrusion Studies	T&MSS	0
1.2.3.7.3.2	8.3.1.9.3.2	Potential Effects of Explor. or Extract. of Nat'l. Resources	T&MSS	0
1.2.3.9 Special Studies				
			Subtotal:	5,817
1.2.3.9.2	8.3.1	Extended Dry Repository	LBL	0
1.2.3.9.3		Test Interference Evaluations	M&O	0
1.2.3.9.4		Tracers, Fluids and Materials	M&O	0
1.2.3.9.4		Tracers, Fluids and Materials	EG&G	0
1.2.3.9.5		3-D Site Model	M&O	821
1.2.3.9.5		3-D Site Model	EG&G	1,335
1.2.3.9.6		Field Test Coordinator Support	USBR	0
1.2.3.9.7		ESF Field Test Coordinator	LANL	1,397
1.2.3.9.7		ESF Field Test Coordinator	REECo	270
1.2.3.9.7		SBT Coordination	M&O	1,284
1.2.3.9.9		Study Plan Preparation	M&O	240
1.2.3.9.9		Study Plan Preparation	LANL	0
1.2.3.9.9		Study Plan Preparation	LBL	0
1.2.3.9.9		Study Plan Preparation	LLNL	0
1.2.3.9.9		Study Plan Preparation	SNL	0
1.2.3.9.9		Study Plan Preparation	USGS	0
1.2.3.9.10		Peer Review	LANL	0
1.2.3.9.10		Peer Review	LBL	0
1.2.3.9.10		Peer Review	LLNL	0
1.2.3.9.10		Peer Review	M&O	0
1.2.3.9.10		Peer Review	SNL	0
1.2.3.9.11		Technical Analysis (incl. Calico Hills decision & TPR)	M&O	470
1.2.3.9.Y		NSF I.A. Agree. Cntrb. to Site Inv. (1.2.3.9.8)	LLNL	0
1.2.3.9.Y		NSF I.A. Agree. Cntrb. to Site Inv. (1.2.3.9.8)	NSF	0
1.2.3.10 Altered Zone Characterization				
			Subtotal:	1,997
1.2.3.10.1		Char. Techniq. for Altered Zone	LLNL	528
1.2.3.10.2		Characterization of Thermal Effects on the Altered Zone	LLNL	367
1.2.3.10.3.1		Integrated Radionuclide Release: Tests & Models	LLNL	661
1.2.3.10.3.2		Thermodyn. Data Determination	LLNL	441

Table 4-3 FY 1995 Budget Allocation for Site Investigations by WBS Element

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.11 Geophysics				
			Subtotal:	4,073
1.2.3.11.1		Borehole Geophysical Logging	RSN	0
1.2.3.11.1		Borehole Geophysical Logging	LLNL	0
1.2.3.11.1		Borehole Geophysical Logging	T&MSS	1,415
1.2.3.11.2		Surface Geophysics	LANL	0
1.2.3.11.2		Surface Geophysics	LLNL	0
1.2.3.11.2		Surface Geophysics	LBL	1,000
1.2.3.11.2		Surface Geophysics	SNL	210
1.2.3.11.2		Surface Geophysics	T&MSS	1,033
1.2.3.11.3		ESF Geophysics	LLNL	200
1.2.3.11.3		ESF Geophysics	LANL	215
1.2.3.12 Waste Pkg. Environment Testing & Modeling				
			Subtotal:	5,238
1.2.3.12.1	8.3.4.2.4.1	Chemical & Mineralogical Prop. of Waste Package	LLNL	829
1.2.3.12.2	8.3.4.2.4.2	Hydrologic Prop. of Waste Package Environment	LLNL	1,366
1.2.3.12.3	8.3.4.2.4.3	Mech. Attributes of Waste Package Environment	LLNL	550
1.2.3.12.4	8.3.4.2.4.4	EBS Field Tests	LLNL	1,521
1.2.3.12.4	8.3.4.2.4.4	EBS Field Tests	REECo	267
1.2.3.12.4	8.3.4.2.4.4	EBS Field Tests	RSN	0
1.2.3.12.5		Char. of Eff. of Man-Made Matls. on Chem. & Min. Chgs. in Post-Emplacement Environ.	LLNL	705
1.2.3.13 Sealing				
			Subtotal:	752
1.2.3.13.1		Sealing Performance Requ.	SNL	151
1.2.3.13.2		Sealing Testing	SNL	601

Table 4-4 FY 1995 Budget Allocation for WBS 1.2.3 by Participant

WBS	SCP Number	Title	Participant	FY95 Allocation
PARTICIPANT: EG&G			Subtotal:	1,335
1.2.3.9.4		Tracers, Fluids and Materials	EG&G	0
1.2.3.9.5		3-D Site Model	EG&G	1,335
PARTICIPANT: EPA			Subtotal:	15
1.2.3.1.1		Coordination and Planning	EPA	15
PARTICIPANT: JC			Subtotal:	0
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support	JC	0
PARTICIPANT: LANL			Subtotal:	12,764
1.2.3.1.1		Coordination and Planning	LANL	864
1.2.3.2.1.1.1	8.3.1.3.2.1	Min, Petrol. & Rock Chemistry of Trnsp. Pathways	LANL	1,014
1.2.3.2.1.1.2	8.3.1.3.2.2	Mineralogic & Geochemical Alteration	LANL	475
1.2.3.2.1.2.2	8.3.1.3.3.2	Kinetics and Thermodynamics of Mineral Evolution	LANL	377
1.2.3.2.1.2.3	8.3.1.3.3.3	Conceptual Model of Mineral Evolution	LANL	0
1.2.3.2.5.1.1	8.3.1.8.1.1	Probability of Volcanic Eruption	LANL	195
1.2.3.2.5.1.2	8.3.1.8.1.2	Effects of a Volc. Erupt. Penetrating the Repos.	LANL	730
1.2.3.2.5.5.1	8.3.1.8.5.1	Charact. of Volcanic Features	LANL	410
1.2.3.2.8.1	8.3.1.17.1	Potential for Ash Fall at Site	LANL	0
1.2.3.2.8.4.6	8.3.1.17.4.6	Quat. Faulting W/in the Site Area	LANL	0
1.2.3.3.1.2.1	8.3.1.2.2.1	UZ Infiltration	LANL	200
1.2.3.3.1.2.2	8.3.1.2.2.2	Water Movement Tracer Tests	LANL	600
1.2.3.3.1.2.5	8.3.1.2.2.5	Diffusion Tests in the ESF	LANL	100
1.2.3.3.1.2.6	8.3.1.2.2.6	Gaseous-Phase Movement in UZ	LANL	300
1.2.3.3.1.3.1	8.3.1.2.3.1	Site SZ Ground-water Flow System	LANL	300
1.2.3.4.1.1	8.3.1.3.1	Groundwater Chemistry Model	LANL	371
1.2.3.4.1.2.1	8.3.1.3.4.1	Batch Sorption Studies	LANL	850
1.2.3.4.1.2.2	8.3.1.3.4.2	Biological Sorption & Transport	LANL	628
1.2.3.4.1.2.3	8.3.1.3.4.3	Sorption Models	LANL	100
1.2.3.4.1.3.1	8.3.1.3.5.1	Dissolved Species Concentration Limits	LANL	975
1.2.3.4.1.3.2	8.3.1.3.5.2	Colloid Behavior	LANL	0
1.2.3.4.1.4.1	8.3.1.3.6.1	Dynamic Transport Column Exp.	LANL	883
1.2.3.4.1.4.2	8.3.1.3.6.2	Diffusion	LANL	705
1.2.3.4.1.5.1	8.3.1.3.7.1	Retardation Sensitivity Analysis	LANL	750
1.2.3.4.1.5.2	8.3.1.3.7.2	Demo. of Application Lab. Data	LANL	150
1.2.3.4.1.6	8.3.1.3.8	Retardation of Gaseous Radionuclides	LANL	0
1.2.3.6.2.1.4	8.3.1.5.1.4	Paleoenviro. History of YM	LANL	175
1.2.3.7.1	8.3.1.9.1	Natl. Phen. & Human Activ. that Might Degrade Surf. Mrkrs. & Monuments	LANL	0
1.2.3.9.7		ESF Field Test Coordinator	LANL	1,397
1.2.3.9.9		Study Plan Preparation	LANL	0
1.2.3.9.10		Peer Review	LANL	0
1.2.3.11.2		Surface Geophysics	LANL	0
1.2.3.11.3		ESF Geophysics	LANL	215
PARTICIPANT: LBL			Subtotal:	3,340
1.2.3.1.1		Coordination and Planning	LBL	165
1.2.3.2.1.2.1	8.3.1.3.3.1	Natural Analog of Hydrothermal Systems in Tuff	LBL	0
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	LBL	0

Table 4-4 FY 1995 Budget Allocation for WBS 1.2.3 by Participant

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.3.1.2.8	8.3.1.2.2.8	Fluid Flow in UZ Fractured Rock	LBL	300
1.2.3.3.1.2.9	8.3.1.2.2.9	Site UZ Modeling & Synthesis	LBL	775
1.2.3.3.1.3.3	8.3.1.2.3.3	SZ Hydro. Sys. Synthesis & Modeling	LBL	300
1.2.3.4.1.5.2	8.3.1.3.7.2	Demo. of Application Lab. Data	LBL	800
1.2.3.9.2	8.3.1	Extended Dry Repository	LBL	0
1.2.3.9.9		Study Plan Preparation	LBL	0
1.2.3.9.10		Peer Review	LBL	0
1.2.3.11.2		Surface Geophysics	LBL	1,000
PARTICIPANT: LLNL			Subtotal:	8,303
1.2.3.1.1		Coordination and Planning	LLNL	275
1.2.3.4.2		Geochemical Modeling	LLNL	565
1.2.5.3.4		GEMBOCHS	LLNL	295
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support	LLNL	0
1.2.3.9.9		Study Plan Preparation	LLNL	0
1.2.3.9.10		Peer Review	LLNL	0
1.2.3.9.Y		NSF I.A. Agree. Cntrb. to Site Inv. (1.2.3.9.8)	LLNL	0
1.2.3.10.1		Char. Techniq. for Altered Zone	LLNL	528
1.2.3.10.2		Characterization of Thermal Effects on the Altered Zone	LLNL	367
1.2.3.10.3.1		Integrated Radionuclide Release: Tests & Models	LLNL	661
1.2.3.10.3.2		Thermodyn. Data Determination	LLNL	441
1.2.3.11.1		Borehole Geophysical Logging	LLNL	0
1.2.3.11.2		Surface Geophysics	LLNL	0
1.2.3.11.3		ESF Geophysics	LLNL	200
1.2.3.12.1	8.3.4.2.4.1	Chemical & Mineralogical Prop. of Waste Package	LLNL	829
1.2.3.12.2	8.3.4.2.4.2	Hydrologic Prop. of Waste Package Environment	LLNL	1,366
1.2.3.12.3	8.3.4.2.4.3	Mech. Attributes of Waste Package Environment	LLNL	550
1.2.3.12.4	8.3.4.2.4.4	EBS Field Tests	LLNL	1,521
1.2.3.12.5		Char. of Eff. of Man-Made Matls. on Chem. & Min. Chgs. in Post-Emplacement Environ.	LLNL	705
PARTICIPANT: M&O			Subtotal:	4,503
1.2.3.1.1		Coordination and Planning	M&O	1,658
1.2.3.1.1		Coordination and Planning	M&O	0
1.2.3.5.2.4		Title III Engineering For SBT	M&O	30
1.2.3.9.3		Test Interference Evaluations	M&O	0
1.2.3.9.4		Tracers, Fluids and Materials	M&O	0
1.2.3.9.5		3-D Site Model	M&O	821
1.2.3.9.7		SBT Coordination	M&O	1,284
1.2.3.9.9		Study Plan Preparation	M&O	240
1.2.3.9.10		Peer Review	M&O	0
1.2.3.9.11		Technical Analysis (incl. Calico Hills decision & TPR)	M&O	470
PARTICIPANT: NSF			Subtotal:	0
1.2.3.9.Y		NSF I.A. Agree. Cntrb. to Site Inv. (1.2.3.9.8)	NSF	0
PARTICIPANT: NSF			Subtotal:	0
1.2.3.7.1	8.3.1.9.1	Natl. Phen. & Human Activ. that Might Degrade Surf. Mrkrs. & Monuments	PMO	0
PARTICIPANT: REEC			Subtotal:	12,236

Table 4-4 FY 1995 Budget Allocation for WBS 1.2.3 by Participant

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	REECo	730
1.2.3.2.7.2.1	8.3.1.15.2.1	Site Ambient Stress Conditions	REECo	0
1.2.3.3.1.1.2	8.3.1.2.1.2	Runoff & Streamflow	REECo	0
1.2.3.3.1.2.2	8.3.1.2.2.2	Water Movement Tracer Tests	REECo	0
1.2.3.3.1.2.3	8.3.1.2.2.3	Perc. in the UZ - Surf. Based Study	REECo	115
1.2.3.3.1.2.4	8.3.1.2.2.4	Perc. in the UZ - ESF Study (radial boreholes)	REECo	725
1.2.3.3.1.2.5	8.3.1.2.2.5	Diffusion Tests in the ESF	REECo	0
1.2.3.3.1.3.1	8.3.1.2.3.1	Site SZ Ground-water Flow System	REECo	0
1.2.3.3.1.3.2	8.3.1.2.3.2	SZ Hydrochemistry	REECo	1,240
1.2.3.4.1.5.2	8.3.1.3.7.2	Demo. of Application Lab. Data	REECo	400
1.2.3.5.1		Sample Management Facility	REECo	500
1.2.3.5.2.1	8.3.1	Common-to-Drilling Support (C-To-D = 7500K, incl. 1500K cap.)	REECo	4,116
1.2.3.5.2.2	8.3.1	Engrg., Design & Drilling Supt. (trenching)	REECo	0
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support (borehole security)	REECo	0
1.2.3.5.2.3	8.3.1.2.2.3.2	Integ. Data Acq. Syst. (IDAS)	REECo	0
1.2.3.5.3.1	8.3.1.2.3.1	Water Table Drillholes	REECo	1,004
1.2.3.5.3.2	8.3.1.2.1.3.3	Fortymile Wash Drillholes & Pond Construction	REECo	0
1.2.3.5.3.3	8.3.1.2.2.1.2	Natural Infiltration Drillholes & Construction	REECo	0
1.2.3.5.3.4	8.3.1.2.2.1.3	Rainfall Sim./Artif. Infiltr. Drillholes & Plot Construction	REECo	0
1.2.3.5.3.5	8.3.1.2.2.3.2	UZ, Vert. and Seis. Prof., & Prot. Drllhs. & Tsts.	REECo	1,102
1.2.3.5.3.6	8.3.1.2.2.3.3	Solitario Canyon Horiz. Drillhole & Tests in UZ	REECo	0
1.2.3.5.3.7	8.3.1.2.2.4	Multipurpose Boreholes	REECo	0
1.2.3.5.3.8	8.3.1.2.2.7.1	Gas-Phase Circulation Tests in UZ Drillholes	REECo	0
1.2.3.5.3.9	8.3.1.2.2.8.1	Gas-Phase Chemical Tests in UZ Drillholes	REECo	0
1.2.3.5.3.10	8.3.1.2.3.1.1	Solitario Canyon Fault Drillholes & Tests in SZ	REECo	0
1.2.3.5.3.11	8.3.1.2.3.1.2	Multiple Well Interference Tests at C-Hole Complex	REECo	756
1.2.3.5.3.12	8.3.1.2.3.1	Conservative Tracer Tests	REECo	0
1.2.3.5.3.13	8.3.1.2.3.1	Reactive Tracer Tests	REECo	0
1.2.3.5.3.14	8.3.1.2.3.2	SZ Hydrochemistry Tests	REECo	0
1.2.3.5.3.15	8.3.1.4.2.1	Geologic Drillholes	REECo	0
1.2.3.5.3.16	8.3.1.4.2.2	Geologic Pavements	REECo	0
1.2.3.5.3.17	8.3.1.4.3.1	Geostatistical Drillholes	REECo	601
1.2.3.5.3.18	8.3.1.5.2.1	Calcite-Silica Drillholes & Trenches	REECo	0
1.2.3.5.3.19	8.3.1.8.5.1.1	Volcanic Drillholes	REECo	0
1.2.3.5.3.20	8.3.1.14.2.1	Surface Facilities Drillholes	REECo	0
1.2.3.5.3.21	8.3.1.16.2.1	Water Supply Drillholes & Tests	REECo	0
1.2.3.5.3.22	8.3.1.17.4.8	In Situ Strs. Drllhle. & Tsts., & Qua. Flt. Trnchs.	REECo	180
1.2.3.5.3.23		Access and Pad Construction	REECo	200
1.2.3.5.3.24	8.3.1.4.2.1	Drilling / Drilling Engrg. of Surf.-Based Geophys. Testing	REECo	30
1.2.3.9.7		ESF Field Test Coordinator	REECo	270
1.2.3.12.4	8.3.4.2.4.4	EBS Field Tests	REECo	267
PARTICIPANT: RSN			Subtotal:	0
1.2.3.2.6.2.3	8.3.1.14.2.3	Surf. & Subsurf. Fac. Field Tests & Char. Meas.	RSN	0
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support (SBT=5100K, ESF=1400K)	RSN	0
1.2.3.5.3.24	8.3.1.4.2.1	Drilling / Drilling Engrg. of Surf.-Based Geophys. Testing	RSN	0
1.2.3.11.1		Borehole Geophysical Logging	RSN	0
1.2.3.12.4	8.3.4.2.4.4	EBS Field Tests	RSN	0

Table 4-4 FY 1995 Budget Allocation for WBS 1.2.3 by Participant

WBS	SCP Number	Title	Participant	FY95 Allocation
PARTICIPANT: SNL			Subtotal:	8,618
1.2.3.1.1		Coordination and Planning	SNL	182
1.2.3.1.2		Participant Management & Integration	SNL	575
1.2.3.2.2.1	8.3.1.4.3.1	Systematic Acq. of Site Specific Subsurface Info.	SNL	413
1.2.3.2.2.2	8.3.1.4.3.2	3-D Rock Charact. Models	SNL	681
1.2.3.2.6.1	8.3.1.14.2.1	Surf. & Subsurf. Fac. Explor. Program	SNL	283
1.2.3.2.6.2	8.3.1.14.2.2	Surf. & Subsurf. Fac. Lab Tests & Mat'l. Prop. Meas.	SNL	137
1.2.3.2.6.3	8.3.1.14.2.3	Surf. & Subsurf. Fac. Field Tests & Char. Meas.	SNL	332
1.2.3.2.7.1.1	8.3.1.15.1.1	Lab. Thermal Properties	SNL	520
1.2.3.2.7.1.2	8.3.1.15.1.2	Lab. Thermal Expansion Testing	SNL	340
1.2.3.2.7.1.3	8.3.1.15.1.3	Lab. Determin. of Mech. Prop. of Intact Rock	SNL	400
1.2.3.2.7.1.4	8.3.1.15.1.4	Lab. Determin. of the Mech. Prop. of Fractures	SNL	400
1.2.3.2.7.3.1		Excavation Investigations	SNL	63
1.2.3.2.7.3.2		In-Situ Thermomechanical	SNL	533
1.2.3.7.3.3.3		In-Situ Mechanical	SNL	188
1.2.3.2.7.3.4		In-Situ Design Ver	SNL	1,496
1.2.3.2.7.4		Rock Mass Analysis	SNL	368
1.2.3.2.8.3.3	8.3.1.17.3.3	Grd. Mot. from Region. EQ & U/G Nuc. Exp.	SNL	65
1.2.3.4.1.5.1	8.3.1.3.7.1	Retardation Sensitivity Analysis	SNL	60
1.2.3.6.2.1.6	8.3.1.5.1.6	Future Regional Climate and Environments	SNL	620
1.2.3.7.1	8.3.1.9.1	Natl. Phen. & Human Activ. that Might Degrade Surf. Mkrs. & Monuments	SNL	0
1.2.3.9.9		Study Plan Preparation	SNL	0
1.2.3.9.10		Peer Review	SNL	0
1.2.3.11.2		Surface Geophysics	SNL	210
1.2.3.13.1		Sealing Performance Requi.	SNL	151
1.2.3.13.2		Sealing Testing	SNL	601
PARTICIPANT: T&MSS			Subtotal:	8,067
1.2.3.1.1		Coordination and Planning	T&MSS	342
1.2.3.2.5.4	8.3.1.8.4	Chgs. in Rock Geochem. Prop. Resulting from Tect. Proc.	T&MSS	0
1.2.3.5.1		Sample Management Facility (760K=lith. logging; 4900K=oper.; 155K=cap.)	T&MSS	3,418
1.2.3.5.2.2	8.3.1	Engineering, Design and Drilling Support	T&MSS	1,859
1.2.3.7.2.2	8.3.1.9.2.2	Water Resource Assessment	T&MSS	0
1.2.3.7.3.1	8.3.1.9.3.1	Future Inadvertent Human Intrusion Studies	T&MSS	0
1.2.3.7.3.2	8.3.1.9.3.2	Potential Effects of Explor. or Extract. of Nat'l. Resources	T&MSS	0
1.2.3.11.1		Borehole Geophysical Logging	T&MSS	1,415
1.2.3.11.2		Surface Geophysics	T&MSS	1,033
PARTICIPANT: UNLV/HRC			Subtotal:	0
1.2.3.7.2.1	8.3.1.9.2.1	Natural Resource Assessment	UNLV/HRC	0
PARTICIPANT: USBR			Subtotal:	0
1.2.3.9.6		Field Test Coordinator Support	USBR	0

Table 4-4 FY 1995 Budget Allocation for WBS 1.2.3 by Participant

WBS	SCP Number	Title	Participant	FY95 Allocation
			Subtotal:	26,601
PARTICIPANT: USGS			USGS	2,188
1.2.3.1.1		Coordination and Planning	USGS	2,263
1.2.3.2.2.1.1	8.3.1.4.2.1	Vert. and Lat. Dist. of Strat. Units in Site Area	USGS	2,887
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	USGS	0
1.2.3.2.2.1.3	8.3.1.4.2.3	Three-Dimensional Geologic Model	USGS	0
1.2.3.2.3.1	8.3.1.6.1	Present Location & Rates of Surface Erosion	USGS	0
1.2.3.2.3.2	8.3.1.6.2	Effects of Future Climate Conditions on Erosion	USGS	0
1.2.3.2.3.3	8.3.1.6.3	Effects of Future Tectonic Activity on Erosion	USGS	0
1.2.3.2.3.4	8.3.1.6.4	Effects of Erosion on Hydrol., Geochem. & Rock Charact.	USGS	0
1.2.3.2.5.2	8.3.1.8.2	Tectonics Effects: Evaluations of Changes in the Natural and Engineered Barrier Systems Resulting from Tectonic Processes and Events	USGS	265
1.2.3.2.5.5.2	8.3.1.8.5.2	Charact. of Igneous Intrusive Features	USGS	0
1.2.3.2.6.1	8.3.1.14.1	Topographic Char. of Potent. Locations of Surface Facilities	USGS	0
1.2.3.2.6.2.1	8.3.1.14.2.1	Surf. & Subsurf. Fac. Explor. Program	USGS	0
1.2.3.2.6.2.2	8.3.1.14.2.2	Surf. & Subsurf. Fac. Lab Tests & Mat'l. Prop. Meas.	USGS	34
1.2.3.2.6.2.3	8.3.1.14.2.3	Surf. & Subsurf. Fac. Field Tests & Char. Meas.	USGS	161
1.2.3.2.7.2.2	8.3.1.15.2.2	Site Ambient Thermal Conditions	USGS	0
1.2.3.2.8.2	8.3.1.17.2	Faulting Potential at Repository	USGS	182
1.2.3.2.8.3.1	8.3.1.17.3.1	Relevant EQ Sources	USGS	0
1.2.3.2.8.3.2	8.3.1.17.3.2	U/G Nuclear Explosion Sources	USGS	700
1.2.3.2.8.3.3	8.3.1.17.3.3	Grd. Mot. from Region. EQ & U/G Nuc. Exp.	USGS	0
1.2.3.2.8.3.4	8.3.1.17.3.4	Eff. of Loc. Site Geo. on Surf. & Subsurf. Motions	USGS	0
1.2.3.2.8.3.5	8.3.1.17.3.5	Ground Motion at Site from Controlling Seismic Events	USGS	708
1.2.3.2.8.3.6	8.3.1.17.3.6	Probabilistic Seismic Hazards Analyses	USGS	1,601
1.2.3.2.8.4.1	8.3.1.17.4.1	Historical and Current Seismicity	USGS	0
1.2.3.2.8.4.2	8.3.1.17.4.2	Loc. & Rec. of Falt. Near Prosp. Surf. Facil.	USGS	766
1.2.3.2.8.4.3	8.3.1.17.4.3	Quat. Faulting w/in 100 km of Yucca Mtn.	USGS	370
1.2.3.2.8.4.4	8.3.1.17.4.4	Quat. Faulting in NE- Trending Fault Zones	USGS	230
1.2.3.2.8.4.5	8.3.1.17.4.5	Detachment Faults	USGS	475
1.2.3.2.8.4.6	8.3.1.17.4.6	Quat. Faulting W/in the Site Area	USGS	0
1.2.3.2.8.4.7	8.3.1.17.4.7	Subsurf. Geom. & Concealed Extensions of Quat. Faults	USGS	0
1.2.3.2.8.4.8	8.3.1.17.4.8	Stress Field Within and Proximal to Site Area	USGS	0
1.2.3.2.8.4.9	8.3.1.17.4.9	Tect. Geomorph. of YM Region	USGS	200
1.2.3.2.8.4.10	8.3.1.17.4.10	Geodetic Leveling	USGS	0
1.2.3.2.8.4.11	8.3.1.17.4.11	Reg. Lat. Crustal Movement	USGS	235
1.2.3.2.8.4.12	8.3.1.17.4.12	Tectonic Models & Synthesis	USGS	320
1.2.3.3.1.1.1	8.3.1.2.1.1	Precip. & Meteor. Monitor. for Region. Hydrology	USGS	399
1.2.3.3.1.1.2	8.3.1.2.1.2	Runoff & Streamflow	USGS	250
1.2.3.3.1.1.3	8.3.1.2.1.3	Reg. Ground-water Flow System	USGS	400
1.2.3.3.1.1.4	8.3.1.2.1.4	Regional Hydro. Sys. Synth. & Modeling	USGS	1,330
1.2.3.3.1.2.1	8.3.1.2.2.1	UZ Infiltration	USGS	2,997
1.2.3.3.1.2.3	8.3.1.2.2.3	Perc. in the UZ - Surf. Based Study	USGS	1,303
1.2.3.3.1.2.4	8.3.1.2.2.4	Perc. in the UZ - ESF Study	USGS	289
1.2.3.3.1.2.6	8.3.1.2.2.6	Gaseous-Phase Movement in UZ	USGS	905
1.2.3.3.1.2.7	8.3.1.2.2.7	UZ Hydrochemistry	USGS	185
1.2.3.3.1.2.8	8.3.1.2.2.8	Fluid Flow in UZ Fractured Rock	USGS	250
1.2.3.3.1.2.9	8.3.1.2.2.9	Site UZ Modeling & Synthesis	USGS	0
1.2.3.3.1.2.10		Prototype Hydrol. Tests that Support Multiple Site Char. Activities	USGS	0

Table 4-4 FY 1995 Budget Allocation for WBS 1.2.3 by Participant

WBS	SCP Number	Title	Participant	FY95 Allocation
1.2.3.3.1.3.1	8.3.1.2.3.1	Site SZ Ground-water Flow System	USGS	1,200
1.2.3.3.1.3.2	8.3.1.2.3.2	SZ Hydrochemistry	USGS	420
1.2.3.3.1.3.3	8.3.1.2.3.3	SZ Hydro. Sys. Synthesis & Modeling	USGS	573
1.2.3.3.2.2	8.3.1.16.2	Location of Adequate Water Supplies	USGS	0
1.2.3.3.2.3	8.3.1.16.3	Ground-Water Conditions w/ in & above Potent. Host Rock	USGS	0
1.2.3.6.2.1.1	8.3.1.5.1.1	Modern Regional Climate	USGS	45
1.2.3.6.2.1.2	8.3.1.5.1.2	Paleoclim. Study of Lake, Playa, & Marsh Deposits	USGS	400
1.2.3.6.2.1.3	8.3.1.5.1.3	Climatic Implications of Terrestrial Paleoecology	USGS	200
1.2.3.6.2.1.4	8.3.1.5.1.4	Paleoenviro. History of YM	USGS	910
1.2.3.6.2.1.5	8.3.1.5.1.5	Paleoclimate-Paleoenviro. Analysis	USGS	90
1.2.3.6.2.2.1	8.3.1.5.2.1	Quaternary Regional Hydrology	USGS	720
1.2.3.6.2.2.2	8.3.1.5.2.2	Future Reg. Hydrology due to Climate Change	USGS	0
1.2.3.7.2.1	8.3.1.9.2.1	Natural Resource Assessment	USGS	150
1.2.3.9.9		Study Plan Preparation	USGS	0
PARTICIPANT: OTHER ("none" / "TBD")			Subtotal:	0
1.2.3.3.2.1	8.3.1.16.1	Flood Recurrence Intervals & Lvl. at Pot. Loc. of Surf. Facil. (completed)	(none)	0
1.2.3.2.4	8.3.1.7	Rock Dissolution	(TBD)	0
1.2.3.2.6.X		TSS Preclosure Char. Report	(TBD)	0
1.2.3.2.8.3.X		Technical Report - Final Preclosure Tectonics	(TBD)	0
1.2.3.7.2.2	8.3.1.9.2.2	Water Resource Assessment	(TBD)	0
1.2.3.7.3.X	8.3.1.9.3.X	Human Activities	(TBD)	0

TABLE 5.1 SURFACE BASED TESTING PLANNED FOR FY 95

DRILLING (see Table 5-2a)

USW SD-7
USW SD-12
USWWT-24

TRENCHING (see Table 5-2b)

Amargosa Valley Trenches
Bare Mountain Trench
Crater Flat Trenches
Rock Valley Trenches
Sleeping Buttes Trenches
Additional Outcrop or Pavement Studies

GEOPHYSICS (see Table 5-2c)

UE-25 UZ#16 Vertical Seismic
Profiling
Borehole Geophysical Logging
Geophysics over Repository Block
Regional Seismic Reflection Survey
Seismicity Monitoring
Geodetic Leveling

HYDROLOGY TESTING (see Table 5-2d)

C-Hole Tracer Tests
G-2 Workover and Pump
USW WT-10 Workover and Pump
USW WT-12 Workover and Pump
USW WT-11 Workover and Pump

INSTRUMENTATION (see Table 5-2d)

USW NRG-6
USW NRG-7a
UE-25 UZ#4
UE-25 UZ#7

WORKOVER OF BORHEOLE (see Table 5-2d)

UE-25 NRG#4 Cleanout
UE-25 UZ#4 Reaming
UE-25 UZ#7 Cleanout
UE-25 UZ#16 Cleanout

GEOTECHNICAL DATA COLLECTION

ESF Leach Field
Soil and Rock Properties

TABLE 5-2a: DRILLING PLANNED IN FY 1995

Hole Name	Rig	Location	Drilling Type	Proposed Finished Hole Diameter	Proposed Depth
1. <u>WT Borehole</u>					
USW WT-24	Stratmaster or other comparable rig	N776673 E562306	Dry; conventional circulation	> 6 in	About 2850 ft (150 ft below base of Calico Hills)
2. <u>SD Borehole</u>					
USW SD-7	Stratmaster	N758,950 E561,240	Dry	> 6 in	About 2,675 ft
USW SD-12	LM-300	N761,957 E561,606	Dry, dual-wall reverse circulation	12 1/4 in	About 2,300 ft

TABLE 5-2b: PLANNED FY 1995 TRENCHES, TEST PITS, OUTCROP AND PAVEMENT STUDIES

WBS	SCP	Title	Activity
1.2.3.2.8.4.6	8.3.1.17.4.6	Quaternary Faulting Within the Site Area	Excavate at least three new trenches in Crater Flat
1.2.3.2.8.4.4	8.3.1.17.4.4	Quaternary Faulting Within Northeast-Trending Fault Zones	Excavate two trenches and at least four test pits across the Rock Valley fault system.
1.2.3.2.8.4.3	8.3.1.17.4.3	Quaternary Faulting Within 100km of Yucca Mountain, Including the Walker Lane	Excavate additional trenches across the Bare Mountain fault Excavate 1-3 trenches in Amargosa Valley
1.2.3.2.5.5.1	8.3.1.8.5.1	Characterization of Volcanic Features	Up to 15 trenches at Crater Flat Up to 10 trenches at Sleeping Butte
1.2.3.2.6.2	8.3.1.14.2	Soil and Rock Properties of Potential Surface Facilities	Up to 50 auger borings or test pits at ESF muck conveyor system or other facilities (number pending definition of program)
1.2.3.2.2.1.2	8.3.1.4.2.2	Structural Features Within the Site Area	3 additional outcrop or pavement sites

TABLE 5-2c: PLANNED FY 1995 GEOPHYSICAL SURVEYS

Activity	WBS	Study Plan	Start Field	Comments
1. Repository Geophysics	1.2.3.11.2	8.3.1.4.2.1	December 1994 "	Seismic reflection, gravity, magnetics, and magnetotelluric surveys on existing roads in site area
2. UE-25 UZ#16 VSP	1.2.3.2.2.1.2	8.3.1.2.2.3	January 1995	Two zero-offset and tow "walkaway" VSP profiles obtained at UZ#16 in August, 1993.
3. Operate seismic network and portable seismograph stations	1.2.3.2.8.4.1	8.3.1.17.4.1	ongoing	
3a. install additional stations	"	"	"	
3b. install seismic telemetry sites	"	"	"	
4. Conduct geophysical logging in boreholes	1.2.3.11.1	8.3.1.4.2.1	as needed	Level of effort, dependent on completion of boreholes
5. Aeromagnetic studies to support volcanic characterization	1.2.3.2.5.2	8.3.1.8.2.1	TBD FY 1995	
6. Geodetic Leveling	1.2.3.2.8.4.10	8.3.1.17.4.10	TBD FY 1995	

TABLE 5-2d: PLANNED FY95 HYDROLOGIC STUDIES
SITE CHARACTERIZATION ACTIVITIES

ACTIVITY	WBS	STUDY PLAN	TPP	JP	START FIELD	COMMENTS
1. Precipitation Monitoring: expansion of data collection network	1.2.3.3.1.1.1	8.3.1.2.1.1 NRC Phase I review completed; no Phase II review.				
2. Runoff and Streamflow Monitoring: expand data collection network	1.2.3.3.1.1.2	8.3.1.2.1.2 Complete through NRC Phase II review.				Installation of 2 sets of paired continuous streamflow/peak streamflow gauges on upper Fortymile Wash.
3. Amargosa Desert, conduct pump tests, collect water samples	1.2.3.3.1.1.3	8.3.1.2.1.3 NRC Phase I review completed; no Phase II review.	94-10			Pumping and testing of existing wells.
4. Ponding and Infiltration Tests: Fortymile Wash	1.2.3.3.1.1.3	8.3.1.2.1.3 NRC Phase I review completed; no Phase II review.	94-12			Infiltration tests will be conducted at selected sites.
5. Ponding/Infiltration Studies	1.2.3.3.1.2.1	8.3.1.2.2.1 NRC Phase I review completed; no Phase II review.	93-01 94-13		3/93	Artificial infiltration tests will continue in FY95; the results will support preparation of infiltration flux map.
6. UZ#16 VSP	1.2.3.3.1.2.3	8.3.1.2.2.3 NRC Phase I review completed; no Phase II review.	92-02	92-09 95-07		VSP instrumentation is scheduled to start in mid- December.
7. ESF - Unsaturated Zone Studies						See Table 5.3.
8. UZ-6, UZ-6s, Gas Sampling		8.3.1.2.2.6 NRC Phase I review completed; no Phase II review.		94-05	On-going	Continue to collect gas samples and make gas flow measurements.
9. C-Well Pump Tests	1.2.3.3.1.3.1	8.3.1.2.3.1 NRC Phase I review completed; Phase II review deferred.	92-03	92-21	7/1/93	C-Well Phase IA is scheduled to begin in early Dec. 94. Phase II is scheduled to begin in mid-FY95. Construction of electrical facilities is scheduled to begin in early FY95. Concerns: - USGS needs to submit criteria letter for tracers. - Vendor qualification for tracer suppliers is a QA concern.

ACTIVITY	WBS	STUDY PLAN	TPP	JP	START FIELD	COMMENTS
10. Saturated Zone Hydrochemistry Sample Collection	1.2.3.3.1.3.2	8.3.1.2.3.2 NRC Phase I review completed; no Phase II review.	94-04 94-05 94-07 94-11			Begin clean-out and hydrologic/hydrochemical testing of WT wells in FY95.
11. Collect Outcrop Samples for Hydrologic Properties	1.2.3.3.1.3.3	8.3.1.2.3.3 NRC Phase I review completed 6/16/93; Phase II completed 8/22/94.				Collect small-diameter, drilled outcrop samples.
12. USW NRG-6						
a. Air Permeability Testing	1.2.3.3.1.2.3	8.3.1.2.2.3	92-01	92-11	10/94	Completed.
b. Instrumentation/Stemming	1.2.3.3.1.2.3	8.3.1.2.2.3			11/94	Completed.
c. Pneumatic Testing	1.2.3.3.1.2.3	8.3.1.2.2.3			11/94	On-going.
13. USW NRG-7a						
a. Air Permeability Testing	1.2.3.3.1.2.3	8.3.1.2.2.3	92-01	93-05	9/94	Completed.
b. Instrumentation/Stemming	1.2.3.3.1.2.3	8.3.1.2.2.3			11/94	Completed.
c. Pneumatic Testing	1.2.3.3.1.2.3	8.3.1.2.2.3		94-05	11/94	On-going.
14. UE-25 UZ#4						
a. Air Permeability Testing	1.2.3.3.1.2.3	8.3.1.2.2.3	94-02	TBD	3/95	
b. Instrumentation/Stemming	1.2.3.3.1.2.3	8.3.1.2.2.3			5/95	
c. Pneumatic Testing	1.2.3.3.1.2.3	8.3.1.2.2.3			6/95	
15. UE-25 UZ#7						
a. Air Permeability Testing	1.2.3.3.1.2.3	8.3.1.2.2.3	94-02	TBD	4/95	Borehole clean-out planned for 1/95
b. Instrumentation/Stemming	1.2.3.3.1.2.3	8.3.1.2.2.3			5/95	
c. Pneumatic Testing	1.2.3.3.1.2.3	8.3.1.2.2.3			6/95	

TABLE 5-3 ESF TESTING PLANNED FOR FY95

ACTIVITY	WBS	STUDY PLAN	TPP	JP	SCOPE	COMMENTS
Geologic Mapping - ESF	1.2.3.2.2.1.2	8.3.1.4.2.2 NRC initial review complete	TPP 92-10.2	JP 92-20A.2	Characterization of Structural Features in the Site Area	Characteristic Program
Perched water Testing - North Ramp	1.2.3.3.1.2.4	8.3.1.2.2.4 NRC initial review complete	TPP 92-11.1	JP 92-20B.2	Characterization of the YM Unsaturated Zone in the ESF	Geohydrologic Program
Geologic Sampling						
a. Matrix Hydrologic Properties	1.2.3.3.1.2.3	8.3.1.2.2.3 NRC initial review complete	TPP 92-12.2	JP 92-20C.2	Characterization of the Percolation in the Unsaturated-Zone Surface-based Study	Geohydrology Program
b. History of Mineralogic and Geochemical Alteration of YM	1.2.3.2.1.1.1	8.3.1.3.2.2 NRC final review complete	TPP 92-12.2	JP 92-20C.2	History of Mineralogic and Geochemical Alteration of YM	Geochemistry Program
c. Petrologic stratigraphy of the Topopah Spring Member	1.2.3.2.1.1.1	8.3.1.3.2.1 NRC Final Review complete	TPP 92-12.2	JP 92-20C.2	Mineralogy, Petrology, and Chemistry of Transport Pathways	Geohydrology Program
d. Mineral distribution between the host rock and the accessible environment	1.2.3.2.1.1.1	8.3.1.3.2.1 NRC final review complete	TPP 92-12.2	JP 92-20C.2	Mineralogy, Petrology, and Chemistry of Transport Pathways	Geohydrologic Program

WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.1.1.1	3	LANL	4058	30-sep-1995	29-sep-1995		1	L.R.: Mineral Stud in Suppt of ESF Mapping Activit
1.2.3.2.1.1.1	3	LANL	4078	30-jun-1995	30-jun-1995		0	Ltr Rpt: Trace Mineral Study
1.2.3.2.1.1.1	3	LANL	3374	31-jan-1995	31-jan-1995		0	Mineral Content of Bkgrd and Drilling Dusts at SD9
1.2.3.2.1.1.1	3	LANL	3326	30-sep-1995	02-oct-1995		-2	Calcite Surface Chemistry and Mineralogy
1.2.3.2.1.1.1	3	LANL	3435	31-jan-1995	31-jan-1995		0	Model X-Ray Difr Opal, Cristob., Tridymite
1.2.3.2.1.1.1	3	LANL	4055	31-jul-1995	31-jul-1995		0	Ltr Rpt: Analysis of Sorption Samples
1.2.3.2.1.1.1	3	LANL	4079	31-jul-1995	31-jul-1995		0	Ltr Rpt: Multi-Generational Zeollite Deposition in
1.2.3.2.1.1.2	3	LANL	4009	30-sep-1995	02-oct-1995		-2	Ltr Rpt: Alt Features N Portal ESF Tunnel
1.2.3.2.1.1.2	3	LANL	3441	31-jan-1995	31-jan-1995		0	Summary of Clinoptilolite-H2O System
1.2.3.2.1.1.2	3	LANL	3442	30-jun-1995	30-jun-1995		0	Dehyd of Clinop/Importance of Heat Budg Calcs
1.2.3.2.1.1.2	3	LANL	4011	30-sep-1995	02-oct-1995		-2	Ltr Rpt: Analysis of LLNL Hydro Expt Prod
1.2.3.2.1.2.2	3	LANL	4092	30-sep-1995	29-sep-1995		1	Ltr Rpt: Solub Meas to Eval Thermo Stab Na-End
1.2.3.2.1.2.2	3	LANL	3445	30-sep-1995	29-sep-1995		1	Diss/Precip Kinetics Clinop FXN of H2O, SiO2, etc
1.2.3.2.1.2.2	3	LANL	4037	30-sep-1995	02-oct-1995		-2	Ltr Rpt: Kinetics of Smectite to Illite Rxn
1.2.3.2.1.2.2	3	LANL	3444	30-sep-1995	29-sep-1995		1	Modeling Study of Clinop-to-Analcime Transistion
1.2.3.2.2.1.1	2	USGS	M369	06-oct-1994	09-oct-1998		1464	YMP Issues Status Report on Regional Geophysics
1.2.3.2.2.1.1	3	USGS	3GGU510M	05-jan-1995	05-jan-1995		0	UPDATE OF 3-D MODELS-LITHO/STRUCT/ROCK PROP
1.2.3.2.2.1.1	3	USGS	3GGU51BM	22-jun-1995	22-jun-1995		0	PROV RESULTS: UPDATE SITE-SCALE 3D MODEL
1.2.3.2.2.1.1	3	USGS	3GGU520M	30-jun-1995	30-jun-1995		0	DATA TO YMSCO: PRE/POST-1992 MEASURED SECTIONS
1.2.3.2.2.1.1	3	USGS	3GGU530M	31-jan-1995	28-feb-1995		-28	RPT: GEOPHYSICS WHITE PAPER, PHASE II
1.2.3.2.2.1.1	3	USGS	3GGU540M	17-may-1995	17-may-1995		0	PROV RESULTS: SEISMIC REFLECTION PROFILES
1.2.3.2.2.1.1	3	USGS	3GGU560M	30-dec-1994	30-dec-1994		0	DATA TO DOE-YMSCO: PHASE I LITHOLOGIC LOGGING
1.2.3.2.2.1.1	3	USGS	3GGU56AM	28-apr-1995	28-apr-1995		0	DATA TO DOE-YMSCO: LITHOLOGIC LOGGING PHASE II
1.2.3.2.2.1.1	3	USGS	3GGU590M	31-mar-1995	31-mar-1995		0	ANLYS PPR: MAG/GRAV ALONG SEISMIC PROFILE
1.2.3.2.2.1.1	3	USGS	3GGU5M0M	31-jul-1995	31-jul-1995		0	RPT: LITHOLOGY AND HYDROLOGIC PROP IN THE PTn
1.2.3.2.2.1.1	3	USGS	3GGU5Q0M	31-jul-1995	31-jul-1995		0	LTR RPT: GRAV/MAG INVEST LOCATE DRILL-HOLES
1.2.3.2.2.1.2	3	USGS	3GGF500M	30-jun-1995	30-jun-1995		0	LTR RPT: ENHANCEMENT OF SCOTT & BONK
1.2.3.2.2.1.2	3	USGS	3GGF510M	31-aug-1995	30-aug-1995		1	LTR RPT: GEOMETRY & CONTINUITY - SUNDANCE FAULT
1.2.3.2.2.1.2	3	USGS	3GGF530M	31-jan-1995	31-jan-1995		0	RPT: STRUCT/STRAT OF THE ESF - NORTH RAMP
1.2.3.2.2.1.2	3	USGS	3GGF540M	30-jun-1995	30-jun-1995		0	RPT: STRUCT/STRAT OF THE ESF - NORTH RAMP
1.2.3.2.2.1.2	3	USGS	3GGF550M	31-aug-1995	31-aug-1995		0	LRT RPT: VERT CONT/FRACTIONAL PAINTBRUSH GRP
1.2.3.2.2.1.2	3	USGS	3GGF560M	30-jun-1995	30-jun-1995		0	LETTER REPORT: PAVEMENT MAPPING AT FRAN RIDGE
1.2.3.2.2.1.2	3	REECO	0R322D94	31-dec-1994	01-dec-1994		30	ESF MAPPING SUPPORT
1.2.3.2.2.1.2	3	REECO	0R322D50	01-sep-1995	30-oct-1995		-59	GEOLOGIC MAPPING
1.2.3.2.2.1.3	2	USGS	M368	01-jan-1995	16-feb-1996		-411	Issue Report on Preliminary Site Geologic Descript
1.2.3.2.2.2.1	3	SNL	32221A11	31-mar-1995	01-may-1995		-31	MANAGE DRILLING OF SD-12

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.2.2.1	3	SNL	32221A12	13-jan-1995	25-jan-1995		-12	CREATE GEOLOGIC LOG, SD-12
1.2.3.2.2.2.1	3	SNL	32221A13	31-mar-1995	01-may-1995		-31	MEASURE LABORATORY ROCK PROPERTIES, SD-12
1.2.3.2.2.2.1	3	SNL	32221A14	31-may-1995	07-jun-1995		-7	COMPILE AND ANALYZE DATA, SD-12; PREPARE REPORTS
1.2.3.2.2.2.1	3	SNL	32221M11	28-oct-1994	02-nov-1994		-5	SUBMIT TDIF DATA TRANSFER FOR SD-12, FY94 (0S82)
1.2.3.2.2.2.1	3	SNL	32221M12	29-nov-1994	06-dec-1994		-7	SUBMIT TDIF DATA TRANSFER FOR SD-12, 2000 FEET
1.2.3.2.2.2.1	3	SNL	32221M13	09-jan-1995	16-jan-1995		-7	SUBMIT TDIF DATA TRANSFER FOR SD-12, TO TD
1.2.3.2.2.2.1	3	SNL	32221M14	30-may-1995	06-jun-1995		-7	SUBMIT SD-12 SUMMARY REPORT (0S83)
1.2.3.2.2.2.1	3	SNL	32221A21	06-feb-1995	03-oct-1994	03-oct-1994	126	MANAGE DRILLING OF SD-9
1.2.3.2.2.2.1	3	SNL	32221A22	31-mar-1995	28-nov-1994		123	CREATE GEOLOGIC LOG, SD-9
1.2.3.2.2.2.1	3	SNL	32221A23	28-apr-1995	29-mar-1995		30	MEASURE LABORATORY ROCK PROPERTIES, SD-9
1.2.3.2.2.2.1	3	SNL	32221A24	02-aug-1995	05-apr-1995		119	COMPILE AND ANALYZE DATA, SD-9; PREPARE REPORTS
1.2.3.2.2.2.1	3	SNL	32221M21	28-oct-1994	02-nov-1994		-5	SUBMIT TDIF DATA TRANSFER FOR SD-9, FY94 (0S84)
1.2.3.2.2.2.1	3	SNL	32221M22	09-mar-1995	02-nov-1994		127	SUBMIT TDIF DATA TRANSFER FOR SD-9, TO TD
1.2.3.2.2.2.1	3	SNL	32221M23	02-aug-1995	05-apr-1995		119	SUBMIT SD-9 SUMMARY REPORT, (0S85)
1.2.3.2.2.2.1	3	SNL	32221A31	31-mar-1995	07-mar-1995		24	MANAGE DRILLING OF SD-7
1.2.3.2.2.2.1	3	SNL	32221A32	23-dec-1994	31-jan-1995		-39	CREATE GEOLOGIC LOG, SD-7
1.2.3.2.2.2.1	3	SNL	32221A33	31-mar-1995	07-mar-1995		24	MEASURE LABORATORY ROCK PROPERTIES, SD-7
1.2.3.2.2.2.1	3	SNL	32221A34	31-may-1995	07-sep-1995		-99	COMPILE AND ANALYZE DATA; PREPARE REPORTS, SD-7
1.2.3.2.2.2.1	3	SNL	32221M31	14-nov-1994	05-apr-1995		-142	SUBMIT TDIF DATA TRANSFER FOR SD-7 THRU 1,000 FT
1.2.3.2.2.2.1	3	SNL	32221M32	16-jan-1995	05-may-1995		-109	SUBMIT TDIF DATA TRANSFER FOR SD-7, 2000 FEET
1.2.3.2.2.2.1	3	SNL	32221M33	19-feb-1995	05-may-1995		-75	SUBMIT TDIF DATA TRANSFER FOR SD-7, TO TD
1.2.3.2.2.2.1	3	SNL	32221M34	30-may-1995	07-sep-1995		-100	SUBMIT SD-7 SUMMARY REPORT
1.2.3.2.2.2.2	3	SNL	32222A11	01-may-1995	01-may-1995		0	DEFINE MODEL(S) AND RECEIVE DATA F/TEST ORG'S
1.2.3.2.2.2.2	3	SNL	32222A12	30-jun-1995	07-mar-1995		115	ANALYZE SPATIAL CONTINUITY & VARIABILITY OF DATA
1.2.3.2.2.2.2	3	SNL	32222A13	30-jun-1995	08-jun-1995		22	CREATE GEOMETRIC AND GEOSTATISTICAL MODEL
1.2.3.2.2.2.2	3	SNL	32222A14	01-aug-1995	01-aug-1995		0	PREPARE REPORTS AND DELIVERABLES
1.2.3.2.2.2.2	3	SNL	32222M11	28-jul-1995	28-jul-1995		0	SLTR ON THERMAL/MECH MATERIAL-PROPERTY MODEL
1.2.3.2.2.2.2	3	SNL	32222M12	28-jul-1995	28-jul-1995		0	SUBMIT THERMAL/MECH MATERIAL-PROP MODEL TO TDB
1.2.3.2.2.2.2	3	SNL	32222A21	01-may-1995	01-may-1995		0	DEFINE MODEL(S) AND APPROACH; RECEIVE DATA
1.2.3.2.2.2.2	3	SNL	32222A22	13-jan-1995	13-feb-1995		-31	CREATE 2-D GEOSTATISTICAL MODELS
1.2.3.2.2.2.2	3	SNL	32222A23	30-jun-1995	30-jun-1995		0	ANALYZE SPATIAL CONTINUITY & VARIABILITY OF DATA
1.2.3.2.2.2.2	3	SNL	32222A24	30-jun-1995	30-jun-1995		0	CREATE 3-D GEOMETRIC AND GEOSTATISTICAL MODEL
1.2.3.2.2.2.2	3	SNL	32222A25	28-jul-1995	28-jul-1995		0	PREPARE REPORTS AND DELIVERABLES
1.2.3.2.2.2.2	3	SNL	32222M21	28-jul-1995	28-jul-1995		0	SLTR ON THERMAL/MECH MATERIAL-PROPERTY MODEL
1.2.3.2.2.2.2	3	SNL	32222M22	28-jul-1995	28-jul-1995		0	SUBMIT THERMAL/MECH MATERIAL-PROP MODEL TO TDB
1.2.3.2.2.2.2	3	SNL	32222A31	29-sep-1995	12-oct-1995		-13	MANAGE MODELING PROCESS/INTERACTIONS

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.2.2.2	3	SNL	32222A32	30-mar-1995	28-apr-1995		-29	EVALUATE DATA & MODEL USES & DES MODELING APPROA
1.2.3.2.2.2.2	3	SNL	32222A34	30-mar-1995	28-apr-1995		-29	CONSTRUCT AND EVALUATE PROTOTYPE GEOSTAT MODEL
1.2.3.2.2.2.2	3	SNL	32222A35	15-may-1995	14-jun-1995		-30	CONSTRUCT/EVALUATE FINAL GEOSTATISTICAL MODEL
1.2.3.2.2.2.2	3	SNL	32222A36	15-may-1995	14-jun-1995		-30	PREPARE REPORTS AND DELIVERABLES
1.2.3.2.2.2.2	3	SNL	32222A41	29-sep-1995	29-sep-1995		0	MANAGE MODELING PROCESS/INTERACTIONS
1.2.3.2.2.2.2	3	SNL	32222A42	30-jun-1995	30-jun-1995		0	EVALUATE DATA & MODEL USES & DES MODELING APPROA
1.2.3.2.2.2.2	3	SNL	32222A44	30-jun-1995	30-jun-1995		0	CONSTRUCT/EVAL PROTOTYPE GEOSTATISTICAL MODEL
1.2.3.2.2.2.2	3	SNL	32222A45	15-aug-1995	15-aug-1995		0	CONSTRUCT/EVAL FINAL GEOSTATISTICAL MODELS (2-D)
1.2.3.2.2.2.2	3	SNL	32222A46	15-aug-1995	15-aug-1995		0	PREPARE REPORTS AND DELIVERABLES
1.2.3.2.2.2.2	3	SNL	32222A47	29-sep-1995	29-sep-1995		0	PREPARE SUMMARY REPORT ON SZ STOCHASTIC MODELS
1.2.3.2.2.2.2	3	SNL	32222M41	01-sep-1995	01-sep-1995		0	SAND REPORT ON SATURATED ZONE STOCHASTIC MODELS
1.2.3.2.2.2.2	3	SNL	32222M42	15-aug-1995	15-aug-1995		0	TRANSMIT FINAL MODELS TO TDB
1.2.3.2.2.2.2	3	SNL	32222A51	01-dec-1994	03-jan-1995		-33	DEFINE SHORT-TERM SCALING REQUIREMENTS
1.2.3.2.2.2.2	3	SNL	32222A52	31-mar-1995	31-mar-1995		0	REVIEW LITERATURE FOR EXISTING UPSCALING TECHNIQUE
1.2.3.2.2.2.2	3	SNL	32222A53	28-apr-1995	28-apr-1995		0	CONDUCT NUMERICAL EXPERIMENTS
1.2.3.2.2.2.2	3	SNL	32222A54	23-jun-1995	23-jun-1995		0	EVALUATE UPSCALING TECHNIQUES
1.2.3.2.2.2.2	3	SNL	32222A55	28-jul-1995	28-jul-1995		0	PREPARE REPORT
1.2.3.2.2.2.2	3	SNL	32222A71	01-dec-1994	03-jan-1995		-33	SOFTWARE MODIFICATION TO GSLIB ALGORITHMS
1.2.3.2.2.2.2	3	SNL	32222A72	31-oct-1994	04-nov-1994		-4	DEVELOP PROTOTYPE MATERIAL-PROPERTY EXPECTED VALUE
1.2.3.2.2.2.2	3	SNL	32222A73	31-mar-1995	25-apr-1995		-25	CONTRUCT AND EVALUATE PROTOTYPE SIMULATED MODELS
1.2.3.2.2.2.2	3	SNL	32222A74	31-may-1995	31-may-1995		0	PREPARE REPORTS
1.2.3.2.2.2.2	3	SNL	32222M71	31-may-1995	31-may-1995		0	SAND REPORT EVALUATING PROTOTYPE MODEL
1.2.3.2.2.2.2	3	SNL	32222A91	29-sep-1995	29-sep-1995		0	MANAGE MODELING PROCESS AND INTERACTION
1.2.3.2.2.2.2	3	SNL	32222M91	17-jul-1995	17-jul 1995		0	SLTR SUMMARIZING, GEOSTATISTICAL RES. BY SCRF
1.2.3.2.2.2.2	3	SNL	32222B11	29-sep-1995	29-sep-1995		0	DEVELOP MODELING PROCESS FOR SITE-SCALE MODELING
1.2.3.2.2.2.2	3	SNL	32222B12	29-sep-1995	29-sep-1995		0	PREPARE REPORTS AND DOCUMENTATION
1.2.3.2.2.2.2	3	SNL	32222N11	01-sep-1995	01-sep-1995		0	SUMMARY REPORT
1.2.3.2.5.1.1	2	LANL	R478	27-sep-1995	04-nov-1999		1499	Issue Report on Probability of Future Volcanic Act
1.2.3.2.5.1.1	3	LANL	T056	29-sep-1995	29-sep-1995		0	Revised Probability Calculations
1.2.3.2.5.1.1	3	LANL	3399	31-jul-1995	31-jul-1995		0	Stochastic Mdls of Spatial & Strct. Locs. Bslt. Vo
1.2.3.2.5.1.1	3	LANL	4050	29-sep-1995	29-sep-1995		0	Letter Report on Detectability of Basalt Intrusion
1.2.3.2.5.1.2	3	LANL	3432	31-jul-1995	31-jul-1995		0	Entrainment of Xenoliths SM. Volum. Basaltic Ctrs
1.2.3.2.5.1.2	3	LANL	4024	31-mar-1995	28-apr-1995		-28	Report Eval Size of Subsurface Effect Zone
1.2.3.2.5.1.2	3	LANL	4021	29-sep-1995	29-sep-1995		0	Magma System Dynamics Yearly Report
1.2.3.2.5.2	3	USGS	3GTW520M	29-sep-1995	29-sep-1995		0	PROG. RPT: TECTONIC EFFECTS ON YM HYDROLOGY
1.2.3.2.5.5.1	2	LANL	T283	19-sep-1995	02-oct-1997		-744	Chronology of the Yucca Mountain Region

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WBS	Level	Participant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.5.5.1	3	LANL	3166	29-sep-1995	02-oct-1995		-3	Geochem Data for Basalts of the Crater Flat Vol. Z
1.2.3.2.5.5.1	3	LANL	4060	29-sep-1995	29-sep-1995		0	Ltr Rpt: Evolution of Basaltic Volcanic Fields
1.2.3.2.5.5.1	3	LANL	4049	29-sep-1995	29-sep-1995		0	Letter Rpt. on Progress in Geochronology Studies
1.2.3.2.5.5.1	3	LANL	3169	31-jul-1995	31-jul-1995		0	Field Geologic Study Buckboard Mesa & Slp/Bt M3
1.2.3.2.6.2.1	3	SNL	32621A12	01-feb-1995	01-mar-1995		-28	MAIN DRIFT GEOTECHNICAL REPORT
1.2.3.2.6.2.1	3	SNL	32621A14	29-sep-1995	29-sep-1995		0	SOIL & ROCK PROP'S EXPLORATION PROG ACTIVITIES
1.2.3.2.6.2.1	3	SNL	32621M12	01-feb-1995	01-mar-1995		-28	MAIN DRIFT GEOTECHNICAL REPORT
1.2.3.2.6.2.1	3	SNL	32621A21	01-feb-1995	01-mar-1995		-28	CORE LOGGING CONSOLIDATION PROG, PLAN/IMPLEMENT
1.2.3.2.6.2.1	3	SNL	32621A22	01-feb-1995	01-mar-1995		-28	CORE LOGGING CONSOLIDATION PROGRAM
1.2.3.2.6.2.1	3	SNL	32621M21	01-feb-1995	01-mar-1995		-28	SLTR DOCUMENTING CORE LOGGING PROCEDURES
1.2.3.2.6.2.2	3	SNL	32622A11	30-may-1995	30-may-1995		0	MECH PROP'S TESTS, RANIER MESA & OTHER TUFFS
1.2.3.2.6.2.2	3	SNL	32622A12	23-dec-1994	01-feb-1995		-40	MUCK CONVEYOR SOILS TESTS
1.2.3.2.6.2.2	3	SNL	32622A13	01-nov-1994	01-nov-1994		0	WATER STORAGE TANK SOIL TESTS
1.2.3.2.6.2.2	3	SNL	32622M11	23-dec-1994	01-feb-1995		-40	MUCK CONVEYOR FOUNDATION SOILS TESTS TDIF
1.2.3.2.6.2.3	3	USGS	3GSR500M	30-aug-1995	30-aug-1995		0	LTR RPT: USGS SUP TC SURF FAC FIELD TEST & CHAR
1.2.3.2.6.2.3	3	SNL	32623A12	01-feb-1995	14-apr-1995		-72	MAIN DRIFT CROSS SECTION
1.2.3.2.6.2.3	3	SNL	32623A14	30-nov-1994	14-apr-1995		-135	DEVELOP GEOLOGIC AND STRUCTURAL LOGS FOR SD-7
1.2.3.2.6.2.3	3	SNL	32623A18	23-dec-1994	14-apr-1995		-112	DEVELOP ROCK QUALITY ESTIMATES FOR SD-7
1.2.3.2.6.2.3	3	SNL	32623A19	23-dec-1994	14-apr-1995		-112	DEVELOP ROCK MASS MECHANICAL PROPERTIES F/SD-7
1.2.3.2.6.2.3	3	SNL	32623F12	01-feb-1995	14-apr-1995		-72	SUBMIT MAIN DRIFT CROSS SECTION REPORT
1.2.3.2.6.2.3	3	SNL	32623F14	30-nov-1994	14-apr-1995		-135	SUBMIT GEO/STRUCT LOGS FOR SD-7
1.2.3.2.6.2.3	3	SNL	32623F18	23-dec-1994	14-apr-1995		-112	SUBMIT SD-7 ROCK QUALITY ESTIMATES
1.2.3.2.6.2.3	3	SNL	32623F19	23-dec-1994	14-apr-1995		-112	SUBMIT ROCK MASS MECH PROP'S FOR SD-7
1.2.3.2.7.1.1	3	SNL	32711A11	29-sep-1995	29-sep-1995		0	CONDUCT SAMPLE CHARACTERIZATION
1.2.3.2.7.1.1	3	SNL	32711A12	29-sep-1995	29-sep-1995		0	MEASURE HEAT CAPACITY OF SELECTED SAMPLES
1.2.3.2.7.1.1	3	SNL	32711A13	29-sep-1995	29-sep-1995		0	MEASURE THERMAL CONDUCTIVITY OF SELECTED SAMPLES
1.2.3.2.7.1.1	3	SNL	32711A14	29-sep-1995	29-sep-1995		0	RPT RELATION SAMPLE SAT/MEAS VALUES THERM CONDUCTI
1.2.3.2.7.1.1	3	SNL	32711M11	30-aug-1995	30-aug-1995		0	SUBMIT INTERIM HEAT CAPACITY TDIF BY BOREHOLE
1.2.3.2.7.1.1	3	SNL	32711M12	30-aug-1995	30-aug-1995		0	UPDATE RIB VALUE FOR HEAT CAPACITY
1.2.3.2.7.1.1	3	SNL	32711M13	30-aug-1995	30-aug-1995		0	SUBMIT INTERIM THERM CONDUCT TDIF BY BOREHOLE
1.2.3.2.7.1.1	3	SNL	32711M14	30-aug-1995	30-aug-1995		0	UPDATE THE RIB VALUE FOR THERMAL CONDUCTIVITY
1.2.3.2.7.1.1	3	SNL	32711M15	30-aug-1995	30-aug-1995		0	SUBMIT RPT RELATION SAMPLE SAT THERM CONDUCT
1.2.3.2.7.1.2	3	SNL	32712A11	29-sep-1995	29-sep-1995		0	MEASURE THERMAL EXPANSION OF SELECTED SAMPLES
1.2.3.2.7.1.2	3	SNL	32712A12	29-sep-1995	29-sep-1995		0	CONDUCT EXP'S CONFINING PRESSURE THERM EXPANS
1.2.3.2.7.1.2	3	SNL	32712M11	30-aug-1995	30-aug-1995		0	SUBMIT INTERIM THERM EXPANSION TDIF BY BOREHOLE
1.2.3.2.7.1.2	3	SNL	32712M12	30-aug-1995	30-aug-1995		0	UPDATE THE RIB VALUE FOR THERMAL EXPANSION

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.7.1.2	3	SNL	32712M13	30-aug-1995	30-aug-1995		0	CONDUCT EXP'S CONFINING PRESSURE THERM EXPANSION
1.2.3.2.7.1.3	3	SNL	32713A11	01-dec-1994	01-dec-1994		0	SAMPLE PREP, TIME DEP MECH PROP INTACT WELD TUFF
1.2.3.2.7.1.3	3	SNL	32713A12	30-jun-1995	30-jun-1995		0	EXPERIMENTS, TIME DEP MECH PROP INTACT WELD TUFF
1.2.3.2.7.1.3	3	SNL	32713A13	01-sep-1995	01-sop-1995		0	PREPARE RPT, TIME DEP MECH PROP INTACT WELD TUFF
1.2.3.2.7.1.3	3	SNL	32713M11	31-aug-1995	31-aug-1995		0	SAND REPORT ON MECHANICAL PROPERTY EXPERIMENTS
1.2.3.2.7.1.3	3	SNL	32713A21	01-dec-1994	01-dec-1994		0	SAMPLE PREP, ELEVATED PRESSURE EXP'S NRG-6&7/7A
1.2.3.2.7.1.3	3	SNL	32713A22	13-jan-1995	13-jan-1995		0	MECH PROPS EXP'S, ELEVATED PRESSURE NRG-6 & 7/7A
1.2.3.2.7.1.3	3	SNL	32713A23	01-mar-1995	01-mar-1995		0	PREP RPT, ELEVATED PRESSURE EXP'S NRG-6 & 7/7A
1.2.3.2.7.1.3	3	SNL	32713M21	28-feb-1995	28-feb-1995		0	TDIF ON MECH PROPERTY EXP'S, NRG-6 & 7/7A
1.2.3.2.7.1.3	3	SNL	32713A31	01-feb-1995	01-feb-1995		0	SAMPLE PREP, INTACT TUFF PROPS FROM SD-12
1.2.3.2.7.1.3	3	SNL	32713A32	15-mar-1995	15-mar-1995		0	EXPERIMENTS, INTACT TUFF PROPS FROM SD-12
1.2.3.2.7.1.3	3	SNL	32713A33	01-may-1995	01-may-1995		0	PREPARE RPT, INTACT TUFF PROPS FROM SD-12
1.2.3.2.7.1.3	3	SNL	32713M31	28-apr-1995	28-apr-1995		0	TDIF ON MECH PROP EXP'S, SD-12 (0S105)
1.2.3.2.7.1.3	3	SNL	32713A41	15-feb-1995	17-nov-1995		-275	SAMPLE PREP, INTACT TUFF PROPS FROM SD-7
1.2.3.2.7.1.3	3	SNL	32713A42	31-mar-1995	12-jan-1996		-287	EXPERIMENTS, INTACT TUFF PROPS FROM SD-7
1.2.3.2.7.1.3	3	SNL	32713A43	15-may-1995	26-feb-1996		-287	PREPARE RPT, INTACT TUFF PROPS FROM SD-7
1.2.3.2.7.1.3	3	SNL	32713M41	12-may-1995	23-feb-1996		-287	SAND REPORT ON MECH PROP EXP'S, SD-7
1.2.3.2.7.1.3	3	SNL	32713A51	01-jun-1995	01-jun-1995		0	SAMPLE PREP, INTACT TUFF PROPS FROM SD-9
1.2.3.2.7.1.3	3	SNL	32713A52	14-jul-1995	14-jul-1995		0	EXPERIMENTS, INTACT TUFF PROPS FROM SD-9
1.2.3.2.7.1.3	3	SNL	32713A53	01-sep-1995	01-sep-1995		0	PREPARE RPT, INTACT TUFF PROPS FROM SD-9
1.2.3.2.7.1.3	3	SNL	32713M51	31-aug-1995	31-aug-1995		0	TDIF ON MECH PROP EXP'S, SD-9
1.2.3.2.7.1.3	3	SNL	32713A61	01-sep-1995	01-dec-1995		-91	SAMPLE PREP, INTACT TUFF PROPS FROM SD-3
1.2.3.2.7.1.3	3	SNL	32713A62	29-sep-1995	05-jan-1996		-98	EXPERIMENTS, INTACT TUFF PROPS FROM SD-3
1.2.3.2.7.1.3	3	SNL	32713A71	15-mar-1995	29-nov-1995		-259	SAMPLE PREP, INTACT TUFF PROPS FROM SRG-3
1.2.3.2.7.1.3	3	SNL	32713A72	01-may-1995	23-jan-1996		-267	EXPERIMENTS, INTACT TUFF PROPS FROM SRG-3
1.2.3.2.7.1.3	3	SNL	32713A73	15-jun-1995	07-mar-1996		-266	PREPARE RPT, INTACT TUFF PROPS FROM SRG-3
1.2.3.2.7.1.3	3	SNL	32713M71	14-jun-1995	06-mar-1996		-266	SAND REPORT ON MECH PROP EXP'S, SRG-3
1.2.3.2.7.1.3	3	SNL	32713A81	15-may-1995	30-nov-1995		-199	SAMPLE PREP, INTACT TUFF PROPS FROM SRG-2
1.2.3.2.7.1.3	3	SNL	32713A82	30-jun-1995	24-jan-1996		-208	EXPERIMENTS, INTACT TUFF PROPS FROM SRG-2
1.2.3.2.7.1.3	3	SNL	32713A83	15-aug-1995	07-mar-1996		-205	PREPARE RPT, INTACT TUFF PROPS FROM SRG-2
1.2.3.2.7.1.3	3	SNL	32713M81	14-aug-1995	06-mar-1996		-205	SAND REPORT ON MECH PROP EXP'S, SRG-2
1.2.3.2.7.1.3	3	SNL	32713A91	15-jun-1995	08-dec-1995		-176	SAMPLE PREP, INTACT TUFF PROPS FROM SRG-1
1.2.3.2.7.1.3	3	SNL	32713A92	01-aug-1995	31-jan-1996		-183	EXPERIMENTS, INTACT TUFF PROPS FROM SRG-1
1.2.3.2.7.1.3	3	SNL	32713A93	15-sep-1995	15-mar-1996		-182	PREPARE RPT, INTACT TUFF PROPS FROM SRG-1
1.2.3.2.7.1.3	3	SNL	32713M91	14-sep-1995	14-mar-1996		-182	SAND REPORT ON MECH PROP EXP'S, SRG-1
1.2.3.2.7.1.3	3	SNL	32713B11	01-jun-1995	30-jun-1995		-29	SAMPLE PREP, INTACT TUFF PROPS FROM THE ESF

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.7.1.3	3	SNL	32713B12	01-aug-1995	30-aug-1995		-29	EXPERIMENTS, INTACT TUFF PROPS FROM THE ESF
1.2.3.2.7.1.3	3	SNL	32713B13	29-sep-1995	29-sep-1995		0	PREPARE RPT, INTACT TUFF PROPS FROM THE ESF
1.2.3.2.7.1.3	3	SNL	32713N11	01-sep-1995	01-sep-1995		0	ESF & BOREHOLE TUFF BULK AND MECH PROP'S
1.2.3.2.7.1.4	3	SNL	32714A11	01-dec-1994	01-dec-1994		0	SAMPLE PREP, TIME DEP MECH PROP FRACT'S IN TUFF
1.2.3.2.7.1.4	3	SNL	32714A12	30-jun-1995	30-jun-1995		0	EXPERIMENTS, TIME DEP MECH PROP FRACT'S IN TUFF
1.2.3.2.7.1.4	3	SNL	32714A13	01-sep-1995	01-sep-1995		0	PREPARE RPT, TIME DEP MECH PROP FRACT'S IN TUFF
1.2.3.2.7.1.4	3	SNL	32714M11	31-aug-1995	31-aug-1995		0	SAND RPT, TIME DEPEND PROP'S, WELDED TUFF FRAC'S
1.2.3.2.7.1.4	3	SNL	32714A21	15-nov-1994	29-nov-1994		-14	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF NRG-7/7A
1.2.3.2.7.1.4	3	SNL	32714A22	13-jan-1995	25-jan-1995		-12	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF NRG-7/7A
1.2.3.2.7.1.4	3	SNL	32714A23	15-mar-1995	15-mar-1995		0	PREPARE RPT, PROP'S OF FRACT'S IN TUFF NRG-7/7A
1.2.3.2.7.1.4	3	SNL	32714M21	14-mar-1995	14-mar-1995		0	TDIF/MECH PROP'S/TUFF FRAC'S/NRG-7/7A(0S10
1.2.3.2.7.1.4	3	SNL	32714A31	01-feb-1995	01-feb-1995		0	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SD-12
1.2.3.2.7.1.4	3	SNL	32714A32	15-mar-1995	15-mar-1995		0	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SD-12
1.2.3.2.7.1.4	3	SNL	32714A33	01-may-1995	01-may-1995		0	PREPARE RPT, PROP'S OF FRACT'S IN TUFF SD-12
1.2.3.2.7.1.4	3	SNL	32714M31	28-apr-1995	28-apr-1995		0	TDIF, MECH PROP'S OF TUFF FRAC'S FROM SD-12
1.2.3.2.7.1.4	3	SNL	32714A41	15-feb-1995	17-nov-1995		-275	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SD-7
1.2.3.2.7.1.4	3	SNL	32714A42	31-mar-1995	12-jan-1996		-287	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SD-7
1.2.3.2.7.1.4	3	SNL	32714A43	15-may-1995	26-feb-1996		-287	PREPARE RPT, PROP'S OF FRACT'S IN TUFF SD-7
1.2.3.2.7.1.4	3	SNL	32714M41	12-may-1995	23-feb-1996		-287	SAND RPT, MECH PROP'S OF TUFF FRAC'S FROM SD-7
1.2.3.2.7.1.4	3	SNL	32714A51	01-jun-1995	01-jun-1995		0	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SD-9
1.2.3.2.7.1.4	3	SNL	32714A52	14-jul-1995	14-jul-1995		0	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SD-9
1.2.3.2.7.1.4	3	SNL	32714A53	01-sep-1995	01-sep-1995		0	PREPARE RPT, PROP'S OF FRACT'S IN TUFF SD-9
1.2.3.2.7.1.4	3	SNL	32714M51	31-aug-1995	31-aug-1995		0	TDIF, MECH PROP'S OF TUFF FRAC'S FROM SD-9
1.2.3.2.7.1.4	3	SNL	32714A61	01-sep-1995	01-dec-1995		-91	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SD-3
1.2.3.2.7.1.4	3	SNL	32714A62	29-sep-1995	05-jan-1996		-98	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SD-3
1.2.3.2.7.1.4	3	SNL	32714A71	15-mar-1995	29-nov-1995		-259	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SRG-3
1.2.3.2.7.1.4	3	SNL	32714A72	01-may-1995	23-jan-1996		-267	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SRG-3
1.2.3.2.7.1.4	3	SNL	32714A73	15-jun-1995	07-mar-1996		-266	PREPARE RPT, PROP'S OF FRACT'S IN TUFF SRG-3
1.2.3.2.7.1.4	3	SNL	32714M71	14-jun-1995	06-mar-1996		-266	SAND RPT, MECH PROP'S OF TUFF FRAC'S FROM SRG-3
1.2.3.2.7.1.4	3	SNL	32714A81	15-may-1995	30-nov-1995		-199	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SRG-2
1.2.3.2.7.1.4	3	SNL	32714A82	30-jun-1995	24-jan-1996		-208	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SRG-2
1.2.3.2.7.1.4	3	SNL	32714A83	15-aug-1995	07-mar-1996		-205	PREPARE RPT, PROP'S OF FRACT'S IN TUFF SRG-2
1.2.3.2.7.1.4	3	SNL	32714M81	14-aug-1995	06-mar-1996		-205	SAND RPT, MECH PROP'S OF TUFF FRAC'S FROM SRG-2
1.2.3.2.7.1.4	3	SNL	32714A91	15-jun-1995	08-dec-1995		-176	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF SRG-1
1.2.3.2.7.1.4	3	SNL	32714A92	01-aug-1995	31-jan-1996		-183	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF SRG-1
1.2.3.2.7.1.4	3	SNL	32714A93	15-sep-1995	15-mar-1996		-182	PREPARE RPT, PROP'S OF FRACT'S IN TUFF SRG-1

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.7.1.4	3	SNL	32714M91	14-sep-1995	14-mar-1996		-182	SAND RPT, MECH PROP'S OF TUFF FRAC'S FROM SRG-1
1.2.3.2.7.1.4	3	SNL	32714B11	01-jun-1995	01-jun-1995		0	SAMPLE PREP, PROP'S OF FRACT'S IN TUFF F/ESF
1.2.3.2.7.1.4	3	SNL	32714B12	01-aug-1995	01-aug-1995		0	EXPERIMENTS, PROP'S OF FRACT'S IN TUFF F/ESF
1.2.3.2.7.1.4	3	SNL	32714B13	29-sep-1995	29-sep-1995		0	PREPARE RPT, PROP'S OF FRACT'S IN TUFF F/ESF
1.2.3.2.7.1.4	3	SNL	32714N11	01-sep-1995	01-sep-1995		0	SAND RPT, MECH PROP'S OF TUFF FRAC'S ESF/BOREHOLES
1.2.3.2.7.2.2	3	USGS	3GAT106M	31-aug-1995	31-aug-1995		0	PROV RSLTS: TEMPERATURE DATA COLLECTED IN ESF
1.2.3.2.7.3.1	3	SNL	42111A11	30-nov-1994	30-nov-1994		0	DESIGN ACCESS CONVERGENCE TEST, NORTH RAMP
1.2.3.2.7.3.1	3	SNL	42111M11	30-nov-1994	30-nov-1994		0	PROGRESS RPT, NR ACCESS CONVERGENCE TEST DESIGN
1.2.3.2.7.3.1	3	SNL	42111A21	29-sep-1995	31-jul-1996		-306	REPORT DATA FROM ACCESS CONVERGENCE EXPERIMENT
1.2.3.2.7.3.1	3	SNL	42111A31	28-jul-1995	27-jun-1996		-335	WRITE EXCAVATION INVESTIGATIONS PROGRESS SLTR
1.2.3.2.7.3.1	3	SNL	42111M31	27-jul-1995	26-jun-1996		-335	SAND RPT, EXCAVATION INVESTIGATION ACTIVITES, NR
1.2.3.2.7.3.2	3	SNL	42112A11	23-dec-1994	23-dec-1994		0	PROPOSE RESP'S, SNL TECH REVIEW, SP 8.3.1.15.1.6
1.2.3.2.7.3.2	3	SNL	42112A12	23-dec-1994	31-jan-1995		-39	RESOLVE SNL TECH COMMENTS, SP 8.3.1.15.1.6
1.2.3.2.7.3.2	3	SNL	42112A13	30-jan-1995	28-feb-1995		-29	PROPOSE RESP'S, SNL MGMT REVIEW, SP 8.3.1.15.1.6
1.2.3.2.7.3.2	3	SNL	42112A14	30-jan-1995	30-jan-1995		0	RESOLVE SNL MGMT COMMENTS, SP 8.3.1.15.1.6
1.2.3.2.7.3.2	3	SNL	42112A15	30-aug-1995	30-aug-1995		0	RESOLVE DOE COMMENTS, SP 8.3.1.15.1.6
1.2.3.2.7.3.2	3	SNL	42112M11	29-aug-1995	30-aug-1995		-1	SUBMITTAL OF FINAL IN SITU THERMOMECH PROPS SP
1.2.3.2.7.3.2	3	SNL	42112M12	29-nov-1994	29-nov-1994		0	SUBMITTAL OF DRAFT IN SITU THERMOMECH PROPS SP
1.2.3.2.7.3.2	3	SNL	42112A21	30-mar-1995	03-mar-1995		27	DEFINE THERMAL TESTS
1.2.3.2.7.3.2	3	SNL	42112A22	29-sep-1995	01-sep-1995		28	DESIGN THERMAL TESTS
1.2.3.2.7.3.2	3	SNL	42112A23	29-sep-1995	01-sep-1995		28	CONDUCT THERMAL TESTS DESIGN CALCULATIONS
1.2.3.2.7.3.2	3	SNL	42112A24	29-sep-1995	01-sep-1995		28	CONDUCT THERMAL TESTS INTERFERENCE CALCULATIONS
1.2.3.2.7.3.2	3	SNL	42112A25	29-sep-1995	29-sep-1995		0	CONDUCT THERMAL TESTS SENSOR OPTIMIZATION CALC'S
1.2.3.2.7.3.2	3	SNL	42112M21	30-aug-1995	30-aug-1995		0	SLTR ON THERMAL TEST DESIGN
1.2.3.2.7.3.3	3	SNL	42113A11	30-jun-1995	30-jun-1995		0	PREPARE DRAFT STUDY PLAN 8.3.1.15.1.7
1.2.3.2.7.3.3	3	SNL	42113A12	29-sep-1995	29-sep-1995		0	TECH & MGMT REVIEW OF STUDY PLAN 8.3.1.15.1.7
1.2.3.2.7.3.3	3	SNL	42113M11	01-sep-1995	01-sep-1995		0	SUBMITTAL OF IN SITU MECHANICAL PROPS SP
1.2.3.2.7.3.3	3	SNL	42113A21	07-feb-1995	30-nov-1994		69	DEFINE IN SITU MECH PROP TESTS
1.2.3.2.7.3.3	3	SNL	42113A22	29-sep-1995	31-jul-1995		60	DESIGN IN SITU MECH PROP TESTS
1.2.3.2.7.3.4	3	SNL	42114A11	29-sep-1995	30-oct-1995		-31	MEASURE FAR-FIELD PEAK PARTICLE VELOCITIES
1.2.3.2.7.3.4	3	SNL	42114A12	29-sep-1995	30-oct-1995		-31	MEASURE NEAR-FIELD PEAK PARTICLE VELOCITIES
1.2.3.2.7.3.4	3	SNL	42114A13	29-sep-1995	30-oct-1995		-31	COLLECT CONSTRUCTOR BLASTING DATA
1.2.3.2.7.3.4	3	SNL	42114A14	29-sep-1995	30-oct-1995		-31	RECORD BLAST PERFORMANCE
1.2.3.2.7.3.4	3	SNL	42114A15	29-sep-1995	30-oct-1995		-31	MEASURE INDUCED STRESS
1.2.3.2.7.3.4	3	SNL	42114A16	29-sep-1995	30-oct-1995		-31	DETERMINE INCREASE IN FRACTURE FREQUENCY
1.2.3.2.7.3.4	3	SNL	42114A21	29-sep-1995	29-sep-1995		0	INSTALL ROCK BOLT LOAD CELLS

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.7.3.4	3	SNL	42114A22	29-sep-1995	29-sep-1995		0	INSTRUMENT STEEL SETS
1.2.3.2.7.3.4	3	SNL	42114A31	29-sep-1995	29-sep-1995		0	INSTALL CROSS-DRIFT CONVERGENCE STATIONS
1.2.3.2.7.3.4	3	SNL	42114A32	29-sep-1995	29-sep-1995		0	INSTALL BOREHOLE EXTENSOMETERS, NR
1.2.3.2.7.3.4	3	SNL	42114A33	29-sep-1995	29-sep-1995		0	READ INSTALLED INSTRUMENTS, NR
1.2.3.2.7.3.4	3	SNL	42114A41	29-aug-1995	29-aug-1995		0	MONITOR NORTH RAMP AIR QUALITY AND VENTILATION
1.2.3.2.7.3.4	3	SNL	42114M41	29-aug-1995	29-aug-1995		0	SUBMIT FINAL REPORT ON VENTILATION STUDY
1.2.3.2.7.3.4	3	SNL	42114A51	29-aug-1995	29-jun-1995		61	WRITE STARTER TUNNEL DATA SAND REPORT
1.2.3.2.7.3.4	3	SNL	42114M51	29-aug-1995	29-jun-1995		61	SAND RPT, STARTER TUNNEL DATA (0S75)
1.2.3.2.7.3.4	3	SNL	42114A61	30-jun-1995	13-mar-1995		109	PREPARE TEST PLAN, FY96 ESF EXCAVATIONS
1.2.3.2.7.3.4	3	SNL	42114A62	29-sep-1995	09-jun-1995		112	REVIEW PLANNING DOCUMENTS, FY96 ESF EXCAVATIONS
1.2.3.2.7.3.4	3	SNL	42114A81	29-sep-1995	29-sep-1995		0	PROVIDE PLANNING AND MANAGEMENT SUPPORT TO ES&H
1.2.3.2.7.3.4	3	SNL	42114A82	29-sep-1995	29-sep-1995		0	MANAGE AND SCHEDULE ACTIVITIES
1.2.3.2.7.3.4	3	SNL	42114A83	29-sep-1995	29-sep-1995		0	DEVELOP TEST INSTRUCTIONS, OVERSEE COMPLIANCE
1.2.3.2.7.3.4	3	SNL	42114A84	29-sep-1995	29-sep-1995		0	MANAGE QA ACTIVITIES
1.2.3.2.7.3.4	3	SNL	611A41	29-sep-1995	31-aug-1995		29	RPT DATA F/ROCK QUAL CLASS IN THE NORTH RAMP
1.2.3.2.7.3.4	3	SNL	611A42	29-sep-1995	31-aug-1995		29	ANALYZE AND RPT DATA F/STRESS MEAS NORTH RAMP
1.2.3.2.7.3.4	3	SNL	611A43	29-sep-1995	31-aug-1995		29	ANALYZE/RPT DATA F/EVAL MINING METHODS NR
1.2.3.2.7.3.4	3	SNL	611A44	29-sep-1995	29-sep-1995		0	ANALYZE/RPT DATA F/MONITORING NR GSS
1.2.3.2.7.3.4	3	SNL	611A45	29-sep-1995	29-sep-1995		0	ANALYZE/RPT DATA F/MONITORING DRIFT STAB NR
1.2.3.2.7.3.4	3	SNL	611M41	01-sep-1995	06-jul-1995		57	TDIF, DATA F/ROCK QUAL CLASS IN NORTH RAMP
1.2.3.2.7.3.4	3	SNL	611M42	01-sep-1995	06-jul-1995		57	TDIF, DATA F/STRESS MEAS, NORTH RAMP
1.2.3.2.7.3.4	3	SNL	611M43	01-sep-1995	06-jul-1995		57	TDIF, DATA F/EVAL MINING METHODS, NORTH RAMP
1.2.3.2.7.3.4	3	SNL	611M44	01-sep-1995	01-sep-1995		0	TDIF, DATA F/MONITORING NR GSS
1.2.3.2.7.3.4	3	SNL	611M45	01-sep-1995	01-sep-1995		0	TDIF, DATA F/MONITORING DRIFT STAB, NORTH RAMP
1.2.3.2.7.3.4	3	SNL	611A11	29-sep-1995	09-oct-1995		-10	GENERATE Q & RMR INDICES, & PRELIM ASSESSMENTS
1.2.3.2.7.3.4	3	SNL	611A12	29-sep-1995	09-oct-1995		-10	RECORD STRUCTURAL FEATURES
1.2.3.2.7.3.4	3	SNL	611A13	29-sep-1995	09-oct-1995		-10	ASSESS POTENTIAL FOR KEY BLOCK STRUCTURES
1.2.3.2.7.4	3	SNL	4212A21	02-dec-1994	06-jan-1995		-35	MODIFY EXISTING LOADING FRAME FOR BIAXIAL LOADIN
1.2.3.2.7.4	3	SNL	4212A22	03-feb-1995	02-mar-1995		-27	CONSTRUCT AND TEST LAYERED POLYCARBONATE MODEL
1.2.3.2.7.4	3	SNL	4212A23	31-mar-1995	27-apr-1995		-27	TEST MODEL USING ROCK OR ROCK REPLICATE
1.2.3.2.7.4	3	SNL	4212A24	02-jun-1995	29-jun-1995		-27	CONSTRUCT AND TEST A BLOCKY ROCK MODEL
1.2.3.2.7.4	3	SNL	4212A25	30-jun-1995	21-jul-1995		-21	WRITE REPORT
1.2.3.2.7.4	3	SNL	4212A26	18-aug-1995	18-aug-1995		0	REVIEW AND ISSUE REPORT
1.2.3.2.7.4	3	SNL	4212M21	18-aug-1995	18-aug-1995		0	SUBMIT RPT, LAB-SCALE EXP'S, JOINTED ROCK MODELS
1.2.3.2.7.4	3	SNL	4212A31	23-dec-1994	26-jan-1995		-34	CONDUCT PRE-TEST ANAL., CONTINUUM MODEL/BLK CODE
1.2.3.2.7.4	3	SNL	4212A32	03-feb-1995	01-mar-1995		-26	COMPARE PRE-TEST ANALYSIS W/EXPERIMENTAL RESULTS

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WBS	Level	Participant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.7.4	3	SNL	4212A33	28-apr-1995	24-may-1995		-26	PERFORM POST-TEST ANALYSES
1.2.3.2.7.4	3	SNL	4212A34	30-jun-1995	27-jul-1995		-27	WRITE REPORT
1.2.3.2.7.4	3	SNL	4212A35	01-sep-1995	01-sep-1995		0	REVIEW AND ISSUE REPORT
1.2.3.2.7.4	3	SNL	4212M31	01-sep-1995	01-sep-1995		0	SUBMIT RPT, ROCK MASS MODELING TECHNIQUES VALIDA
1.2.3.2.7.4	3	SNL	4212A51	01-feb-1995	08-feb-1995		-7	COMPLETE APPARATUS DESIGN
1.2.3.2.7.4	3	SNL	4212A52	01-aug-1995	08-aug-1995		-7	FABRICATE APPARATUS AND ACQUIRE PARTS
1.2.3.2.7.4	3	SNL	4212A53	29-sep-1995	06-oct-1995		-7	INTEGRATE APPARATUS WITH EXISTING TEST SYSTEM
1.2.3.2.7.4	3	SNL	4212A54	01-sep-1995	11-sep-1995		-10	PREPARE REPORT ON DESIGN DESCRIPTION
1.2.3.2.7.4	3	SNL	4212A55	29-sep-1995	06-oct-1995		-7	REVIEW AND ISSUE REPORT
1.2.3.2.7.4	3	SNL	4212M51	15-feb-1995	15-feb-1995		0	SLTR, PROGRESS TOWARDS APPARATUS DESIGN
1.2.3.2.7.4	3	SNL	4212A61	31-may-1995	31-may-1995		0	CONDUCT LITERATURE SEARCH/EVAL EXISTING MODELS
1.2.3.2.7.4	3	SNL	4212A62	31-jul-1995	31-jul-1995		0	PREPARE FINAL REPORT
1.2.3.2.7.4	3	SNL	4212A63	15-sep-1995	15-sep-1995		0	REVIEW FINAL REPORT
1.2.3.2.7.4	3	SNL	4212M61	15-sep-1995	15-sep-1995		0	SUBMIT FINAL REPORT
1.2.3.2.8.3.1	3	USGS	3GSS500M	29-sep-1995	29-sep-1995		0	DATA RPT: SYN. OF GEOL/GEOPHYS/SEISMIC DATA
1.2.3.2.8.3.3	3	USGS	3GSA511M	31-aug-1995	31-aug-1995		0	PROV RESULTS: SUMMARY OF GROUND MOTION MODELING
1.2.3.2.8.3.3	3	USGS	3GSA512M	30-jun-1995	29-jun-1995		1	PROV RESULTS: SUMMARY OF GM MODELING WORKSHOP
1.2.3.2.8.3.3	3	SNL	32833A12	28-feb-1995	28-feb-1995		0	CONDUCT MODELING & DEVELOP YUCCA FLAT UNE MODEL
1.2.3.2.8.3.3	3	SNL	32833A13	31-may-1995	31-may-1995		0	SYNTHESIZE EMPIRICAL MODEL
1.2.3.2.8.3.3	3	SNL	32833M11	30-may-1995	30-may-1995		0	SAND RPT, EARTHQUAKE GRD MOTION MODEL SUM (0S80)
1.2.3.2.8.3.3	3	SNL	32833M12	28-feb-1995	28-feb-1995		0	ACTIVITY/PROGRESS GROUND MOTION MONITORING
1.2.3.2.8.3.6	3	USGS	3GSH501M	31-jan-1995	31-jan-1995		0	PROV RSLTS: LIST OF EXPERTS TO EVAL GM ATTENUATION
1.2.3.2.8.3.6	3	USGS	3GSH502M	28-apr-1995	28-apr-1995		0	PROV RESULTS: SUMMARY DATA ASSESSMENT WORKSHOP
1.2.3.2.8.3.6	3	USGS	3GSH511M	30-jan-1995	30-jan-1995		0	PROV RSLTS: LIST OF EXPERTS FOR PSHA ELICITATION
1.2.3.2.8.3.6	3	USGS	3GSH512M	20-jan-1995	25-apr-1995		-95	PROV RESULTS: PSHA DATA WORKSHOP SUMMARY
1.2.3.2.8.3.6	3	USGS	3GSH513M	31-mar-1995	31-mar-1995		0	PROV RESULTS: PSHA WORKSHOP SUMMARY
1.2.3.2.8.3.6	3	USGS	3GSH514M	21-apr-1995	16-may-1995		-25	PROV RSLTS: FAULT DISPLACEMENT METHODOLOGY SUM.
1.2.3.2.8.4.1	3	USGS	3GSM500M	30-mar-1995	26-apr-1995		-27	CATALOG OF SEISMIC ACTIVITY IN SGB FOR 1994
1.2.3.2.8.4.1	3	USGS	3GSM530M	30-jun-1995	30-jun-1995		0	RPT: PRECARIOUS ROCK METH. - APPLICATIONS TO YM
1.2.3.2.8.4.3	2	USGS	P739	13-jun-1995	19-jul-1995		-36	Map: Surficial Deposits of Beatty 1:100,000 Quad
1.2.3.2.8.4.3	3	USGS	3GTQ500M	31-jul-1995	31-jul-1995		0	ANLYS PPR: QUATERNARY FLTING-AMARGOSA DESERT
1.2.3.2.8.4.3	3	USGS	3GTQ510M	31-jul-1995	31-jul-1995		0	ANLYS PPR: QUATERNARY FLTING - REGIONAL FAULTS
1.2.3.2.8.4.3	3	USGS	3GTQ530M	31-aug-1995	31-aug-1995		0	FINAL RPT: QUATERNARY ACT. - BARE MTN FAULT ZONE
1.2.3.2.8.4.3	3	USGS	3GTQ540M	31-aug-1995	31-aug-1995		0	RPT: QUAT. ACT. -DEATH VALLEY/FURNACE CRK FLT
1.2.3.2.8.4.4	3	USGS	3GTN500M	30-jun-1995	08-aug-1995		-39	RPT: CHAR. QUAT. FLTING - ROCK VALLEY FAULT ZONE
1.2.3.2.8.4.4	3	USGS	3GTN510M	31-may-1995	31-may-1995		0	RPT: QUATERNARY FLTING - MINE MTN FLT SYSTEM

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.2.8.4.4	3	USGS	3GTN520M	31-jul-1995	31-jul-1995		0	RPT: QUAT. FLTING - CANE SPRING FAULT SYSTEM.
1.2.3.2.8.4.5	3	USGS	3GTD500M	31-may-1995	31-may-1995		0	FINAL REPORT: DETACHMENT FAULTING
1.2.3.2.8.4.6	3	USGS	3GPF500M	31-aug-1995	08-sep-1995		-8	ANLYS PPR: QUAT FLTING-SOLITARIO CYN/CRATER FLAT/
1.2.3.2.8.4.6	3	USGS	3GPF510M	31-jul-1995	31-jul-1995		0	ANLYS PPR: QUAT FLTING - GHOST DANCE FLT
1.2.3.2.8.4.6	3	USGS	3GPF520M	31-may-1995	31-may-1995		0	RPT: QUAT. FLT - POSTULATED FORTY MILE WASH FLT
1.2.3.2.8.4.6	3	USGS	3GPF530M	31-may-1995	31-may-1995		0	ANLYS PPR: BOW RIDGE/PAINTBRUSH CYN
1.2.3.2.8.4.7	2	USGS	M379	13-dec-1994	01-oct-1997		1023	Issue Report on Site-Specific Geophysics Analysis
1.2.3.2.8.4.8	3	USGS	3GSF500M	03-feb-1995	03-feb-1995		0	STUDY PLAN: IN-SITU STRESS FIELDS
1.2.3.2.8.4.1	3	USGS	3GTM510M	31-may-1995	31-may-1995		0	PROG REPORT: DEATH VAL/FURNACE CRK LEVEL LINES
1.2.3.2.8.4.1	2	USGS	P762	14-jun-1995	20-jan-1997		-586	Interpretive Report: Tectonic Scenarios
1.2.3.2.8.4.1	3	USGS	3GTE500M	31-may-1995	31-may-1995		0	TECHNICAL REPORT: TECTONIC MODEL(S)
1.2.3.3.1.1.1	3	USGS	3GMM105M	30-jun-1995	30-jun-1995		0	LTR RPT: ANALYSIS OF REGIONAL AVG ANNUAL PRECIP
1.2.3.3.1.1.2	3	USGS	3GRS101M	14-apr-1995	14-apr-1995		0	LTR RPT: STREAMFLOW & PRECIP DATA, FY94
1.2.3.3.1.1.3	3	USGS	3GRG105M	31-may-1995	31-may-1995		0	LTR RPT: SUM ASSESSMT OF KEY DATA/MODELING PROB
1.2.3.3.1.1.3	3	USGS	3GRG137M	30-jun-1995	30-jun-1995		0	LETTER RPT: FY93-FY94 DATA FROM FORTY MILE WASH
1.2.3.3.1.1.4	3	USGS	3GRM141M	30-jun-1995	30-jun-1995		0	DATA TO TDB: INITIAL BOUNDARY CONDITIONS DATA
1.2.3.3.1.1.4	3	USGS	3GRM161M	31-mar-1995	31-mar-1995		0	DATA TO TDB: BASIC REGIONAL MODELING DATA
1.2.3.3.1.1.4	3	USGS	3GRM166M	30-dec-1994	30-dec-1994		0	HYDROSTRATIGRAPHIC MAP TO DOE
1.2.3.3.1.1.4	3	USGS	3GRM167M	31-mar-1995	31-mar-1995		0	LTR RPT: GEOLOGIC STRUCTURES ON GW FLOW
1.2.3.3.1.2.1	3	LANL	4086	30-apr-1995	27-apr-1995		3	Ltr Rpt: Soil Moisture/Atmos. Interact. (Study Pla
1.2.3.3.1.2.1	3	LANL	4087	30-sep-1995	29-sep-1995		1	Ltr Rpt. Soil Moisture/Atmospheric Interactions
1.2.3.3.1.2.1	3	USGS	3GUI240M	29-sep-1995	29-sep-1995		0	PROV RESULTS: NET INFILTRATION FLUX MAP TO DOE
1.2.3.3.1.2.1	3	USGS	3GUI241M	29-sep-1995	29-sep-1995		0	PRV RLTS: POTENTIAL FAST PATHWAYS FLUX MAP - DOE
1.2.3.3.1.2.2	3	LANL	3431	30-sep-1995	29-sep-1995		1	Dist CL36 in UZ-16, UZ-14
1.2.3.3.1.2.2	3	LANL	4089	30-sep-1995	21-apr-1995		162	Ltr Rpt: Dist of CL36 in Near Surface and ESF Samp
1.2.3.3.1.2.3	3	USGS	3GUP421M	31-mar-1995	31-mar-1995		0	LTR RPT: IN-SITU BOREHOLE MONITORING DATA REPORT
1.2.3.3.1.2.3	3	REECO	0R33D50	31-aug-1995	29-sep-1995		-29	PERCOLATION UZ SURF BASED STUDY
1.2.3.3.1.2.4	3	USGS	3GUS208M	29-sep-1995	29-sep-1995		0	LTR RPT: ALCOVE 1 TESTING
1.2.3.3.1.2.4	3	REECO	0R331D50	01-dec-1994	30-dec-1994		-29	PERCHED WATER SAMPLING
1.2.3.3.1.2.4	3	REECO	0R331D51	29-nov-1994	28-dec-1994		-29	CONSOLIDATED SAMPLING
1.2.3.3.1.2.4	3	REECO	0R33D54	15-sep-1995	16-oct-1995		-31	PERCOLATION IN UZ - ESF STUDY
1.2.3.3.1.2.5	3	LANL	4090	01-may-1995	01-may-1995		0	Ltr Rpt: Study Plan Revision
1.2.3.3.1.2.6	3	LANL	3472	30-sep-1995	29-sep-1995		1	Results of Testing Pneum. Pathways w/RAMAN-LIDAR
1.2.3.3.1.2.6	3	LANL	4085	31-mar-1995	30-mar-1995		1	Ltr Rpt: Meas. of Near-Surf. Gas Flow (Study Plan)
1.2.3.3.1.2.6	3	USGS	3GGP120M	30-dec-1994	30-dec-1994		0	LETTER REPORT: GAS CHEMISTRY TRHU 1993
1.2.3.3.1.2.7	3	USGS	3GUH105M	29-sep-1995	29-sep-1995		0	LTR RPT: PRELIMINARY UZ HYDROCHEMISTRY AT YM

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.3.1.2.8	3	LBL	3GLF101M	29-sep-1995	29-sep-1995		0	Anlys PPR: Coupling Dual-Porosity/Site-Scale
1.2.3.3.1.2.8	3	LBL	3GLF103M	30-jun-1995	30-jun-1995		0	Analysis Paper: Sorptivity Inversions
1.2.3.3.1.2.8	3	LBL	0BSZ1	30-jun-1995	29-jun-1995		1	Report on Flow in Unsat Fractured Rock.
1.2.3.3.1.2.8	3	USGS	3GUF105M	29-sep-1995	29-sep-1995		0	LTR RPT: PRELIM FRACTURE MODEL, TIVA CANYON, YM
1.2.3.3.1.2.9	3	LBL	3GLM100M	30-dec-1994	03-jan-1995		-4	Ltr Rpt: Calib of gas-phase model for ESF
1.2.3.3.1.2.9	3	LBL	3GLM105M	29-sep-1995	30-oct-1995		-31	Anlys Paper: Perform of 3D Site Scale Model
1.2.3.3.1.2.9	3	LBL	3GLM107M	29-sep-1995	29-sep-1995		0	Anlys Paper: Sensitivity Studies using 3D model
1.2.3.3.1.2.9	3	LBL	3GLM110M	28-feb-1995	27-feb-1995		1	Data Transfer to Earth Vision Model (EG&G)
1.2.3.3.1.2.9	3	USGS	3GUM107M	29-sep-1995	29-sep-1995		0	INTERMEDIATE UZ HYDROLOGIC FRAMEWORK MODEL
1.2.3.3.1.3.1	2	USGS	P930	14-jul-1995	29-dec-1995		-168	Issue Report: Cross-Hole Studies at UE-25c Wells (
1.2.3.3.1.3.1	3	LANL	4077	30-sep-1995	29-sep-1995		1	Ltr Rpt: Pre-Test Predictions of Solute Transport
1.2.3.3.1.3.1	3	USGS	3GWF143M	30-jun-1995	30-jun-1995		0	UPDATE #1 ON C-WELLS HYDRAULIC & TRACER TESTING
1.2.3.3.1.3.1	3	USGS	3GWF153M	05-jul-1995	05-jul-1995		0	LTR: CROSS-HOLE STUDIES COMMENCEMENT AT C-WELLS
1.2.3.3.1.3.1	3	USGS	3GWF101M	31-mar-1995	31-mar-1995		0	LETTER REPORT: 1993 WATER-LEVEL DATA
1.2.3.3.1.3.1	3	USGS	3GWF105M	30-jun-1995	30-jun-1995		0	LTR RPT: REVISED SITE POTENTIOMETRIC LEVEL MAP
1.2.3.3.1.3.2	3	USGS	3GWH142M	29-sep-1995	29-sep-1995		0	MEMO TO DOE: AWARD HOIST SYSTEM CONTRACT
1.2.3.3.1.3.2	3	USGS	3GWH146M	29-sep-1995	29-sep-1995		0	MEMO TO DOE: AWARD BH DISCRETIZATION CONTRACT
1.2.3.3.1.3.2	3	REECO	SZH001	31-mar-1995	31-mar-1995		0	WT/G WELL Equipment Procurement
1.2.3.3.1.3.2	3	REECO	SZH002	15-sep-1995	15-sep-1995		0	WT/G Well Cleanout
1.2.3.3.1.3.3	3	LBL	0B0Z1	30-sep-1995	28-sep-1995		2	Multiple Well Test Inversion Code
1.2.3.3.1.3.3	3	USGS	3GWM101M	31-may-1995	31-may-1995		0	DATA TO TDB: FRAMEWORK MODEL DATA (TO EG&G)
1.2.3.3.1.3.3	3	USGS	3GWM103M	30-jun-1995	30-jun-1995		0	DATA TO TDB: PRELIM 3-D FRAMEWORK MODEL DATA
1.2.3.3.1.3.3	3	USGS	3GWM132M	30-jun-1995	30-jun-1995		0	DATA TO TDB: PRELIM MODEL DATA (TO EG&G)
1.2.3.3.1.3.3	3	USGS	3GWM134M	30-jun-1995	30-jun-1995		0	PROG RPT TO PA MODELERS: PRELIM 3D SZ FLOW MODEL
1.2.3.3.1.3.3	3	USGS	3GWM151M	30-mar-1995	30-mar-1995		0	LETTER REPORT: SITE SZ CONCEPTUAL MODEL
1.2.3.4.1.1	2	LANL	T534	28-sep-1995	03-oct-1994		360	Modeling and Experimental Results of Saturated and
1.2.3.4.1.1	3	LANL	3387	30-sep-1995	23-oct-1995		-23	Mdlg & Exp Results of SZ & Water Chem
1.2.3.4.1.2.1	3	LANL	3219	30-sep-1995	29-sep-1995		1	Sorption as Function of Groundwater Composition
1.2.3.4.1.2.1	3	LANL	3339	30-sep-1995	29-sep-1995		1	Interim Report: Sorption Isotherms
1.2.3.4.1.2.1	3	LANL	3451	30-sep-1995	29-sep-1995		1	Surface Complexation of Radionuclides in Devitrifi
1.2.3.4.1.2.2	3	LANL	3178	30-sep-1995	29-sep-1995		1	Analytical Methods and Procedures for ESF
1.2.3.4.1.2.2	3	LANL	3410	30-sep-1995	29-sep-1995		1	Biological - Actinide Transport Progress Report
1.2.3.4.1.2.3	3	LANL	3394	30-apr-1995	28-apr-1995		2	RPT INFLUENCE SURF PRE-RXN ON SORPT PROP OF MIN
1.2.3.4.1.3.1	3	LANL	4084	30-sep-1995	02-oct-1995		-2	Ltr Rpt: Progress Report on EQ3/6 Data Base
1.2.3.4.1.3.1	3	LANL	3463	30-sep-1995	29-sep-1995		1	Modeled Actinide Solubilities and Speciation
1.2.3.4.1.3.1	3	LANL	3464	30-sep-1995	29-sep-1995		1	Report on Np Solid Characterization

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WBS	Level	Participant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.4.1.3.1	3	LANL	4082	29-sep-1995	29-sep-1995		0	Ltr Rpt. Solubility Studies of Selenium
1.2.3.4.1.3.1	3	LANL	4067	31-may-1995	05-may-1995		26	Ltr Rpt: Key Data needs from Tc Studies
1.2.3.4.1.3.1	3	LANL	4091	30-sep-1995	07-sep-1995		23	Ltr Rpt: Temperature Dependent Pu(VI) Hydrolysis
1.2.3.4.1.3.2	3	LANL	4083	30-sep-1995	30-sep-1996		-366	Ltr Rpt: Pu Colloid Stability & Characteristics
1.2.3.4.1.4.1	3	LANL	3063	30-sep-1995	29-sep-1995		1	Trans Radionuclides Fract Flow under Sat Con
1.2.3.4.1.4.1	3	LANL	3043	30-sep-1995	29-sep-1995		1	Techniques Conducting Unsaturated Colum Exps
1.2.3.4.1.4.1	3	LANL	3457	30-sep-1995	29-sep-1995		1	Column Experiments with Crushed Material
1.2.3.4.1.4.2	3	LANL	3064	30-sep-1995	29-sep-1995		1	Techniques to Study Diffusion in Unsat/Tuff
1.2.3.4.1.5.1	2	LANL	T513	31-mar-1995	02-oct-1998		1281	Issue Report on Retardation Sensitivity Analysis
1.2.3.4.1.5.1	3	LANL	3468	30-sep-1995	29-sep-1995		1	Summary Report Site-Scale Integrated Transport
1.2.3.4.1.5.1	3	LANL	3469	30-sep-1995	29-sep-1995		1	Summary of Near-Repository Flow & Geochemistry
1.2.3.4.1.5.1	3	LANL	3467	30-sep-1995	29-sep-1995		1	Report on Code Development
1.2.3.4.1.5.1	3	SNL	34151A11	01-may-1995	01-may-1995		0	PREP USERS MANUAL & SOFTWARE QA DOC'S F/LEHGC1.1
1.2.3.4.1.5.1	3	SNL	34151A19	08-sep-1995	08-sep-1995		0	PUBLISH LEHGC1.1 USER'S MANUAL
1.2.3.4.1.5.1	3	SNL	34151A20	01-aug-1995	01-aug-1995		0	CONTINUE DEVELOPMENT OF MP-LEHGC
1.2.3.4.1.5.1	3	SNL	34151M11	01-may-1995	01-may-1995		0	LEHGC1.1 USERS MANUAL & QA DOCUMENTATION
1.2.3.4.1.5.1	3	SNL	34151M14	01-aug-1995	01-aug-1995		0	SUBMIT STATUS RPT. DEV MP-LEHGC
1.2.3.4.1.5.2	3	LANL	T015	30-sep-1995	29-sep-1995		1	Demonstrate applicability of Lab Data Study Plan
1.2.3.4.1.5.2	3	LANL	3433	31-mar-1995	30-mar-1995		1	P-Tunnel Test Plan for Field Experiments
1.2.3.4.1.5.2	3	LANL	3434	30-jun-1995	29-jun-1995		1	TPP for P-Tunnel Experiments
1.2.3.4.1.5.2	3	LANL	4051	30-sep-1995	29-sep-1995		1	Progress Report P-Tunnel Experiments
1.2.3.4.1.5.2	3	LANL	4054	30-jun-1995	29-jun-1995		1	Ltr Rpt: Assessment of the Applicability of P-Tunn
1.2.3.4.1.5.2	3	LBL	0B35	31-aug-1995	31-oct-1994		304	Study Plan
1.2.3.4.1.5.2	3	LBL	0B35D	31-mar-1995	31-oct-1994		151	P-Tunnel Test Plan for Field Exper on Radionuclide
1.2.3.4.1.5.2	3	LBL	0B35F	30-apr-1995	31-oct-1994		181	Test Planning Package P-Tunnel Experiments Transp
1.2.3.4.1.5.2	3	LBL	0B35H	31-aug-1995	31-oct-1994		304	Progress Report for FY95 Activities
1.2.3.4.2.1	3	LLNL	M0L103	31-aug-1995	30-aug-1995		1	PRELIM. RPT ON DEVELOPMENT OF EQ3/6
1.2.3.4.2.1	3	LLNL	M0L153	30-apr-1995	28-apr-1995		2	STATUS ON CODE MAINTENANCE
1.2.3.4.2.1	3	LLNL	M0L104	31-aug-1995	31-aug-1995		0	ANNUAL SUMMARY RPT ON EQ3/6 V&V ACTIVITIES
1.2.3.4.2.2	3	LLNL	M0L232	31-dec-1994	30-dec-1994		1	USERS MANUAL - JEWEL CODE
1.2.3.4.2.2	3	LLNL	M0L102	31-aug-1995	30-aug-1995		1	UPDATED VERSIONS OF DATA0 AND GEMBOCHS
1.2.3.4.2.2	3	LLNL	M0L208	31-aug-1995	30-aug-1995		1	COMPLETE DEVELOPMENT OF FACET
1.2.3.4.2.2	3	LLNL	M0L233	31-oct-1994	29-dec-1994		-59	DATA0 SUITE MANUSCRIPT - GEMBOCHS
1.2.3.5.1	3	REECO	SMF001	30-sep-1995	30-sep-1995		0	Field Sampling Support
1.2.3.5.1	3	M&O	DS0110	15-mar-1995	14-mar-1995		1	ELECTRIC PALLET LIFT EQUIP OPERATIONS
1.2.3.5.2.2	3	REECO	SSS1	01-sep-1995	01-sep-1995		0	Provide Calculations

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1.2.3.5.3.1	2	REECo	T501	10-feb-1995	30-sep-1995		-232	Complete Geologic Drilling
1.2.3.5.3.1	3	REECO	T530	13-feb-1995	12-feb-1995		1	BEGIN WATER TABLE DRILLING
1.2.3.5.3.1	3	REECO	0R3531WO	01-sep-1995	29-sep-1995		-28	WATER TABLE WORKOVERS
1.2.3.5.3.5	1	YMPO	RP509	30-jun-1995	30-mar-1999		1369	Complete Deep Unsaturated Zone Hydrologic Hole Dri
1.2.3.5.3.5	3	REECO	0R35D50	26-apr-1995	24-may-1995		-28	UZ-4 and UZ-7 DRILLHOLES
1.2.3.5.3.5	3	REECO	0R3535D4	28-mar-1995	25-apr-1995		-28	UZ-16 STEMMED AND READY FOR TESTING
1.2.3.5.3.11	3	REECO	0R3531D2	30-jan-1995	30-jan-1995		0	C-WELL COMPLEX PHASE 2
1.2.3.5.3.11	3	REECO	0R3531D3	01-mar-1995	01-mar-1995		0	C-WELL COMPLEX PHASE 3
1.2.3.5.3.11	3	REECO	0R3531D4	31-may-1995	31-may-1995		0	C-WELL COMPLEX PHASE 4
1.2.3.5.3.17	3	REECO	0R11	07-sep-1995	06-sep-1995		1	Complete SD-12 Borehole - Milestone
1.2.3.5.3.17	3	REECO	0R35317M	06-sep-1995	06-sep-1995		0	SD-12 DRILLING PHASE II
1.2.3.5.3.17	3	REECO	0R353H7B	31-may-1995	01-mar-1995		91	SD-7 DRILLING PHASE I
1.2.3.5.3.22	3	REECO	0R35AV	10-nov-1994	15-nov-1994		-5	ARMOGOSA VALLEY TRENCH
1.2.3.5.3.22	3	REECO	0R35BM	20-nov-1994	15-nov-1994		5	BARE MOUNTAIN TRENCH
1.2.3.5.3.22	3	REECO	0R35CFL1	07-oct-1994	07-nov-1994		-31	CRATER FLAT TRENCH
1.2.3.5.3.22	3	REECO	0R35RVF1	20-oct-1994	07-nov-1994		-18	ROCK VALLEY FAULT TRENCH
1.2.3.5.3.22	3	REECO	0R35SBT1	30-oct-1994	07-nov-1994		-8	SLEEPING BUTTE TRENCH
1.2.3.5.3.23	3	REECO	0R353N	07-nov-1994	08-dec-1994		-31	ACCESS ROAD AND PAD CONST
1.2.3.6.2.1.1	3	USGS	3GCR510M	30-jun-1995	30-jun-1995		0	LTR RPT: ISOTOPIC ANALYSIS-MODERN PRECIPITATION
1.2.3.6.2.1.2	3	USGS	3GCL500M	17-jul-1995	17-jul-1995		0	LTR RPT: OSTRACODE & ISOTOPIC DATA
1.2.3.6.2.1.3	3	USGS	3GCL510M	31-jul-1995	31-jul-1995		0	LTR RPT: FAUNA & FLORA AGES
1.2.3.6.2.1.4	3	LANL	4068	30-sep-1995	29-sep-1995		1	Progress Report on Dating of Boulder Deposits
1.2.3.6.2.1.4	3	LANL	4069	30-sep-1995	29-sep-1995		1	Progress Report on Dating of Bedrock Outcrops
1.2.3.6.2.1.4	3	LANL	4070	30-sep-1995	29-sep-1995		1	Ltr Rpt: Refinement of Rock Varnish Calibration SI
1.2.3.6.2.1.4	3	USGS	3GCH500M	31-jan-1995	31-jan-1995		0	LTR RPT: AGES OF SURFICIAL SOIL DEPOSITS
1.2.3.6.2.1.5	3	USGS	3GQH500M	16-nov-1994	16-nov-1994		0	STUDY PLAN TO DOE: PALEOCLIMATE SYNTHESIS
1.2.3.6.2.1.5	3	USGS	3GQH50AM	28-feb-1995	28-feb-1995		0	STUDY PLAN: PALEOCLIMATE/ENVIRONMENTAL SYNTH.
1.2.3.6.2.1.5	3	USGS	3GQH570M	31-aug-1995	31-aug-1995		0	LTR RPT: PRELIMINARY PALEOCLIMATE SYNTHESIS
1.2.3.6.2.1.6	3	SNL	36216A11	03-feb-1995	03-feb-1995		0	VALIDATE GENISIS GLOBAL CLIMATE MODELING CODE
1.2.3.6.2.1.6	3	SNL	36216A12	02-jun-1995	02-jun-1995		0	VALIDATE NESTED CURRENT CLIMATE MODEL
1.2.3.6.2.1.6	3	SNL	36216A13	30-jun-1995	30-jun-1995		0	ANALYZE PALEOCLIMATE MODEL VALIDATION
1.2.3.6.2.1.6	3	SNL	36216A14	11-aug-1995	11-aug-1995		0	PREPARE CLIMATE MODEL VALIDATION REPORT
1.2.3.6.2.1.6	3	SNL	36216M11	10-aug-1995	10-aug-1995		0	SAND RPT, CLIMATE MODEL VALIDATION
1.2.3.6.2.1.6	3	SNL	36216A21	23-dec-1994	26-jan-1995		-34	IDENTIFY USER REQUIREMENTS, FUTURE CLIMATE MODEL
1.2.3.6.2.1.6	3	SNL	36216A22	17-mar-1995	17-mar-1995		0	DEFINE POTENTIAL BOUNDING CLIMATE CONDITIONS
1.2.3.6.2.1.6	3	SNL	36216A23	29-sep-1995	29-sep-1995		0	DETAIL APPROACH TO SYNTHESIS OF FUTURE CLIMATE

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.6.2.1.6	3	SNL	36216M21	16-mar-1995	16-mar-1995		0	SAND RPT, BOUNDING CONDITIONS FUTURE CLIMATE
1.2.3.6.2.1.6	3	SNL	36216M22	01-sep-1995	01-sep-1995		0	SAND RPT, DETAIL APPROACH TO SYN FUTURE CLIMATE
1.2.3.6.2.2.1	2	USGS	T169	17-jan-1995	06-sep-1995		-232	Hydrogenic Deposits Workshop #2/Report
1.2.3.6.2.2.1	3	USGS	3GQH550M	30-mar-1995	30-mar-1995		0	LTR RPT: FORMATION OF SILICA IN YUCCA MOUNTAIN
1.2.3.6.2.2.1	3	USGS	3GQH560M	31-jul-1995	31-jul-1995		0	LTR RPT: DATING OF CALCITE/SILICA VEIN DEPOSITS
1.2.3.6.2.2.1	3	USGS	3GQH520M	30-jun-1995	30-jun-1995		0	LETTER REPORT: PALEODISCHARGE DEPOSITS
1.2.3.6.2.2.1	3	USGS	3GQH580M	31-jul-1995	31-jul-1995		0	RPT: SOIL FLUID/GAS ISOTOPIC CHEMISTRY
1.2.3.6.2.2.1	3	USGS	3GQH590M	31-jul-1995	31-jul-1995		0	PROV RESULTS: SECONDARY MINERAL ORIGINS
1.2.3.7.2.1	3	USGS	3GNR500M	15-mar-1995	15-mar-1995		0	DATA TO TDB: SYNTH OF GEOCHEMICAL/ISOTOPIC DATA
1.2.3.7.2.1	3	USGS	3GNR510M	15-mar-1995	15-mar-1995		0	ANLYS PPR: COMPILATION OF HEAT FLOW DATA FOR YM
1.2.3.9.5	3	EG&G	0E9A01A	01-feb-1995	31-jan-1995		1	Extended Site Model-Geologic Framework
1.2.3.9.5	3	EG&G	0E9A03A	30-mar-1995	29-mar-1995		1	Update of Extended Site Model
1.2.3.9.5	3	EG&G	0E9A05A	01-sep-1995	29-sep-1995		-28	Update of Extended Site Model
1.2.3.9.5	3	EG&G	0E9A09	01-mar-1995	28-feb-1995		1	Report
1.2.3.9.5	3	EG&G	0E9A37	28-feb-1995	27-feb-1995		1	Report
1.2.3.9.5	3	EG&G	0E9A44	07-jan-1995	06-jan-1995		1	Deliver Study Plan Draft
1.2.3.9.5	3	M&O	TM373	29-sep-1995	29-sep-1995		0	UPDATED STRATIGRAPHIC COMPENDIUM
1.2.3.9.5	3	M&O	TM374	23-dec-1994	23-dec-1994		0	MODEL STATUS REPORT
1.2.3.9.5	3	M&O	TM375	31-mar-1995	31-mar-1995		0	MODEL DATA STATUS REPORT
1.2.3.9.5	3	M&O	TM376	30-jun-1995	30-jun-1995		0	MODEL DATA STATUS REPORT
1.2.3.9.5	3	M&O	TM377	29-sep-1995	29-sep-1995		0	MODEL DATA STATUS REPORT
1.2.3.9.5	3	M&O	TM378	30-jun-1995	30-jun-1995		0	SYNTHESIS REPORT
1.2.3.9.5	3	M&O	TM381	30-jun-1995	30-jun-1995		0	STATUS REPORT ON MODEL DELIVERABLES & INTEGRATION
1.2.3.9.5	3	M&O	TM382	28-sep-1995	28-sep-1995		0	STATUS REPORT ON MODEL DELIVERABLES & INTEGRATION
1.2.3.9.5	3	M&O	TM383	23-dec-1994	23-dec-1994		0	STATUS REPORT ON PRODUCTS DEVELOPED & AVAILABLE
1.2.3.9.5	3	M&O	TM384	31-mar-1995	31-mar-1995		0	STATUS REPORT ON PRODUCTS DEVELOPED & AVAILABLE
1.2.3.9.5	3	M&O	TM385	30-jun-1995	30-jun-1995		0	STATUS REPORT ON PRODUCTS DEVELOPED & AVAILABLE
1.2.3.9.5	3	M&O	TM386	28-sep-1995	28-sep-1995		0	STATUS REPORT ON PRODUCTS DEVELOPED & AVAILABLE
1.2.3.9.5	3	M&O	TM387	30-jun-1995	30-jun-1995		0	REPORT 3-D MODEL
1.2.3.10.1	3	LLNL	M0L205	31-aug-1995	30-aug-1995		1	STATUS OF DATA - WATER CHEMISTRY/SECONDARY MINERAL
1.2.3.10.1	3	LLNL	M0L122	30-jun-1995	29-jun-1995		1	PRELIM RPT-RESULTS OF SIMULATION COUPLED PROCESSES
1.2.3.10.1	3	LLNL	M0L228	31-oct-1994	29-dec-1994		-59	DRAFT REPORT ON CODE MODEL CAPABILITY GUIDELINES
1.2.3.10.2	3	LLNL	M0L154	30-jun-1995	29-jun-1995		1	RESOLVE STUDY PLAN COMMENTS
1.2.3.10.2	3	LLNL	M0L229	31-jan-1995	27-jan-1995		4	ACTIVITY PLAN - CHARAC. TECHNIQUES OF AZ
1.2.3.10.2	3	LLNL	M0L123	30-jun-1995	29-jun-1995		1	PRELIM RPT-IMPACT OF PRECIP/DISSOL KINETICS
1.2.3.10.2	3	LLNL	M0L124	30-jun-1995	29-jun-1995		1	PRELIM RPT-ROCK/WTR INTERACTION, TOPOPAH SPRINGS

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1.2.3.10.2	3	LLNL	MOL230	30-nov-1994	29-nov-1994		1	DATA REPORT ON SMALL BLOCK TESTS
1.2.3.10.2	3	LLNL	MOL231	15-nov-1994	14-nov-1994		1	DRAFT RPT ON RATES AND MAGNITUDES OF CHANGES
1.2.3.10.3.1	3	LLNL	MOL135	31-aug-1995	28-sep-1995		-28	RPT ON STRATEGIES FOR INTEGRATED TESTING
1.2.3.10.3.1	3	LLNL	MOL136	30-jun-1995	31-jul-1995		-31	REVISED SIP FOR INTEGRATED TESTS & MODELS
1.2.3.10.3.1	3	LLNL	MOL172	31-aug-1995	28-sep-1995		-28	TEST PLANS FOR TRANSPORT STUDIES IN UNSAT. MTLs
1.2.3.10.3.1	3	LLNL	MOL133	30-mar-1995	29-mar-1995		1	RADIONUCLIDE DIFFUSION IN CLINOPTILOLITE
1.2.3.10.3.1	3	LLNL	MOL218	31-oct-1994	29-nov-1994		-29	COLLOID CHARACTERIZATION REPORT
1.2.3.10.3.1	3	LLNL	MOL217	31-dec-1994	29-dec-1994		2	CORE FLOW EXPERIMENT PROTOCOL DOCUMENTED
1.2.3.10.3.1	3	LLNL	MOL219	30-mar-1995	30-mar-1995		0	REPORT ON TRANSPORT OF SOLUBLE SPECIES
1.2.3.10.3.2	3	LLNL	MOL163	31-aug-1995	30-aug-1995		1	RPT OF LAB MEASUREMENTS OF THERMODYNAMIC DATA
1.2.3.10.3.2	3	LLNL	MOL164	31-aug-1995	30-aug-1995		1	REPORT ON SOLUBILITY PRODUCT, AmOHCO3
1.2.3.10.3.2	3	LLNL	MOL165	31-aug-1995	30-aug-1995		1	DEVELOP NI & Zr THERMODYNAMIC DATABASES
1.2.3.10.3.2	3	LLNL	MOL169	31-aug-1995	30-aug-1995		1	US CONTRIBUTIONS TO NEA TECH VOLUME ON Am
1.2.3.10.3.2	3	LLNL	MOL170	31-aug-1995	30-aug-1995		1	US CONTRIBUTIONS TO NEA TECH VOLUME ON Np/Pu
1.2.3.10.3.2	3	LLNL	MOL171	31-aug-1995	30-aug-1995		1	US CONTRIBUTION TO PEER REVIEW, NEA TECH VOL ON Tc
1.2.3.11.2	3	LBL	0BB02	01-sep-1995	28-sep-1995		-27	Synthesis of Geophys Data S. & N-S Algnmt
1.2.3.11.2	3	LBL	0BB02A	15-jan-1995	12-jan-1995		3	Interim Letter Report: Field Work
1.2.3.11.2	3	LBL	0BB02C	15-apr-1995	13-apr-1995		2	Letter Report: Field Studies
1.2.3.11.2	3	LBL	0BB03	01-sep-1995	08-sep-1995		-7	Summary Rpt: Interp of Multiple Geophys. Surveys
1.2.3.11.2	3	LBL	0BB03A	20-jan-1995	19-jan-1995		1	Interim Letter Report
1.2.3.11.2	3	LBL	0BB03C	20-apr-1995	19-apr-1995		1	Letter Report
1.2.3.11.2	3	LBL	0BB01	01-jul-1995	27-jul-1995		-26	Summary Rept: Grav/Mag Data on Regional Seis Lines
1.2.3.11.2	3	LBL	0BB01A	30-jan-1995	27-jan-1995		3	Interim Letter Report
1.2.3.11.2	3	LBL	0BB01C	30-apr-1995	31-oct-1994		181	Letter Report
1.2.3.11.2	3	SNL	31A21	29-sep-1995	29-sep-1995		0	COORDINATE RAAX LOGGING AND ANALYSES
1.2.3.11.2	3	SNL	31A22	29-sep-1995	29-sep-1995		0	INTERPRET DOWNHOLE IMAGERY
1.2.3.11.2	3	SNL	31A23	29-sep-1995	29-sep-1995		0	PREPARE REPORTS
1.2.3.11.2	3	SNL	31M21	01-sep-1995	01-sep-1995		0	REPORT 3.9.01.2, USEFULNESS OF RAAX OR OTHER
1.2.3.11.2	3	SNL	31M22	01-may-1995	01-may-1995		0	REPORT 3.9.01.2.1, PHASE I: RESULTS OF RAAX
1.2.3.11.2	3	SNL	31M23	01-aug-1995	01-aug-1995		0	REPORT 3.9.01.2.2, PHASE II: RESULTS OF RAAX
1.2.3.11.2	3	M&O	DS10000	15-mar-1995	15-mar-1995		0	BOREHOLE ONC-1-PRELIMINARY INTERPRETATIVE SUMMARY
1.2.3.11.2	3	M&O	DS10010	15-apr-1995	15-apr-1995		0	UZ-4 FORENSIC EVALUATION
1.2.3.11.2	3	M&O	DS10020	30-mar-1995	30-mar-1995		0	QUARTERLY BOREHOLE GEOPH LOGGING REPORT
1.2.3.11.2	3	M&O	DS10030	15-may-1995	15-may-1995		0	UZ-4 PRELIMINARY INTERPRETATIVE SUMMARY
1.2.3.11.2	3	M&O	DS10035	15-apr-1995	15-apr-1995		0	SD-12 PRELIMINARY INTERPRETATIVE SUMMARY
1.2.3.11.2	3	M&O	DS10040	15-apr-1995	15-apr-1995		0	G-2 FORENSIC EVALUATION

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1.2.3.11.2	3	M&O	DS10045	15-apr-1995	15-apr-1995		0	UZ-7 FORENSIC EVALUATION
1.2.3.11.2	3	M&O	DS10050	15-apr-1995	15-apr-1995		0	SD-7 FORENSIC EVALUATION
1.2.3.11.2	3	M&O	DS10055	15-may-1995	15-may-1995		0	G-2 PRELIMINARY INTERPRETATIVE SUMMARY
1.2.3.11.2	3	M&O	DS10060	15-may-1995	15-may-1995		0	UZ-7 PRELIMINARY INTERPRETATIVE SUMMARY
1.2.3.11.2	3	M&O	DS10065	15-may-1995	15-may-1995		0	SD-7 PRELIMINARY INTERPRETATIVE SUMMARY
1.2.3.11.2	3	M&O	DS10080	30-jun-1995	30-jun-1995		0	QUARTERLY BOREHOLE GEOPHYSICAL LOGGING REPORT
1.2.3.11.2	3	M&O	DS10090	30-jul-1995	30-jul-1995		0	PROTOTYPE LOGGING REPORT
1.2.3.11.2	3	M&O	DS10105	15-aug-1995	15-aug-1995		0	LOG ANALYSIS REPORT
1.2.3.11.2	3	M&O	DS10120	30-sep-1995	30-sep-1995		0	QUARTERLY BOREHOLE GEOPHYSICAL LOGGING REPORT
1.2.3.11.2	3	M&O	DS11025	15-apr-1995	15-apr-1995		0	SD-12 FORENSIC EVALUATION OF BOREHOLE DATA
1.2.3.11.2	3	M&O	DS11040	15-feb-1995	15-feb-1995		0	LOG ANALYSIS REPT. JF-3 WATERING MONITORING WELL
1.2.3.11.2	3	M&O	DS11045	15-mar-1995	15-mar-1995		0	QA QUALIFICATION OF QLA-2 NETWORK SOFTWARE
1.2.3.11.2	3	M&O	DS9070	15-nov-1994	15-nov-1994		0	REPORT ON PROCEDURE YAP S.III.5Q
1.2.3.11.2	3	M&O	DS9075	13-jan-1995	13-jan-1995		0	REPORT ON LOG DATA HANDLING WORK INSTRUCTIONS
1.2.3.11.2	3	M&O	DS9080	15-mar-1995	15-mar-1995		0	SD-9 FORENSIC EVALUATION BOREHOLE DATA
1.2.3.11.2	3	M&O	DS9085	30-dec-1994	30-dec-1994		0	QUARTERLY BOREHOLE GEOPHYSICAL LOGGING REPORT
1.2.3.11.2	3	M&O	DS9090	15-apr-1995	15-apr-1995		0	PRELIMINARY INTERPRETATIVE SUMMARY/BOREHOLE SD-9
1.2.3.11.2	3	M&O	DS9095	15-feb-1995	15-feb-1995		0	BOREHOLE ONC-1-FORENSIC EVALUATION
1.2.3.12.1	2	LLNL	P267	30-jun-1995	06-jun-1996		-342	Updated Near-Field Environment Report (NFER) Issue
1.2.3.12.1	3	LLNL	M0L152	31-oct-1994	17-nov-1994		-17	STATUS REPORT ON M0L207
1.2.3.12.1	3	LLNL	M0L206	07-apr-1995	05-apr-1995		2	EVALUATION OF THE THERMODYNAMIC DATABASES
1.2.3.12.1	3	LLNL	M0L207	31-aug-1995	30-aug-1995		1	FIELD-BASED & LABORATORY-BASED MEASUREMENTS
1.2.3.12.1	3	LLNL	M0L220	31-dec-1994	29-dec-1994		2	REVIEW OF EXISTING COUPLED CODE CAPABILITIES
1.2.3.12.1	3	LLNL	M0L115	31-mar-1995	31-mar-1995		0	RESOLVE STUDY PLAN COMMENTS
1.2.3.12.2	3	LLNL	M0L119	28-feb-1995	28-feb-1995		0	RESOLVE STUDY PLAN (LAB) COMMENTS
1.2.3.12.2	3	LLNL	M0L223	31-jan-1995	30-jan-1995		1	SUBMIT STUDY PLAN (MODELING)
1.2.3.12.2	3	LLNL	M0L112	16-dec-1994	16-dec-1994		0	STATUS REPORT ON M0L120
1.2.3.12.2	3	LLNL	M0L120	01-aug-1995	28-jul-1995		4	RPT ON LAB TESTS DRYING/REWETTING OF INTACT ROCK
1.2.3.12.2	3	LLNL	M0L224	31-oct-1994	09-nov-1994		-9	HYDROLOGICAL PROPERTY MEASUREMENTS REPORT
1.2.3.12.2	3	LLNL	M0L113	31-aug-1995	30-aug-1995		1	SUBMIT NUFT CODE INDIVIDUAL SOFTWARE PLAN
1.2.3.12.2	3	LLNL	M0L221	30-mar-1995	30-mar-1995		0	INITIAL BASELINE V-TOUGH COMPLETED
1.2.3.12.2	3	LLNL	M0L121	31-aug-1995	30-aug-1995		1	SUMMARY OF PRE- AND POST-PROCESSORS FOR V-TOUGH
1.2.3.12.2	3	LLNL	M0L222	31-aug-1995	30-aug-1995		1	SUBMIT UPDATED CODE VERSION FOR V-TOUGH
1.2.3.12.2	3	LLNL	M0L116	30-jul-1995	27-jul-1995		3	ANALYSIS OF THE IMPACT OF HETEROGENEITY
1.2.3.12.2	3	LLNL	M0L117	30-jul-1995	27-jul-1995		3	ANALYSIS OF THE LARGE BLOCK TEST
1.2.3.12.2	3	LLNL	M0L234	18-nov-1994	17-nov-1994		1	STATUS REPORT ON M0L117

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.12.3	3	LLNL	M0L100	15-aug-1995	14-sep-1995		-30	REVISE STUDY PLAN
1.2.3.12.3	3	LLNL	M0L155	30-nov-1994	29-nov-1994		1	STATUS REPORT ON M0L98
1.2.3.12.3	3	LLNL	M0L98	31-jul-1995	27-jul-1995		4	PRELIM. RPT ON THE EFFECTS OF RADIATION ON ROCK
1.2.3.12.3	3	LLNL	M0L156	10-feb-1995	10-feb-1995		0	STATUS REPORT ON M0L204
1.2.3.12.3	3	LLNL	M0L204	31-aug-1995	30-aug-1995		1	3D DISCRETE ELEMENT COMPUTER CODE
1.2.3.12.3	3	LLNL	M0L159	13-jan-1995	09-jan-1995		4	STATUS REPORT ON M0L203
1.2.3.12.3	3	LLNL	M0L203	18-aug-1995	16-aug-1995		2	RESULTS OF GEOMECHANICAL MEASUREMENTS
1.2.3.12.3	3	LLNL	M0L160	03-mar-1995	01-mar-1995		2	STATUS REPORT ON M0L236
1.2.3.12.3	3	LLNL	M0L236	04-aug-1995	02-aug-1995		2	PRELIMINARY REPORT ON ANALYSIS OF LARGE BLK TEST
1.2.3.12.4	3	LLNL	M0L250	30-nov-1994	30-nov-1994		0	TEST OPERATIONS PLAN
1.2.3.12.4	3	LLNL	M0L237	31-aug-1995	30-aug-1995		1	ACTIVITY PLAN FOR ESF MTL TESTS
1.2.3.12.4	3	LLNL	M0L257	07-apr-1995	05-apr-1995		2	STATUS REPORT ON M0L237
1.2.3.12.4	3	LLNL	M0L226	15-mar-1995	14-mar-1995		1	FRAME PRE-ASSEMBLY TEST
1.2.3.12.4	3	LLNL	M0L238	30-dec-1994	29-dec-1994		1	STATUS REPORT ON M0L226
1.2.3.12.4	3	LLNL	M0L247	15-nov-1994	14-nov-1994		1	NDE ON FIRST SECTOR OF FRAME
1.2.3.12.4	3	LLNL	M0L248	17-feb-1995	15-feb-1995		2	NDE ON A SECTOR FROM EACH MANU. OF FRAME SECTORS
1.2.3.12.4	3	LLNL	M0L249	15-mar-1995	14-mar-1995		1	NDE COMPLETION
1.2.3.12.4	3	LLNL	M0L251	01-mar-1995	01-mar-1995		0	COMPUTER ASSEMBLY
1.2.3.12.4	3	LLNL	M0L252	31-aug-1995	29-aug-1995		2	COMPLETE INTERNAL FRAME DESIGN
1.2.3.12.4	3	LLNL	M0L253	31-aug-1995	29-aug-1995		2	DESIGN INTERNAL STRUCTURE YEAR-END REPORT
1.2.3.12.4	3	LLNL	M0L254	01-dec-1994	01-dec-1994		0	COMPLETE ENVIRONMENT PROTECTION OF LARGE BLOCK
1.2.3.12.4	3	LLNL	M0L225	31-oct-1994	31-oct-1994	31-oct-1994	0	PRELIMINARY REPORT ON LARGE BLOCK TEST
1.2.3.12.4	3	LLNL	M0L243	31-aug-1995	31-aug-1995		0	PROGRESS REPORT ON SMALL BLOCK TESTS
1.2.3.12.4	3	LLNL	M0L255	17-apr-1995	14-apr-1995		3	STATUS REPORT ON M0L243
1.2.3.12.4	3	LLNL	M0L256	31-aug-1995	30-aug-1995		1	DATA ACQUISITION SYSTEM
1.2.3.12.4	3	REECO	HBT1	10-oct-1994	10-oct-1994		0	Anchor bolt design drawing
1.2.3.12.4	3	REECO	HBT2	30-oct-1994	30-oct-1994		0	Anchor bolt installation drawing & specification
1.2.3.12.4	3	REECO	HBT3	15-nov-1994	15-nov-1994		0	Anchor bolt grout procurement specification
1.2.3.12.4	3	REECO	HBT4	15-dec-1994	15-dec-1994		0	Scaffolding drawing and design
1.2.3.12.4	3	REECO	HBT5	15-jan-1995	15-jan-1995		0	Scaffolding procurement specification
1.2.3.12.5	3	LLNL	M0L126	31-aug-1995	28-sep-1995		-28	PROG RPT - DEVELOPMENT, COMPUTER MODELING MODULES
1.2.3.12.5	3	LLNL	M0L139	01-may-1995	29-may-1995		-28	STATUS REPORT ON M0L126
1.2.3.12.5	3	LLNL	M0L125	31-aug-1995	28-sep-1995		-28	ACTIVITY PLANS
1.2.3.12.5	3	LLNL	M0L140	01-mar-1995	28-mar-1995		-27	STATUS REPORT ON M0L125
1.2.3.12.5	3	LLNL	M0L235	31-mar-1995	01-may-1995		-31	RESOLVE STUDY PLAN COMMENTS
1.2.3.12.5	3	LLNL	M0L128	29-jun-1995	28-jun-1995		1	PRELIM RPT ON HISTORICAL ANALOGS

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WBS	Level	Parti- cipant	Code	Baseline Date	Planned Date	Actual Date	Slip (days)	Title
1.2.3.12.5	3	LLNL	MOL129	31-aug-1995	30-aug-1995		1	CONTINUOUS SWIPE TESTS IN THE ESF #1
1.2.3.12.5	3	LLNL	MOL130	03-feb-1995	30-jan-1995		4	STATUS REPORT ON MOL129
1.2.3.12.5	3	LLNL	MOL132	28-aug-1995	28-sep-1995		-31	RPT ON MATERIAL IDENT., CATEG., AND EVALUATION
1.2.3.12.5	3	LLNL	MOL151	28-oct-1994	25-nov-1994		-28	STATUS REPORT ON MOL132
1.2.3.13.1	3	SNL	461A11	30-jun-1995	30-jun-1995		0	DEVELOP SEALING SCIENTIFIC/DES. INTERFACE F/ACD
1.2.3.13.1	3	SNL	461M11	12-jan-1995	12-jan-1995		0	SEALING REQUIREMENTS AND ASSUMPTIONS INITIAL RPT
1.2.3.13.1	3	SNL	461M12	29-jun-1995	29-jun-1995		0	SEALING REQUIREMENTS AND ASSUMPTIONS FINAL RPT
1.2.3.13.1	3	SNL	461A21	03-feb-1995	03-feb-1995		0	COLLECT SITE CHAR. DATA FOR NR SEAL CON. DESIGN
1.2.3.13.1	3	SNL	461M21	03-feb-1995	03-feb-1995		0	SLTR, NORTH RAMP SEAL CONCEPTUAL DESIGN
1.2.3.13.2	3	SNL	462A11	31-mar-1995	31-mar-1995		0	PREP. FOR IN SITU TESTING OF SEALING COMPONENTS.
1.2.3.13.2	3	SNL	462M12	31-mar-1995	31-mar-1995		0	SLTR, NORTH RAMP SEAL CONCEPTUAL DESIGN
1.2.3.13.2	3	SNL	462A21	29-sep-1995	29-sep-1995		0	CONDUCT LAB TESTS ON CEMENTITIOUS SEALING MAT'S
1.2.3.13.2	3	SNL	462A22	29-sep-1995	29-sep-1995		0	CONDUCT LAB TESTS OF EARTHEN SEALING MATERIALS
1.2.3.13.2	3	SNL	462M21	01-sep-1995	01-sep-1995		0	COMPLETE LAB TESTS ON CEMENTITIOUS SEALING MAT'S
1.2.3.13.2	3	SNL	462M22	01-sep-1995	01-sep-1995		0	COMPLETE EARTHEN SEALING MATERIALS TESTS
1.2.3.13.2	3	SNL	462A31	29-sep-1995	29-sep-1995		0	PREP STUDY PLAN 1.12.2.1, SEAL MAT'S PROP'S DEV
1.2.3.13.2	3	SNL	462M31	01-sep-1995	01-sep-1995		0	SUBMIT DRAFT STUDY PLAN, SEALS MAT'S PROPS DEV

TABLE 6-2

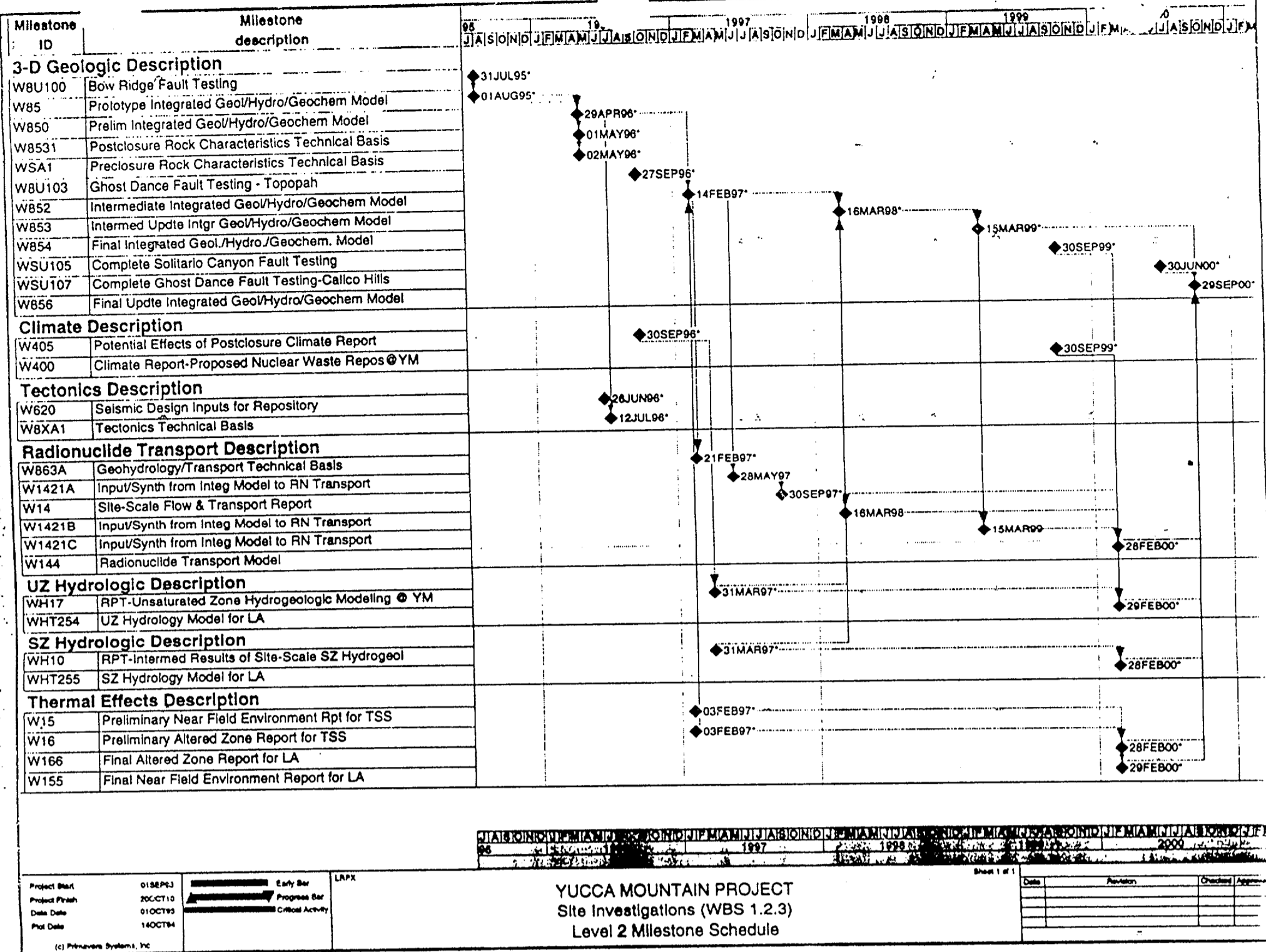


TABLE 7-1