DOE/RW-0247

Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program

November 1989

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

REASSESSMENT OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM

Report to the Congress by the Secretary of Energy

November 29, 1989

FOREWORD

In the Report of the House Committee on Appropriations (House Report No. 101-96) on the Energy and Water Development Appropriation Act, 1990 (P.L. 101-101), the Committee directed the Department of Energy (DOE) ". . . to submit a report within 60 days of enactment . . . which describes in detail how the Department plans to respond to the Committee's . . . concerns dealing with endemic schedule slips, problems in management structure, and lack of integrated contractor efforts."

This report has been prepared in response to the above-mentioned Congressional directive. It is based on a comprehensive review that the Secretary of Energy has recently completed of the Civilian Radioactive Waste Management Program. The Secretary's review has led to the development of a three-point action plan for restructuring the program. This plan is explained in this report.

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EXECUTIVE SUMMARY

The success of the Civilian Radioactive Waste Management Program of the U.S. Department of Energy (DOE) is critical to U.S. ability to manage and dispose of nuclear waste safely–and to the reestablishment of confidence in the nuclear energy option in the United States. The program must conform with all applicable standards and, in fact, set the example for a national policy on the safe disposal of radioactive waste.

The Secretary of Energy has recently completed an extensive review of the Civilian Radioactive Waste Management Program and concluded that it cannot be effectively executed in its current form. In response to Congressional concerns about schedule slips, management structure, and contractor efforts in the program, this report describes the results of that review and outlines actions the Secretary has taken and will take in the near future to restructure the program in order to get it moving forward again.

An important underlying premise of these Secretarial actions is that the program and supporting activities have a sound scientific basis. The intent is to develop and follow a solid, integrated plan based on a realistic assessment of the current situation.

Several months ago, the Secretary directed that a comprehensive review of the schedule for repository-related activities be performed. For the first time since the passage of the Nuclear Waste Policy Act, the program has put together a schedule based on a realistic assessment of activity durations and past experience. This schedule shows a significant slip for the expected start of repository operations–from the year 2003 to approximately 2010. In developing the revised schedule, the DOE was mindful that certain activities, such as the issuance of environmental permits by the State of Nevada and the Nuclear Regulatory Commission review of the license application, are outside the DOE's control.

One new emphasis of the program's efforts will be on completing an integrated array of near-term milestones directed at the scientific investigation of the potential site at Yucca Mountain in Nevada. Since a licensed geologic repository is a first-of-a-kind undertaking, the later dates in the schedule should be viewed as reasonable targets that represent the current estimate of activity durations. The DOE, however, pledges its best efforts toward meeting the near-term and later milestones consistent with its goals of safety and scientific excellence.

To promote the DOE's ability to achieve such milestones and goals, the Secretary is announcing the initiation of a three-point action plan. This plan centers on a

Yucca Mountain

1. Site access: An important prerequisite to new scientific investigations at Yucca Mountain is issuance of the required environmental permits by the State of Nevada. The DOE has attempted to work constructively and positively with the State over the past years, but the State government has been adamantly opposed to the program and has failed to provide environmental permits. While continuing efforts to resolve the current permitting impasse through direct negotiations, the DOE has requested the Department of Justice to initiate litigation to obtain the necessary permits.

2. Site suitability: The priority of the site-characterization activities at Yucca Mountain will be on scientific investigations of the suitability of the site. The DOE plans to take advantage of some early surface-based tests in advance of the ability to construct the exploratory shaft facility. The DOE continues to believe that an iterative scientific approach using both surface-based and underground tests, combined with continuing evaluation of the data as they relate to site suitability, is the efficient, cost-effective, and timely way to conduct the scientific investigations. The early emphasis on surface-based tests to examine the suitability of the site is responsive to suggestions from the State of Nevada and the Edison Electric Institute. The DOE is also carefully reviewing suggestions from the Nuclear Waste Technical Review Board and the Nuclear Regulatory Commission on the design of the exploratory-shaft facility prior to the beginning of major underground investigations. It should be noted that, if the site is found unsuitable at any time during characterization, the DOE will notify the State of Nevada and the Congress and will discontinue further scientific evaluation at Yucca Mountain.

3. Deferral of major site-specific design activities: Major activities related to the design of a repository at the Yucca Mountain site will be deferred until more information is available concerning the suitability of the site. This will conserve resources and allow the concentration of efforts on the scientific investigations.

Monitored retrievable storage

1. Linkages to the repository: The primary objective of the program is to develop a licensed geologic repository for the permanent disposal of spent fuel and high-level waste. The DOE has an obligation to accept spent fuel from the utilities in accordance with the Standard Contract for Disposal of Spent Nuclear Fuel/and or High-Level Radioactive Waste and the Nuclear Waste Policy Act as amended. However, a detailed examination of the repository schedule, allowing the time necessary for sound scientific investigation and design, shows that the DOE cannot

1. INTRODUCTION

1.1 Secretary's review of the program

The Secretary of Energy has recently completed an extensive review of the Civilian Radioactive Waste Management Program and has concluded that the program cannot be effectively executed in its present form. From this review it was apparent that the causes of delays are twofold. First, there are delays that result from extending the durations of site-characterization and repository-development activities. These delays are attributable to (1) underestimation by the DOE of the impact of regulatory requirements for quality assurance and design control on a repository schedule that was unrealistically ambitious and (2) the misperception that the program is simply a construction project rather than a first-of-its-kind scientific investigation. Second, there are critical delays in the start of new scientific investigations at the Yucca Mountain candidate site--delays attributable, in part, to an unwillingness on the part of the State of Nevada to allow the scientific investigations that are necessary to determine the suitability of the Yucca Mountain site.

The Secretary recognizes that the program is technically and institutionally unprecedented. In order to obtain a license for the repository, the DOE will have to design and implement an iterative program of scientific investigations, engineered-barrier designs, and performance assessments that will permit a determination whether the repository system--both the natural features of the site and the engineered barriers--will meet the standards promulgated by the Environmental Protection Agency and the technical criteria issued by the Nuclear Regulatory Commission (NRC) to implement those standards. The Secretary also recognizes that the program is not simply a construction project, but a scientific endeavor of critical significance to the Nation's ability to safely manage and dispose of nuclear waste, and to the reestablishment of confidence in the nuclear energy option in the United States. It is also important that the program provide a model for other nations as they work to meet their energy needs and solve their radioactive-waste-disposal problems. Consequently, the Secretary is committed to ensuring that scientific investigations be the focal point of the program to ensure that the results are technically sound and uncoupled from a scheduling process that constrains the time required for gathering sufficient information.

2. MANAGEMENT

2.1 Introduction

To manage the program mandated by the Nuclear Waste Policy Act, the Congress established, within the DOE, the Office of Civilian Radioactive Waste Management (OCRWM), whose Director is to be appointed by the President, by and with the advice and consent of the Senate.

The program has unique characteristics that affect its management structure, including the following:

- Requirements to obtain licenses from the Nuclear Regulatory Commission and to maintain a quality-assurance program that is acceptable to the Commission.
- Requirements to interface with Congressionally mandated technical review boards, offices, and commissions.
- Geoscience and performance-assessment capabilities necessary to meet the EPA and NRC requirements for the repository.
- Institutional issues involved in dealing with the affected States, local governments, Indian Tribes, and the public.
- Maintaining contractual relationships with the utilities.
- Responsibilities associated with the investment and management of the Nuclear Waste Fund.

As discussed below, steps have already been taken to establish an improved management structure and procedures.

2.2 New OCRWM Director

The Director of the OCRWM is responsible for carrying out the functions assigned to the Secretary of Energy under the Nuclear Waste Policy Act, as amended. The OCRWM has been headed by acting directors for the past 2 years. The appointment of an OCRWM Director is necessary not only for the management and direction of the program but also to expedite the initiatives resulting from the Secretary's review of the program.

2.5 Contractor support

Like many Federal agencies, the OCRWM relies on contractors to provide the services needed to carry out its technical functions. The functions that are performed by the OCRWM and the DOE Project Offices are the management functions that involve the exercise of discretionary authority, the development and implementation of policy, decisionmaking, and final value judgments regarding the development, execution, and evaluation of the program.

Examples of the services performed by OCRWM contractors are design and engineering; geologic, hydrologic, and geochemical investigations; the development and implementation of methods and techniques for assessing the safety and performance of the repository and other waste-management facilities; and facility construction, operation, maintenance, and testing. In addition, the OCRWM contracts for outside expertise, beyond that available within the organization itself, to support or improve program analysis, decisionmaking, management, and administration and to support or improve the operation of management systems. These various services are being provided by a variety of contractors, including the national laboratories.

Changes in the program, discussed in the next section, are expected to reduce near-term needs for contractor support in a variety of areas, such as the design of the exploratory-shaft facility needed for scientific investigations at Yucca Mountain, the designs of the repository and the waste package, and some field studies. In keeping with its general approach of adjusting contractor support to a level consistent with the schedule and available funding, the OCRWM initiated a review of its contracted work to identify the activities that could be deferred, canceled, or consolidated. The OCRWM is now analyzing the results to determine specific actions that could be taken to enhance cost effectiveness, integrate activities, and improve management oversight.

The contract review has prompted the following actions:

1. The number of contractors involved in performance assessment for the repository has been reduced from thirteen to eight.

2. A significant portion of the waste-package work previously assigned to the Chicago Operations Office has been transferred to, and consolidated with, waste-package work at the Yucca Mountain Project Office.

3. The geophysics and geohydrology research previously assigned to the Chicago Operations Office has been transferred to the Yucca Mountain Project Office.

and contractor staff, and qualification audits performed to determine ability to implement the required procedures. As a result, more than 1,000 persons working for eight major program participants have received the required training and are now working under an NRC-accepted program. When the remaining qualification audits are completed in August 1990, a quality-assurance program that has been fully qualified and approved by the NRC will be in place.

2.6.3 Establishment of baselines

The technical, cost, and schedule baselines are being established to define the criteria and objectives against which program performance and progress can be measured, thus facilitating effective program control. All reporting and performance measurement will be ultimately tied to the baselines. When potential impacts on the baselines are detected, a corrective action process will be initiated to remove or mitigate the problem. Alternatively, if the problem cannot be removed, the baseline will be modified to the extent necessary. However, any changes in the baselines can be effected only through a formal change-control procedure that involves a systematic review by the appropriate level of management to ensure that all primary and secondary effects of proposed changes are identified and weighed in the decisionmaking process.

The technical baseline, which is currently under revision, includes the functional and technical requirements at the program level. These requirements are being put into final form for issuance over the next several months. This will lead to the development of specifications and designs for system elements and subsystems, evaluations of the specifications and designs against the requirements, and the refinement of the requirements.

The reference program schedule is being formally baselined. This represents the first formal modification of the program schedule baseline since mid-1987. In the spring of 1990, the OCRWM will finalize a cost baseline to accompany the schedule baseline.

reevaluation are summarized in Figure 1. A more detailed schedule showing significant milestones up to the submittal of the license application is shown in Attachment 1. The near-term decision milestones on which the overall schedule is based are shown in Attachment 2; these milestones are being baselined, and strict management controls are being instituted to ensure adherence to them.

Schedule for the repository. The program review has led to the development of a realistic schedule that is based on past experience and the detailed information developed for the site characterization plan--information that led to a better understanding of the activities to be conducted during site characterization and how long they are likely to take.

Assumptions. The milestones in the schedule have been defined as rigorously as possible on the basis of current plans and currently available information, but it must be recognized that certain activities are beyond the DOE's control and, conversely, that for certain major long-term milestones the DOE may be able to use alternative strategies designed to accelerate the program. In the case of milestones beyond the DOE's control, reasonable assumptions were used. One such assumption was the date for obtaining the permits necessary for new scientific investigations to begin. It was assumed that these new scientific investigations would begin in January 1991. This date is optimistic because it assumes success in the options the DOE has decided to pursue to gain access to the site (see Section 3).

New focus. For the repository, a cornerstone of the schedule is a new focus on the early evaluation of the suitability of the Yucca Mountain site as suggested by the Edison Electric Institute and the State of Nevada. Instead of beginning site characterization with a total-system approach directed at evaluating the performance of engineered barriers as well as the site and based to a large extent on underground testing, this evaluation will focus first on certain particular features of the site that can be investigated through surface-based testing. The revised schedule recognizes, however, that the duration of the scientific investigations, especially the investigations conducted in the exploratory shafts and the underground testing facility, will be considerably longer than previously expected. As a result, the date for submitting the repository license application to the Nuclear Regulatory Commission is now shown as October 2001, a delay of nearly 7 years from the previously scheduled submittal

of January 1995, and the start of repository operations is delayed from the year 2003 to 2010.

Initiatives for schedule improvement. While the schedule identifies a substantial delay, the DOE remains committed to seeking ways to improve the schedule while satisfying all technical and regulatory requirements. With this objective in mind, the DOE has initiated a study of alternative strategies for compliance with the NRC requirements in 10 CFR Part 60 for a license application. Each alternative licensing strategy will include the following elements: (1) an approach to determining site suitability, (2) a general plan for licensing, and (3) priorities for testing to support the site-suitability determination. As viable and promising new strategy initiatives emerge from this study, they will be incorporated into the official program plan through the formal change-control procedure.

During the prelicensing phase, the DOE will continue to consult with industry and pursue interactions with the Nuclear Regulatory Commission and the Environmental Protection Agency that are consistent with the regulatory responsibilities and mission of each agency. These interactions are designed to reduce the number of unresolved issues remaining at the time of licensing, which should enhance confidence that the license application can be reviewed in 3 years, as called for in the Nuclear Waste Policy Act. In particular, the DOE will either initiate or encourage the regulatory agencies to begin rulemaking on those issues whose resolution before the licensing phase would enhance the schedule for licensing. For example, the DOE will soon petition the Commission to establish in 10 CFR Part 60 a guideline for the maximum radiation doses that are permissible for accidents occurring during repository operations.

Regarding interactions with the Environmental Protection Agency, the DOE is reviewing the drafts of the revised standards in 40 CFR Part 191, in order to identify any concerns that could undermine DOE's ability to develop a repository or MRS facility. The objective of these interactions during the prelicensing phase is to seek ways of resolving contentious licensing issues before the submittal of the license application.

Schedule for the MRS facility. As indicated in Figure 1, the reference schedule for the MRS facility assumes that (1) a site will be obtained through the efforts of the Nuclear Waste Negotiator and (2) the statutory linkages specified in the Nuclear Waste Policy Amendments Act between the MRS facility and the repository (see Section 4) are modified. Under these assumptions, it is estimated that waste acceptance at an MRS site could begin, on a limited basis, as early as January 1998; a full-capability MRS facility (i.e., a facility that would store spent fuel as necessary and stage spent-fuel shipments to the repository for final disposal), as recommended in the

3. SCIENTIFIC INVESTIGATION OF YUCCA MOUNTAIN

The DOE is committed to developing a geologic repository for spent fuel and high-level waste through a scientifically based, technically sound, and cost-effective program, and the development of the repository remains the focus of the Civilian Radioactive Waste Management Program. The difficulties facing the repository program therefore received particular attention during the Secretary's comprehensive program review.

The Secretary's review focused on management readiness to proceed with scientific investigations at the Yucca Mountain candidate site, including the implementation of a quality-assurance program that has been reviewed and accepted by the Nuclear Regulatory Commission; the OCRWM's understanding of the magnitude of the effort to be undertaken; and the views of the State of Nevada. As discussed in Section 2.7, the review led to the development of a revised schedule, including near-term decision milestones, and significant changes in the focus of the near-term program.

3.1 Site access

An important factor in the near-term plans for scientific investigations at Yucca Mountain is the unwillingness of the State of Nevada to process the DOE's applications for environmental permits in a manner consistent with the State's legal obligations. For instance, the DOE applied for air-quality permits (needed for surface-disturbing activities)in January 1988 and submitted additional information requested by the State of Nevada in February 1988. Despite State regulations requiring action within 75 days, the Nevada Division of Environmental Protection has yet to issue the DOE an air-quality permit or to provide an official denial of the DOE's application. Moreover, on November 1, 1989, the State Attorney General issued an opinion that the State had disapproved the site within the meaning of Section 115 of the Nuclear Waste Policy Act and that State agencies considering environmental permits should disregard DOE's applications.

The DOE is committed to reestablishing confidence in the program. Success in this effort will depend, in particular, on the commencement of the scientific investigations necessary to determine the suitability of Yucca Mountain as the site for the nation's first repository. While cooperation and direct negotiation with the State of Nevada is the preferred approach to expediting scientific investigations, the DOE will pursue all available options to facilitate the timely determination of site suitability. Among them is the option of litigation.

access, the shaft-construction method, and the need for additional drifts came from the Nuclear Waste Technical Review Board.

The new focus on surface-based testing is not meant to suggest that underground testing at the proposed repository depth is now deemed less important. On the contrary, as shown in Figure 1, the Secretary's evaluation has led to an extension of the schedule for in-situ testing, in accordance with the commitment to conduct a scientifically based and technically sound program. The Secretary believes that conducting both surface-based and underground tests, combined with continuing evaluation of the data as they are obtained, will allow a cost-effective and timely assessment of the site.

Recognizing that the Yucca Mountain candidate site could be found unsuitable, the DOE will also support the Negotiator in efforts to identify alternative volunteer repository sites.

3.3 Deferral of major site-specific design activities

Because of the change in the plans for scientific investigations at the Yucca Mountain candidate site and the extension of the schedule, major activities related to the design of a repository at the Yucca Mountain site and the waste package are being deferred. They will be resumed when more information is available concerning the suitability of the site. This approach will conserve resources and allow the DOE to concentrate efforts on scientific investigations.

early date; and (3) the opening of the repository were delayed considerably beyond its presently scheduled date of operation."

The MRS Review Commission recommended that the Congress authorize the construction of a Federal Emergency Storage facility with a capacity limit of 2,000 metric tons of uranium; authorize the construction of a User-Funded Interim Storage facility with a capacity limit of 5,000 metric tons of uranium; and reconsider the need for additional interim storage in the year 2000. Thus, the DOE and the MRS Review Commission agree as to the necessity for a facility that would provide storage before permanent geologic disposal, but they differ on the storage capacity required and the appropriate funding mechanism.

4.3 DOE's position on the MRS facility

The DOE testified to the MRS Commission on May 25, 1989, that it supports the development of an MRS facility as an integral part of the waste-management system because an integrated MRS facility is critical to achieving the goal of early and timely acceptance of spent fuel and because it would allow the DOE to better meet other strategic objectives, such as timely disposal, schedule confidence, and system flexibility. Though it considered a waste-management system with an MRS facility subject to the current statutory linkages superior to a system without an MRS facility, the DOE stated that a revision of the linkages and the statutory storage-capacity limit would allow the advantages of an MRS facility to be more fully realized. The DOE also expressed preference for an MRS facility sited through the efforts of the Negotiator, especially if these siting negotiations lead to modified linkages.

Schedule delays and the uncertainties inherent in the development of a geologic repository underscore the importance of an integrated MRS facility to the waste-management system. Such a facility could start operations as early as 1998 and is a key component in the DOE's strategy for building confidence in the program.

An integrated MRS facility would enhance confidence in the program for the following reasons: First, it can be developed rapidly because it will make maximum use of technologies that have been proved and because it has fewer licensing uncertainties than a geologic repository. Second, an MRS facility would demonstrate that the Federal Government is using all available means to ensure timely acceptance of spent fuel for disposal. Third, an MRS facility would also show that the Federal Government is able to safely accept, transport, and handle spent fuel early in the program. Fourth, an integrated MRS facility will allow an orderly transfer of spent fuel from reactor sites to the Federal waste-management system independent of the ability to emplace fuel in the repository.

because there is no assurance that the Negotiator will be successful and because of the importance of an integrated MRS facility to the waste-management system, the DOE must be prepared to proceed with MRS siting. The DOE will begin planning such a siting activity and be prepared for its implementation if necessary.

ACRONYMS AND ABBREVIATIONS USED IN ATTACHMENTS

BA	Biological assessment
BLM	Bureau of Land Management
DCP	Document change proposal
DEIS	Draft environmental impact statement
Doc.	Document
DOE	Department of Energy
DOJ	Department of Justice
EA	Environmental assessment
EIS	Environmental impact statement
ESAAB	Energy Systems Acquisition Advisory Board
ESF	Exploratory-shaft facility
FEIS	Final environmental impact statement
FWS	Fish and Wildlife Service
GC	General Counsel
HQ	Headquarters (DOE)
LA	License application
LAD	License-application design
LWT	Legal weight
MA	Office of Assistant Secretary for Management and Administration
MA-1	Assistant Secretary for Management and Administration
MOA	Memorandum of agreement
MRS	Monitored retrievable storage
MTU	Metric tons of uranium
NRC	Nuclear Regulatory Commission
NV	Nevada Operations Office, DOE
OCRWM	Office of Civilian Radioactive Waste Management
PCCB	Program Change Control Board
PDS	Project Decision Schedule
PECCB	Program Elements Change Control Board
PMS	Program Management System
Repos.	Repository
Rev.	Revision
ROD	Record of decision
RW-1	Director, Office of Civilian Radioactive Waste Management
S-1	Secretary of Energy
SBT	Surface-based testing
SEMP	Systems Engineering Management Plan
SFHB	Spent-fuel handling building
SRR	Site Recommendation Report

CHANGES IN THE DOE/OCRWM PROGRAM

"ASSESSMENT OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM"

- o REPORT TO CONGRESS BY THE SECRETARY OF ENERGY, NOVEMBER 29, 1989
- o RESPONSE TO THE APPROPRIATIONS COMMITTEE REPORT
- o BASED ON A COMPREHENSIVE PROGRAM REVIEW COMPLETED BY THE SECRETARY
- o CONTAINS THREE-POINT PLAN FOR A RESTRUCTURED OCRWM PROGRAM

DOE/RW-0247

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Office of Civilian Radioactive Waste Management

THREE POINTS OF THE PLAN

I. o MANAGEMENT STRUCTURE CHANGES

- NEW DIRECTOR
- DIRECT LINE REPORTING BY YMP
- INDEPENDENT MANAGEMENT REVIEW OF OCRWM ORGANIZATION
- CONSOLIDATION OF CONTRACTOR SUPPORT
- MANAGEMENT CONTROLS, i.e., TECHNICAL, COST, SCHEDULE BASELINES
- NUCLEAR WASTE NEGOTIATOR POSITION

II. o YUCCA MOUNTAIN CHANGES

- SITE ACCESS THROUGH LITIGATION AND THE NUCLEAR WASTE NEGOTIATOR TO OBTAIN PERMITS
- SITE SUITABILITY
  - -- SURFACE-BASED TESTING
  - -- NRC AND TRB SUGGESTIONS
- DEFERRAL OF REPOSITORY SITE SPECIFIC DESIGN

III. o MRS

- WORK WITH CONGRESS TO MODIFY LINKAGES
- CONTINUE STUDY OF MRS OPTIONS AND RECOMMENDATIONS OF MRS COMMISSION

OTHER KEY POINTS OF THE REPORT

- STATEMENTS ON UNIQUENESS OF PROGRAM, REGULATORY COMPLIANCE, SCIENTIFIC INVESTIGATION, AND THE NUCLEAR ENERGY OPTION
- REVISED DRAFT MISSION PLAN WILL BE ISSUED FOR COMMENTS BY JUNE 1990
- PROGRAM SCHEDULE IS BEING BASELINED
- TECHNICAL BASELINE IS UNDER REVISION
- FINAL COST BASELINE BY SPRING, 1990
- DISCUSSION OF:
  - SCHEDULE AND ASSUMPTIONS
  - SITE ACCESS/SUITABILITY
  - MRS ISSUES

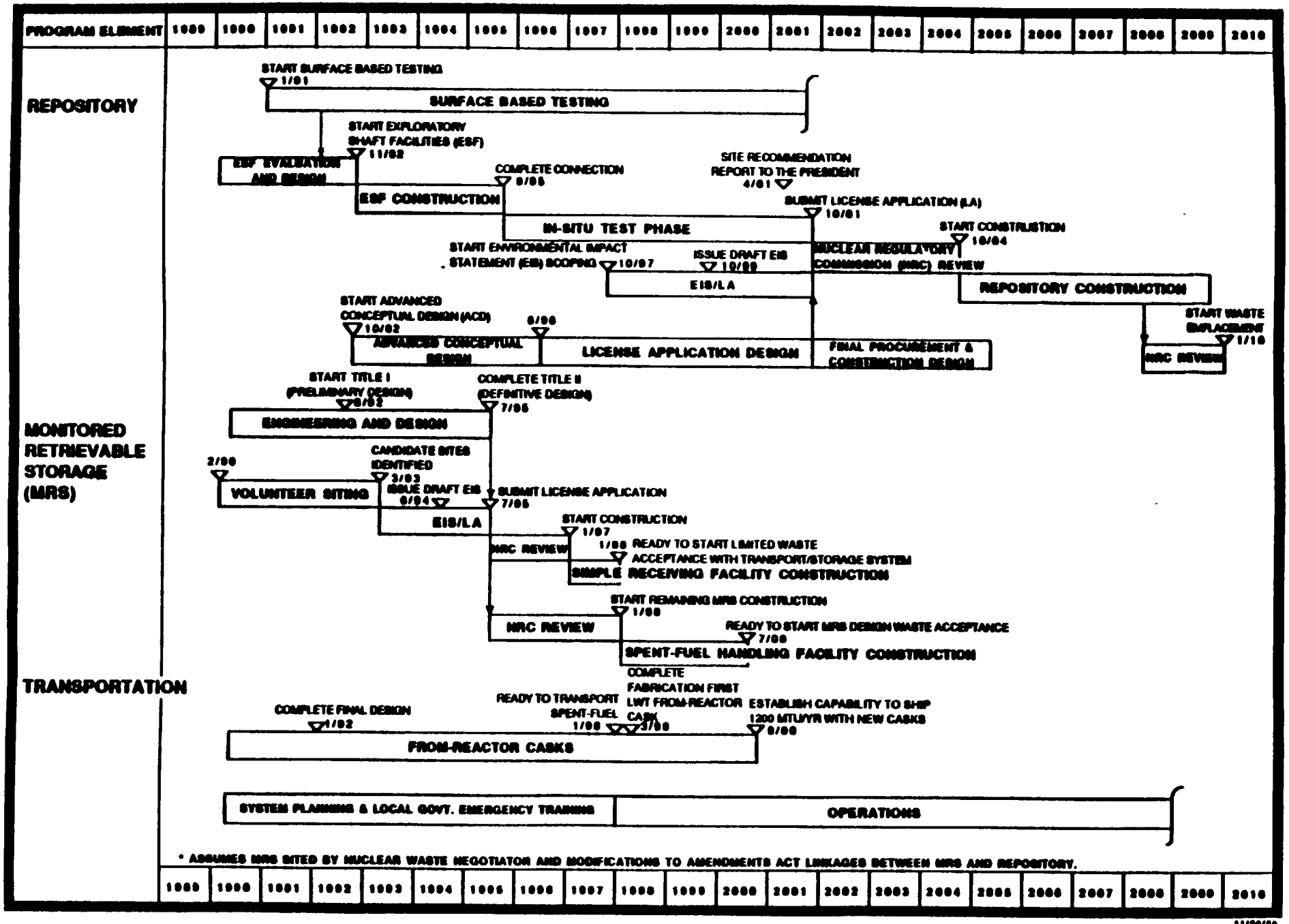


FIGURE 1. REFERENCE SCHEDULE FOR RESTRUCTURED PROGRAM *

STATUS OF DOE QA PROGRAM

	QA PROGRAM PLAN				QUALIFIED QA PROGRAM		
ORGANIZATION	DOE SUBMITS	NRC COMMENTS	DOE REVISES	NRC ACCEPTS	QUALIFICATION AUDITS	DOE ACCEPTS[4]	NRC ACCEPTS
OCRWM [1] [2]	AUG. 26, 1988 SEP. 16, 1988	SEP. 28, 1988 NOV. 3, 1988	NOV. 29, 1988 DEC. 21, 1988	MAY 8, 1989 MAY 2, 1989	JUL 1990	AUG 1990	NO
YMP	AUG. 15, 1988	OCT. 14, 1988	DEC. 13, 1988	DEC. 30, 1988	NA	NA	NA
YMPO	MAY 1990	NO	NO [3]	NO	JUN 1990	JUL 1990	NO
F&S	FEB. 21, 1989	MAR. 22, 1989	AUG. 11, 1989	OCT. 24, 1989	APR 10-14, '89 COMPLETE	PENDING	NO
H&N	MAR. 3, 1989	APR. 26, 1989	AUG. 11, 1989	OCT. 3, 1989	APR 24-26, '89 COMPLETE	PENDING	NO
SNL	APR. 14, 1989	JUN. 26, 1989	SEP. 7, 1989	OCT. 24, 1989	SEP. 11, 1989 COMPLETE	PENDING	NO
USGS	APR. 14, 1989	JUN. 20, 1989	SEP. 7, 1989	OCT. 24, 1989	AUG. 14, 1989 COMPLETE	PENDING	NO
REECo	FEB. 21, 1989	MAY 5, 1989	AUG. 11, 1989	OCT. 3, 1989	SEP. 25, 1989 COMPLETE	PENDING	NO
LLNL	MAR. 3, 1989	JUN. 19, 1989	SEP. 7, 1989	OCT. 24, 1989	JUN 5-9, 1989 COMPLETE	PENDING	NO
LANL	MAR. 15, 1989	JUL. 19, 1989	SEP. 29, 1989	NOV. 1, 1989	MAR 1990	APR 1990	NO

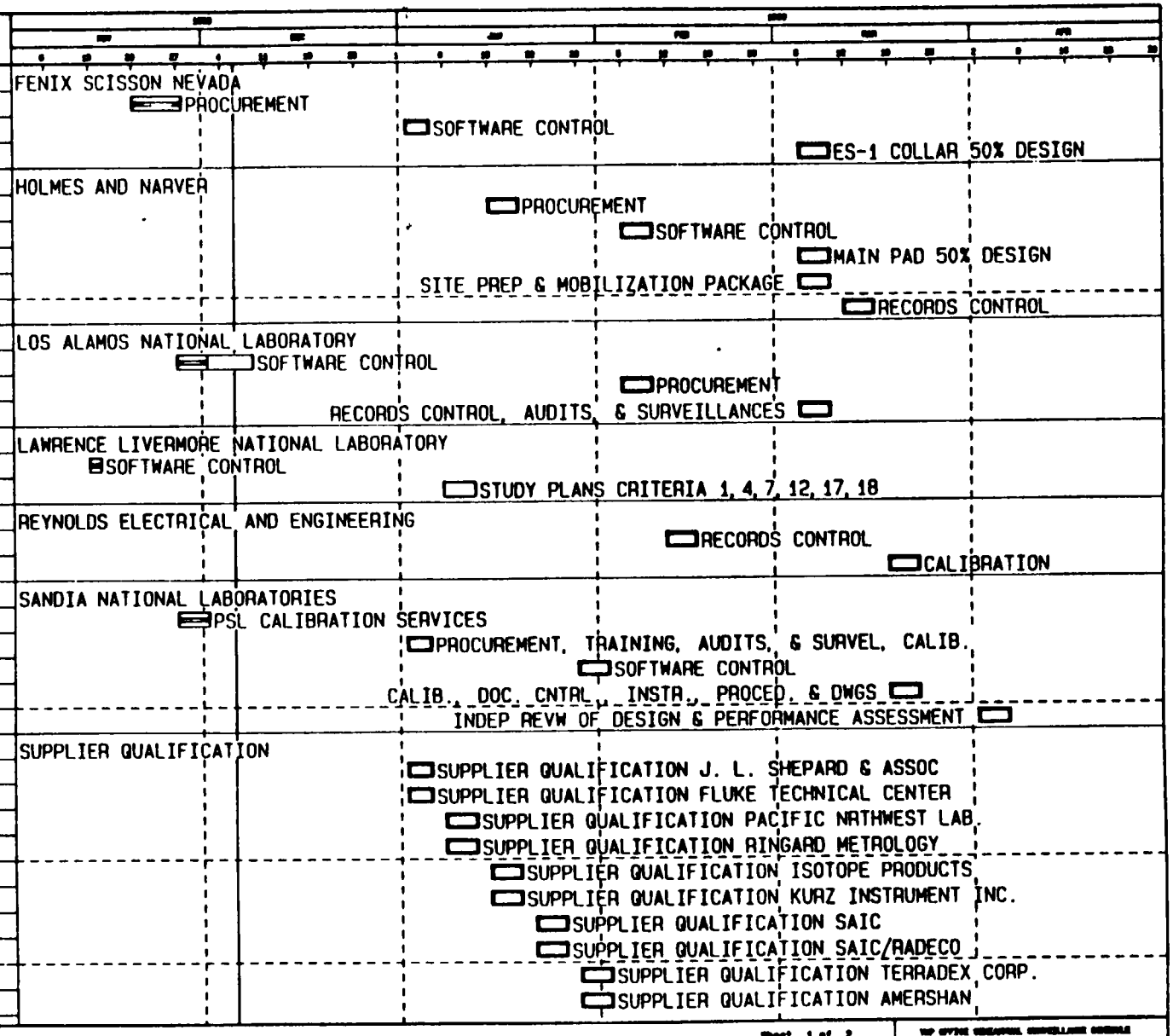
1) OARD 2) QAPD 3) 4 WEEKS AFTER RECEIPT OF NRC COMMENTS
4) BASED ON RECEIPT OF NRC OBSERVATIONS WITHIN 30 DAYS AFTER AUDIT

Attachment 4

FY-90 AUDIT SCHEDULE

ORG	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
LANL						●						
LLNL								●				
USGS									●			
SNL										●		
REECo											●	
H&N												●
FSN												●

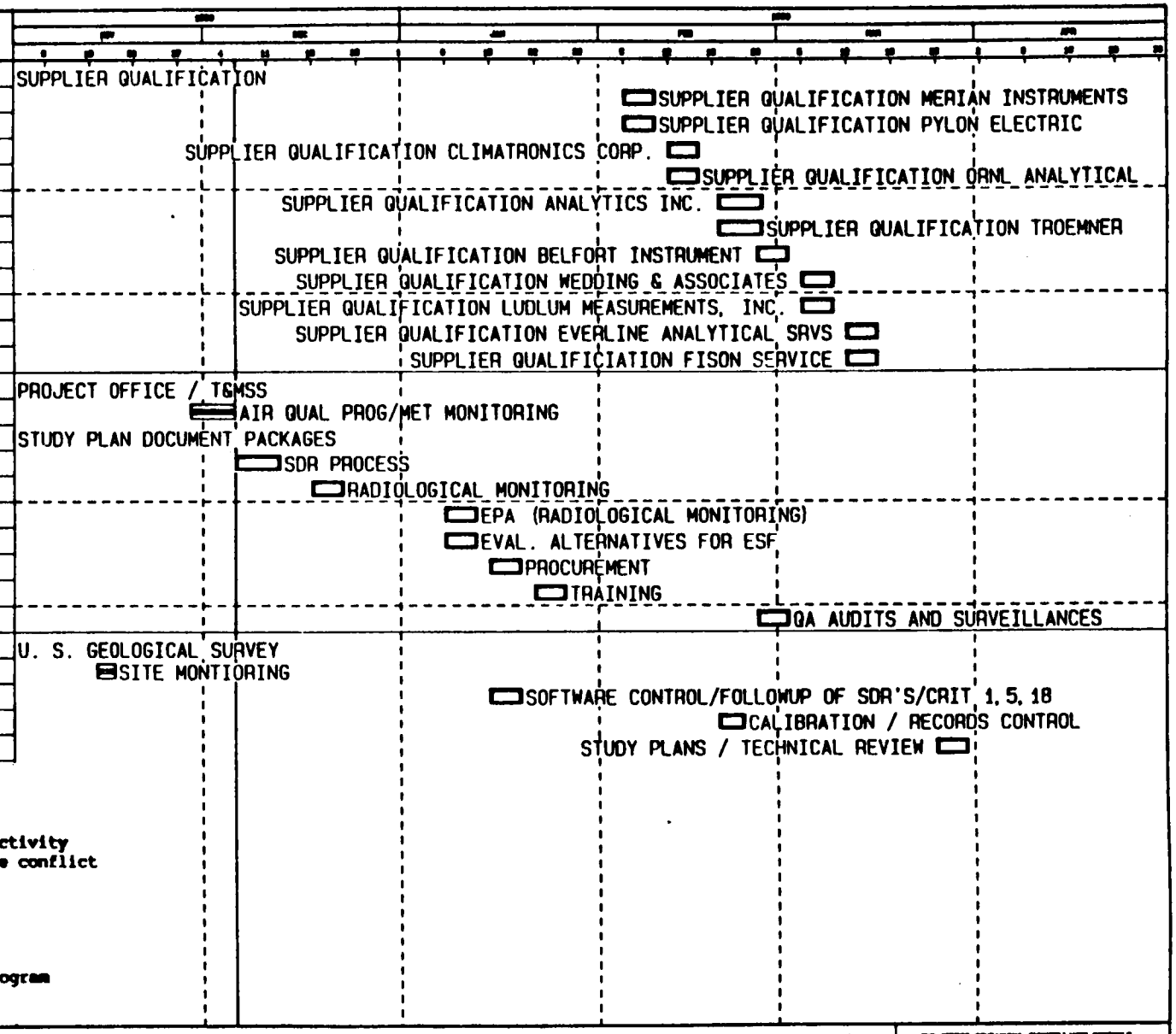
ACTIVITY ID		ORG	EARLY START	EARLY FINISH
FN02	o	FSN	20NOV89A	27NOV89A
FN04	o	FSN	2JAN90	5JAN90
FN06	o	FSN	5MAR90	9MAR90
HN06	o	H&N	15JAN90	19JAN90
HN08	o	H&N	5FEB90	9FEB90
HN02	o	H&N	5MAR90	9MAR90
HN04	* o	H&N	5MAR90	9MAR90
HN10	o	H&N	12MAR90	16MAR90
LA04	*			
LA02		LANL	27NOV89A	8DEC89
LA06	o	LANL	5FEB90	9FEB90
LA08	o	LANL	5MAR90	9MAR90
LL08		LLNL	13NOV89A	14NOV89A
LL04	* o	LLNL	8JAN90	12JAN90
RE02	o	REECO	12FEB90	16FEB90
RE04	o	REECO	19MAR90	23MAR90
SN10		SNL	27NOV89A	1DEC89A
SN06	o	SNL	2JAN90	5JAN90
SN04	o	SNL	29JAN90	2FEB90
SN08	o	SNL	19MAR90	23MAR90
SN02	* o	SNL	2APR90	6APR90
SQ1		SQ	2JAN90	5JAN90
SQ2		SQ	2JAN90	5JAN90
SQ3		SQ	8JAN90	12JAN90
SQ4		SQ	8JAN90	12JAN90
SQ5		SQ	15JAN90	19JAN90
SQ6		SQ	15JAN90	19JAN90
SQ7		SQ	22JAN90	26JAN90
SQ8		SQ	22JAN90	26JAN90
SQ10		SQ	29JAN90	2FEB90
SQ9		SQ	29JAN90	2FEB90



DEPARTMENT OF ENERGY
YUCCA MOUNTAIN PROJECT OFFICE
SEMIANNUAL SURVEILLANCE SCH W/ORG

Sheet 1 of 2

ACTIVITY ID		ORG	EARLY START	EARLY FINISH
SQ11		SQ	5FEB90	9FEB90
SQ12		SQ	5FEB90	9FEB90
SQ13		SQ	12FEB90	16FEB90
SQ14		SQ	12FEB90	16FEB90
SQ15		SQ	20FEB90	26FEB90
SQ16		SQ	20FEB90	26FEB90
SQ17		SQ	26FEB90	2MAR90
SQ18		SQ	5MAR90	9MAR90
SQ19		SQ	5MAR90	9MAR90
SQ20		SQ	12MAR90	16MAR90
SQ21		SQ	12MAR90	16MAR90
P004	*	T&MSS	29NOV89A	5DEC89A
P002		T&MSS		31OCT89A
P018		T&MSS	6DEC89	12DEC89
P008		T&MSS	18DEC89	22DEC89
P010		T&MSS	8JAN90	12JAN90
P016		T&MSS	8JAN90	12JAN90
P012		T&MSS	15JAN90	19JAN90
P014		T&MSS	22JAN90	26JAN90
P006		T&MSS	26FEB90	2MAR90
US02	o	USGS	14NOV89A	16NOV89A
US06	* o	USGS	15JAN90	19JAN90
US08	o	USGS	20FEB90	23FEB90
US10	o	USGS	26MAR90	30MAR90



*

RN04 Delayed due to slip in ESF schedule
LA04 Canceled due to indefinite delay in activity
LL04 Delayed due to Project Office schedule conflict
SN02 Delayed due to slip in ESF schedule
P004 Delayed due to logistics
US06 Scope of US04 combined with US06

o
Surveillance to verify implementation of program after Participant Gold Star Audit

DEPARTMENT OF ENERGY
YUCCA MOUNTAIN PROJECT OFFICE
SEMIANNUAL SURVEILLANCE SCH W/ORG

SUMMARY-YMP AUDIT 89-3 (SNL)

STANDARD DEFICIENCY REPORTS ISSUED
QUALITY ASSURANCE

ISSUED TO	CRITERIA										TOTAL ISSUED
SNL	1	2	3	4	5	8	10	12	16	17	
	1	1	2	2	2	2	1	1	1	1	14
YMP			1			1					2
											16

Attachment 5

SYNOPSIS OF SDR's ISSUED
AUDIT 89-3

- FAILURE TO SEND P.O. DOCUMENTS TO T&MSS QA.
- INADEQUATE STATEMENTS OF MINIMUM EDUCATION AND EXPERIENCE REQUIREMENTS.
- FAULTY IMPLEMENTATION OF PROCEDURES FOR AUDIT SCHEDULING.
- FAULTY IMPLEMENTATION OF PROCEDURES FOR CORRECTIVE ACTION DECISIONS.
- INADEQUATE IDENTIFICATION OF QA RECORDS.
- INADEQUATE CALIBRATION CERTIFICATIONS AND QA RECORDS.
- NO EVIDENCE OF QA REVIEW OF TECHNICAL PROCEDURES.
- CHECK AND INVENTORY OF SAMPLES LIBRARY NOT DONE.

SYNOPSIS OF SDR's ISSUED

AUDIT 89-3

(CONTINUED)

- INACCURATE CROSS REFERENCES IN THE INTERACTIVE GRAPHICS INFORMATION SYSTEM.
- QA APPROVAL OMITTED ON ONE OF 12 DESIGN INVESTIGATION MEMOS.
- LATE TRANSMITTAL OF SOME RECORDS TO THE LRC.
- QA LEVEL I PROCUREMENT DOCUMENTS FAIL TO HAVE (1) A "RIGHT OF ACCESS" CLAUSE AND (2) A NONCONFORMANCE REQUIREMENTS SECTION.
- YMPO DIRECTED WORK TO PROCEED WITH UNAPPROVED WORK PLANS.
- YMPO DID NOT ESTABLISH PROCEDURES FOR CONTROL OF QA LEVEL II DOCUMENT GENERATION. ALSO ASSUMPTIONS AND DATA QA LEVEL NOT STATED.

SYNOPSIS OF SDR's ISSUED

AUDIT 89-3

(CONTINUED)

- INADEQUATE DELINEATION OF THE QA ORGANIZATION.

- DATA USED FOR TWO PRODUCTS ASSIGNED QA LEVEL I WERE NOT IDENTIFIED BY SOURCE NOR QA LEVEL. ALSO THE WBS ELEMENT WAS MISSTATED IN THE RIB.

SUMMARY-YMP AUDIT 89-5 (REECo)

STANDARD DEFICIENCY REPORTS ISSUED
QUALITY ASSURANCE

ISSUED TO	CRITERIA						TOTAL ISSUED
	2	5	6	16	17	18	
REECo	1	1	1	1	1	1	6
YMP							0
							6

SYNOPSIS OF SDR's ISSUED
AUDIT 89-5

- POSITION DESCRIPTIONS DO NOT SPECIFY COMPONENTS OF "EQUIVALENT EXPERIENCE." ALSO MINIMUM REQUIREMENTS OF THE GENERAL MANAGER ARE NOT DEFINED.

- A CORRECTIVE ACTION REPORT WAS NOT WRITTEN WHEN CALLED FOR.

- TEN VIOLATIONS OF PROCEDURE FOR CRITERION 18.

- UNCOMPLETED IMPLEMENTING PROCEDURES FOR RECORDS MANAGEMENT.

- DISCOVERY OF FIVE RECORDS NOT APPROPRIATELY DESIGNATED AS QA RECORDS.

- INACCURATE MASTER LIST OF CONTROLLED DOCUMENTS. IMPLEMENTING PROCEDURES NOT APPROVED BY PQAM.

SUMMARY - YMP AUDIT 89-7 (LANL)

STANDARD DEFICIENCY REPORTS ISSUED

ISSUED TO	QUALITY ASSURANCE CRITERIA							TOTAL ISSUED
	1	2	3	6	15	16	18	
LANL	1	3	3	1	1	1	2	12
								12

SYNOPSIS OF STANDARD DEFICIENCY REPORTS ISSUED AUDIT 89-7

- RESPONSIBILITY AND AUTHORITY OF EACH SUBCONTRACTOR FOR INTERFACE CONTROLS NOT DOCUMENTED.
- EXPERIMENTS AND STUDIES CERTIFIED TO NON-EXISTENT PROCEDURES.
- QUALIFICATION RECORDS FILE OF INDIVIDUALS DID NOT SATISFY MINIMUM EDUCATION REQUIREMENTS OF POSITION DESCRIPTION.
- FUNCTIONAL REQUIREMENTS DOCUMENT CONTAINED NUMEROUS ERRORS AND INCONSISTENT STRUCTURE IN LOGIC ELEMENTS.
- NO DOCUMENTATION THAT STUDY PLANS SUBMITTED TO PROJECT OFFICE WERE TECHNICALLY REVIEWED FOR IMPACT TO LATEST REVIEW PROCEDURE.

SYNOPSIS OF STANDARD DEFICIENCY REPORTS ISSUED AUDIT 89-7

(CONTINUED)

- MANY DPs DO NOT ADDRESS ACCEPT/REJECT CRITERIA OR LIMITS.
- CONTROLLED MANUALS NOT UP-TO-DATE.
- NO DOCUMENTATION THAT A TREND REPORT ON NCRs HAS BEEN ISSUED.
- CARs ARE: MISSING IMPORTANT INFORMATION; BEING REVISED WITHOUT A PROCEDURE; AND NOT BEING TRENDED.
- AUDIT FOLLOW-UP NOT IN ACCORDANCE WITH PROCEDURE.
- AUDIT PLANS INCOMPLETE; AUDIT CHECKLISTS LACK DOCUMENTATION OF EVIDENCE REVIEWED.
- POSITION DESCRIPTIONS DO NOT IDENTIFY REQUIRED TRAINING AND/OR INDOCTRINATION.

SOFTWARE QUALITY ASSURANCE (SQA)

THE PREMISES

- QA MUST BE BUILT INTO A FINAL SOFTWARE PRODUCT COMMENCING WITH THE INITIAL INCEPTION AND CARRIED THROUGH THE ENTIRE "LIFE" OF THE SOFTWARE.

- QA IS BUILT INTO A SOFTWARE PRODUCT THROUGH AN ORGANIZED, STRUCTURED, DISCIPLINED, MANAGED, AND DOCUMENTED APPROACH TO SOFTWARE-PRODUCT DEVELOPMENT, ACQUISITION, OPERATION, AND MAINTENANCE.

THE OBJECTIVES OF SQA

- TO DEMONSTRATE AND DOCUMENT THE "FITNESS FOR USE" OF THE TOTAL SOFTWARE PRODUCT.

- TO ESTABLISH AND DOCUMENT THE LIMITS, CONSTRAINTS, AND RESTRICTIONS THAT DELIMIT THE DOMAIN OF "FITNESS FOR USE."

- PREPARE A USER'S MANUAL THAT ENABLES TECHNICALLY COMPETENT PERSONNEL TO APPLY THE SOFTWARE PRODUCT PROPERLY WITHIN ITS DOMAIN OF "FITNESS FOR USE."

U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN

YUCCA MOUNTAIN PROJECT

YMP-USGS SOFTWARE CLASSIFICATION SYSTEM

A. NATURE	B. IMPORTANCE	C. INTENDED APPLICATION
1. Developed Software: To be developed or currently being developed by YMP-USGS.	1. Critical Software: Intended to directly support repository design or licensing.	1. Scientific and Engineering Software (SES)
		2. Data Acquisition Software (DAS)
2. Acquired Software: To be obtained from sources external to YMP-USGS.	2. Ancillary Software: Applied to routine YMP-USGS site characterization activities.	3. Data Reduction Software (DRS)
		4. Database Management Systems (DBMS)
3. Existing Software: Operational software developed or acquired by YMP-USGS prior to effective data of QMP-3.03, R 1.	3. Supplemental Software: Scoping/bounding or feasibility studies that use a restricted or localized set of Yucca Mountain data.	5. Expert Systems Software (ESS)
		6. Standard Procedures Software (SPS)

SOFTWARE LIFECYCLE DOCUMENTATION

U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN PROJECT

SQA DOCUMENTS

CIRF - CONFIGURATION IDENTIFICATION REQUEST FORM

SRS - SOFTWARE REQUIREMENTS SPECIFICATION

SDD - SOFTWARE DESIGN DESCRIPTION

STS - SOFTWARE TEST SUMMARY

SSF - SOFTWARE SUMMARY FORM

SVR - SOFTWARE VERIFICATION REPORT

MVR - MODEL VALIDATION REPORT

SAS - SOFTWARE APPLICATION SUMMARY

SQA DOCUMENTS – CONTINUED

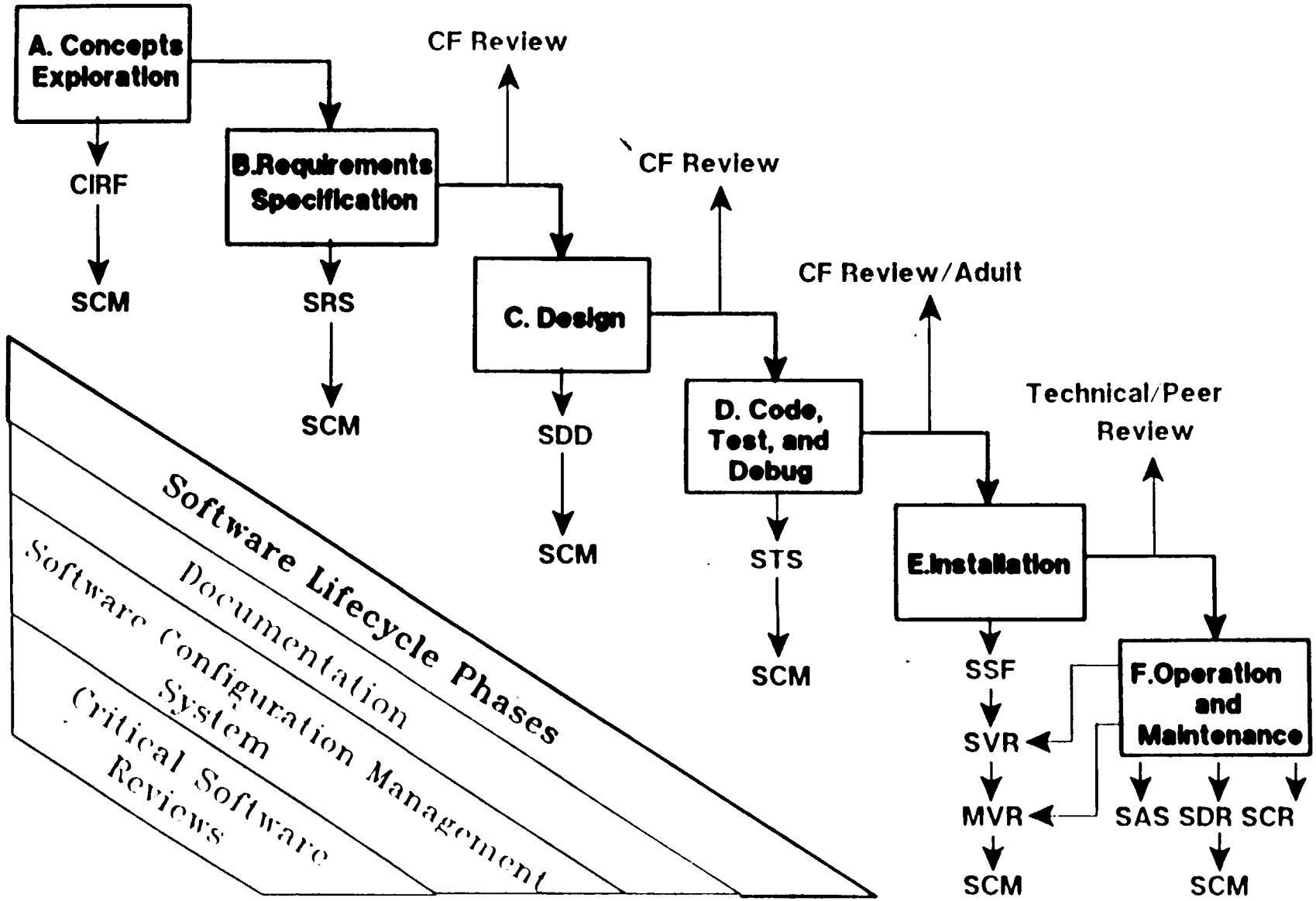
SDR – SOFTWARE DEFECT REPORT

SCR – SOFTWARE COMPLETION REPORT

SRP – SOFTWARE TECHNICAL/PEER REVIEW PLAN

SRR – SOFTWARE TECHNICAL/PEER REVIEW REPORT

YMP - USGS SOFTWARE LIFECYCLE IMPLEMENTATION



U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN

YUCCA MOUNTAIN PROJECT

YMP-USGS SOFTWARE QUALITY ASSURANCE

USER'S MANUAL

- TO BE BASED ON THE GUIDELINES PRESENTED IN NUREG-0856, ESPECIALLY FOR SES.

- MINIMUM CONTENT:

  - PROVIDE A DESCRIPTION OF ALL

    - MATHEMATICAL DERIVATIONS
    - ARITHMETIC ALGORITHMS
    - PHYSICAL MODELS
    - DATA MANIPULATIONS

    IMPLEMENTED BY THE SOFTWARE PRODUCT.

- SUMMARIZE THE
  - DEVELOPMENT
  - TESTING
  - REVIEWS

  OF THE SOFTWARE PRODUCT.

- PROVIDE SUFFICIENT INSTRUCTIONS THAT THE SOFTWARE PRODUCT CAN BE IMPLEMENTED AND ITS CORRECT OPERATION VERIFIED BY AN INDEPENDENT USER (E.G., THE NRC).

REVIEWS AND AUDITS

INTERNAL

- CONFIGURATION (CF) REVIEW: ENSURE THAT ALL APPROPRIATE SOFTWARE-LIFECYCLE DOCUMENTATION IS COMPLETE AND CONSISTENT.

- CONFIGURATION (CF) AUDIT: ENSURE THAT A SOFTWARE PRODUCT SATISFIES THE SPECIFIED FUNCTIONAL REQUIREMENTS.

EXTERNAL: SOFTWARE TECHNICAL/PEER REVIEW

- PERFORM INDEPENDENT TECHNICAL REVIEWS OF SOFTWARE PRODUCTS AND SUPPORTING DOCUMENTATION.

- CERTIFY THE ADEQUACY OF MODEL-VALIDATION ACTIVITIES.

U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN PROJECT

YMP-USGS SOFTWARE QUALITY ASSURANCE

SOFTWARE CONFIGURATION MANAGEMENT (SCM) SYSTEM

PURPOSE

- To IDENTIFY UNIQUELY
  - EACH VERSION OF A SOFTWARE PRODUCT
  - ALL DOCUMENTATION ASSOCIATED WITH EACH VERSION OF A SOFTWARE PRODUCT.
- To ENSURE SYSTEMATIC CONTROL OF CHANGES TO SOFTWARE PRODUCTS AND/OR THEIR SUPPORTING DOCUMENTATION.

PURPOSE

- To ensure the integrity and correct implementation of the YMP-USGS SQA program.

- To maintain a documented, traceable history of the development, acquisition, maintenance, and application of each uniquely identified version of a YMP-USGS software product.

PERSONNEL

- SQA Specialist: SCM System Manager
- SCM Librarian: Tracks codes and supporting documents

CONFIGURATION CONTROL COMMITTEE

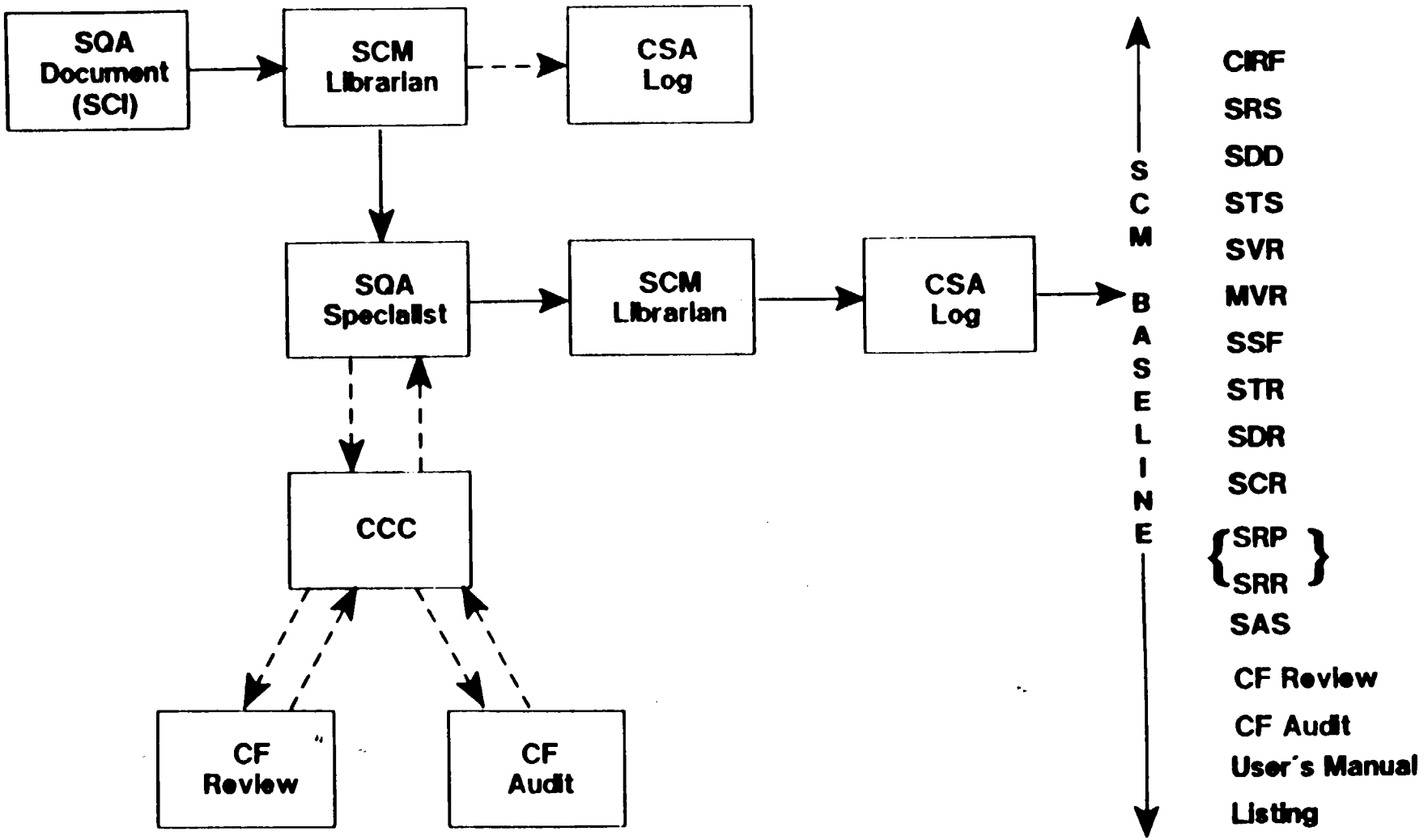
- **MEMBERS**
  - SQA SPECIALIST
  - SCM LIBRARIAN
  - USGS TECHNICAL PERSONNEL

- **FUNCTION**
  - REVIEW AND APPROVE SQA DOCUMENTS
  - CONDUCT INTERNAL REVIEWS AND AUDITS OF SOFTWARE PRODUCTS TO ENSURE COMPLIANCE WITH YMP-USGS SQA PROGRAM

CONFIGURATION STATUS ACCOUNTING (CSA) LOG

- A RECORD OF THE DEVELOPMENT/ACQUISITION, MAINTENANCE, AND APPLICATION OF YMP-USGS SOFTWARE PRODUCTS.

SOFTWARE CONFIGURATION MANAGEMENT SYSTEM



STATUS OF FEDERAL REGISTER NOTICE OF NEW SYSTEM OF RECORDS IN ACCORDANCE WITH PRIVACY ACT OF 1974

THE **FEDERAL REGISTER** NOTICE, WHICH SERVES AS NOTIFICATION TO ESTABLISH A NEW SYSTEM OF RECORDS FOR PURPOSE OF MAINTAINING QA QUALIFICATION AND TRAINING RECORDS OF OCRWM PROGRAM PARTICIPANTS, HAS ENTERED INTO THE FORMAL CONCURRENCE CYCLE WITHIN THE DEPARTMENT OF ENERGY.

THE DOCUMENT HAS RECEIVED CONCURRENCES OF THE OCRWM SENIOR MANAGEMENT AND THE OFFICES OF NUCLEAR ENERGY (NE) AND DEFENSE PROGRAMS (DP). SOME ADDITIONAL LANGUAGE, BASED ON SUGGESTIONS OF NE AND DP, ARE BEING INCORPORATED INTO NOTICE PRIOR TO ITS SUBMISSION TO THE OFFICES OF MANAGEMENT AND ADMINISTRATION (MA) AND GENERAL COUNSEL (GC).

ONCE **FEDERAL REGISTER** NOTICE HAS RECEIVED CONCURRENCES AND APPROVAL BY MA AND GC, THE NOTICE IS FORWARDED TO THE CONGRESS AND PUBLISHED IN THE **FEDERAL REGISTER** AS MANDATED BY THE ACT.

Attachment 7

Quality Assurance Open Items--12/13/89

Please Note: With respect to numerical listing of items: where present DOE and the 9/7/89 NRC listing agree there is one number; where the present DOE and the 9/7/89 NRC listing are not in numerical agreement the NRC number is listed in parentheses just below the DOE number.

	Item	Response
1	QA-C-2, NRC Item 3	CLOSED CDSCP comment responses were addressed in a letter dated 12/28/88, from S. Rousso to H. Thompson which identified that the NRC comments on the CDSCP were addressed by incorporation of information into the SCP. This was superseded by NRC staff comments on SCP, dated July 31, 1989. DOE agrees that this item is closed.
2	QA-F-1, QA-F-2, QA-F-3 (Transmit Defense related QA documents to the NRC)	OPEN Letter sent from DOE dated 8/9/88 from R. Stein related QA documents to J. Youngblood transmitting OGR/B-14. However, responses to NRC comments on OGR/B-14 will not be direct, as they have been overtaken by other events. During the 9/7/89 NRC/DOE QA meeting, DOE informed the NRC that DOE will be revising the QAR to incorporate OGR/B-14 into the overall OCRWM QA program. NRC comments on OGR/B-14 will be considered and reflected in the revisions to the QAR. DOE plans to transmit other Defense Waste QA Plans as they become available. DOE will be developing a draft position on OCRWM/NRC overview/verification activities. Development of a Memorandum of Understanding (MOU) among DOE-RW, NE, and DP is in question, as the idea of an MOU has not yet been settled among the 3 DOE offices.

3	QA-G-1, 1a, 1d (continuing)	CLOSED Responses to NRC audit observation concerns for: YMP audits 88-01, 88-02, 88-03, were transmitted by letter dated 12/29/88, from G. Appel to J. Linehan. YMP audits 88-04, 88-05, 88-06, 88-07, 88-08 and 1986 PNL and USGS audits transmitted by letter dated 4/10/89, from G. Appel to J. Linehan. YMP audit 89-01 (H&N) transmitted by letter dated 6/15/89, from G. Appel to J. Linehan. YMP audit 89-02 (F&S) transmitted by letter dated 6/16/89, from G. Appel to J. Linehan. NRC has added more recent audit observations to this open item. DOE believes it would be more appropriate to close these items associated with completion of the calendar 1988 items and to do the following: (1) - Note the continuing DOE commitment to respond within 30 days after the receipt of an NRC Observation Audit Report. (2) - List the 1989 and later observation reports as individual, new QA open items when 30 days have passed.
4	QA-B-2, 3, 4, 5 and 6 NRC Item 8 (Submit OCRWM QA Plan for NRC for review)	CLOSED QAR rev. 1 sent to NRC on 11/29/88, QAPD rev. 1 sent to NRC on 12/21/88, by letter from L. Barrett to B. J. Youngblood. NRC forwarded the safety evaluation to DOE by letter from J. Linehan to R. Stein on 5/2/89.

5	NRC Items 9 and 11 (Address NRC concerns on Q-List for the exploratory shaft)	OPEN An ESF Meeting was held 7/18-19/88 and a ESF Surveillance of Title II Design was conducted during March, 1989. DOE agrees that there are unresolved QA issues related to Q-List for the ESF and ESF conceptual design.
6	NRC Item 7 (Address control of core at NNWSI)	OPEN Action pending DOE evaluation of Core Handling Procedures development.
7	QA-A-1, QA-B-1d, QA-G-3, QA-G-4 QA-G-5 (Attachment to meeting minutes)	OPEN The process and schedule for establishing a NRC Item 1 qualified DOE QA program, prior to new site characterization activities was reaffirmed at the July 11, 1989 DOE/NRC meeting on Quality Assurance. Also noted was DOE approval and NRC review/acceptance of the plans, and DOE qualification audits.
7a (8)	QA-G-6a (Distribution of Corrective Action Responses to NRC)	CLOSED DOE agrees that this item was closed by discussion and agreement of distribution of Corrective Action Responses to NRC staff.
(9)	NRC Item 1 * (Definitions for conceptual Title I, Title II, and Title III)	OPEN NRCs listing indicates that DOE is to provide definitions for different types of designs.

8 (10)	QA-B-1c (Request from DOE to obtain documents related to NRC inspection and readiness review programs)	CLOSED Letter sent from DOE dated 1/23/89, from G. Appel to J. Linehan requesting specified documents from NRC. NRC provided the requested documents in a letter from J. Linehan to R. Stein dated 3/14/89. DOE is reviewing these documents for applicability to the OCRWM program.
9 (11)	NRC Item 10 (Attachment to meeting minutes)	CLOSED Letter sent from DOE dated 12/28/88, from R. Stein to J. Youngblood which transmitted the DOE-RL response on rights of access between PNL and LLNL. NRC indicated acceptance in a letter from J. Linehan to R. Stein, dated 6/2/89.
10 (7, 12)	QA-B-1d	OPEN The issue of YMPO's authority was addressed in NNWSI-88-9 and program participants QAPPs. DOE continues to provide information concerning YMP's authority over project participants for NRC acceptance of the DOE qualified QA program.
11 (13)	QA-B-10	CLOSED The transmittal of LANL QA Program Plan (QAPP) on 3/10/89, addressed NRC comments on the QA Plan. YMP responses to further NRC comments on the LANL QA Plan were sent to NRC 10/2/89, by letter from R. Stein to J. Linehan.

12 (14)	NRC Items 1 and 2 and, QA-C-1	CLOSED A Letter sent from DOE dated 1/23/89, from G. Appel to J. Linehan transmitted the YMPO SCP Management Plan and Study Plan Preparation Procedure. The NRC staff has reviewed the information and did not identify any problems. NRC closure confirmed by NRC handout at 9/7/89 QA Meeting "Status of DOE QA Open Items".
13 (15)	QA-E-2 and QA-E-3 * (Transmit explanation of approach to experiments on rock mechanics)	CLOSED Letter sent from DOE dated 12/29/88, from G. Appel to J. Linehan which transmitted the document "Approach to Experiment Planning Data Management". NRC transmitted comments to the DOE on 5/31/89.

* NOTE: QA-E-3 was not included with NRC item # 15.

14 (16)	QA-G-2 (Send corrective actions for LANL audit)	CLOSED Letter sent from DOE dated 12/29/88, from G. Appel to J. Linehan which transmitted first monthly report of corrective actions for LANL QA program. Letters dated 3/3/89 and 4/13/89, from Appel to Linehan transmitted 2nd, 3rd, and 4th monthly corrective action status reports. A fifth monthly corrective action status report was transmitted by letter dated 4/28/89, from R. Stein to J. Linehan. Final letter sent from DOE dated 8/15/89, from G. Appel to J. Linehan which transmitted YMP Surveillance of LANL, completing the verification of corrective actions necessary to close the CARs. DOE actions are closed for this item, pending receipt of an NRC response.

15 (17)	QA-G-8 (Provide a list of YMP contractors identifying scopes of work, contractual relationship and work that is important to safety or waste isolation)	CLOSED Letter sent from DOE to NRC dated 6/23/89, transmitted the list of YMP contractors and their scopes of work. NRC closure confirmed by NRC handout 9/7/89 QA Meeting "Status of DOE QA Open Items".
16 (18)	QA-G-8 (Provide a list of OCRWM contractors identifying scopes of work, contractual relationship and work that is important to safety or waste isolation)	CLOSED A letter sent from DOE dated 1/23/89 from G. Appel to J. Linehan which pointed out the section of the QAPD that contained the information on OCRWM's contractors.
17 (19)	NRC Item 2 (YMP QA Training for its contractor personnel)	CLOSED A letter sent from DOE dated 12/29/88 from G. Appel to J. Linehan transmitted YMP's Training Management Plan. DOE was advised that the plan was acceptable in a letter from J. Linehan to R. Stein dated 3/14/89.
18 (20)	QA-A-2, QA-A-3, QA-B-1a, 1b, 1d5, 1d12, and QA-G-12) (Consistency of OCRWM QA program with 88-9 QA Plan)	CLOSED The revision 1 to the QAR and the QAPD were sent to the NRC on 11/29/88 and 12/21/88 respectively. NRC staff reviewed and accepted the QAPD (5/2/89) and the QARD (5/8/89).
19 (21)	NRC Item 11 (Attachment to meeting minutes) (Address concerns regarding DOE-RL pre-audit training)	CLOSED A letter sent from DOE dated 12/28/88 from R. Stein to J. Youngblood transmitted the DOE-RL response regarding adequate pre-audit training.

20	NRC Item 13 (22) (Attachment to meeting minutes) (provide response to concerns regarding access to personnel qualifications)	OPEN RW-3 is working with General Council and personnel managers to initiate a mutually acceptable system and not be in violation of the Privacy Act. DOE provided a status of access to personnel qualifications at the 5/9/89 QA Review meeting and will provide updates at future meetings.
21	QA-E-1 (23) (Qualification of existing data)	OPEN DOE has prepared a procedure to address the qualification of existing data (AP 5.9Q). This procedure is currently being reviewed by OCRWM HQ prior to submittal to NRC.
22	SCA Comments (24)	OPEN DOE is to provide response to the NRC QA SCA Comments.

STATUS OF DEPARTMENT OF ENERGY QUALITY ASSURANCE OPEN ITEMS

During the past six years, the DHLWM staff has identified quality assurance (QA) concerns needing resolution between DOE and NRC. In the July 7, 1988 meeting between DOE and NRC, 130 open items from the previous five years were reviewed and discussed. During this meeting, DOE and NRC decided to close or close with commitments all but 11 of these open items. These 11 items are documented in the meeting minutes of July 7-8, 1988, meeting between the DOE and NRC. The status of these open items, and the items that were closed with commitments during the July 7-8, 1988 meeting, was discussed during the July 11, 1989, meeting between the DOE and NRC. An updated status of each of these is provided in the attached. Item 12 has been added to the list since the July 11, 1989 meeting.

STATUS OF DOE QA OPEN ITEMS

ITEM		DESCRIPTION	STATUS	RECOMMENDATION FOR CLOSURE/REMARKS
1.	(i) QA-F-1 (ii) QA-F-2 (iii) QA-F-3	DOE Waste Glass QA Program	Open	9/9/89 QA Meeting - DOE indicated that QA requirements for waste form production would be incorporated into Rev. 2 of the QAR document. NRC comments on OGR B-14 would be addressed in the new revision, and OGR B-14 would be superseded. Schedule for submitting QAR, Rev. 2 to the NRC for acceptance was to have been 11/1/89. To date, the NRC staff has received neither QAR, Rev. 2 nor the milestones/schedules for the qualification of glass producers' programs.
2.	NRC Items 9 and 11	ESF Q-List and QA Measures	Open	DOE should meet with NRC to discuss and resolve concerns related to Q-List for the ESF and ESF conceptual design.
3.	NRC Item 7	NNWSI Core Handling Procedures	Open	DOE submitted the Core Handling Procedures to the NRC staff in a 8/11/89 transmittal (Gertz to Stein). The issues raised in the YMP QA Surveillance Report (YMP-SR-89-134) will need to be resolved before this item can be closed. NRC will determine acceptability of implementation and adequacy of procedures in a forthcoming audit of the Sample Management Facility.
4.	QA-A-1 QA-B-1d (1) QA-G-3 QA-G-4 QA-G-5	Qualified QA Program before start of new site characterization activities	Open	DOE has made a commitment to having a qualified QA Program before the start of new site characterization activities. However, these items remain open up until the NRC staff accepts the DOE QA Program as qualified for the start of new site characterization activities.

STATUS OF DOE QA OPEN ITEMS

ITEM	DESCRIPTION	STATUS	RECOMMENDATION FOR CLOSURE/REMARKS
5. NRC Item 1 from Enclosure 6 of July 7, 1988 minutes	Definitions for conceptual, Title I, Title II, and Title III	Open	DOE should provide definitions for different types of designs.
6. QA-B-1d (14)	Explanation of YMP's QA Authority over Project Participants	Closed	The NRC staff has evaluated and accepted the 88-9 QA Plan and the QAPPs of the Project Participants. There are sufficient programmatic controls within these program descriptions adequately explaining YMP's QA authority and inteface with the Project Participants.
7. QA-G-2	Corrective Action for LANL Audit	Closed (After July 11, 1989 meeting with DOE)	Status Reports sent to NRC on March 3, 1989, April 13, 1989 and April 28, 1989. Final DOE close out of LANL audit open item received in letters from G. Appel to J. Linehan dated August 15, 1989 and November 1, 1989. NRC reviewed corrective actions during subsequent audits of LANL.
8. NRC Item 13	Access to Project Participants Personnel Qualification files for NRC-DOE	Open	DOE is working with General Counsel and Personnel Managers to initiate mutually acceptable system.
9. QA-E-1	Qualification of Existing Data	Open	DOE should provide the NRC with a procedure for qualifying existing data. This procedure should follow NRC's GTP on Qualification of Existing Data.
10.	SCA comments	Open	DOE should provide a response to the July 31, 1989 NRC SCA comments on the DOE SCP.

STATUS OF DOE QA OPEN ITEMS

ITEM	DESCRIPTION	STATUS	RECOMMENDATION FOR CLOSURE/REMARKS
11.	DOE response (Stein to Youngblood dated 12/28/88) to 7 NRC concerns for DOE Audit 88-01 of Pacific Northwest Laboratory - Material Characterization Center	Open	NRC letter (Linehan to Stein dated 6/2/89) lists open items DOE needs to respond to.
12. QA-G-1; a and d	Response to NRC Observation of DOE QA Audits		DOE should respond within 30 days after the NRC Observation Audit Report transmittal. These DOE responses are to be reviewed and considered by NRC staff in accepting DOE QA Program. DOE is to respond for the observation reports from the following Yucca Mountain Project Office Audits:
12a.	Holmes & Narver Audit S89-1, 11/1/88-11/4/88	Open	3 observations in NRC Observation Audit Report (Linehan to Stein dated 1/23/89).
12b.	Holmes & Narver Audit 89-2, 4/24/89-4/28/89	Open	7 observations in NRC Observation Audit Report (Linehan to Stein dated 7/31/89).
12c.	Sandia National Laboratory Audit 89-3, 9/11/89-9/15/89	Open	3 NRC staff findings from the 7/88 audit not considered in 89-3 audit (NRC Observation Report, Linehan to Stein dated 11/8/89).

U.S. Department of Energy

Washington, D.C.

Attachment 10

DOE 4700.1

3-6-87

SUBJECT: PROJECT MANAGEMENT SYSTEM

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1. PURPOSE. To establish the Department of Energy (DOE) project management system and provide implementing instructions, formats, and procedures, and to set forth the principles and requirements which govern the development, approval, and execution of DOE's outlay program acquisitions as embodied in the project management system (PMS).

2. CANCELLATIONS.

   a. DOE 4210.2, BUSINESS STRATEGY GROUPS, of 4-10-79.

   b. DOE 5700.1C, MAJOR SYSTEM ACQUISITION, of 9-6-83.

   c. DOE 5700.3B, MAJOR SYSTEM ACQUISITION PROCEDURES, of 9-8-83.

   d. DOE 5700.4A, PROJECT MANAGEMENT SYSTEM, of 11-17-83.

   e. DOE 6410.1, MANAGEMENT OF CONSTRUCTION PROJECTS, of 5-26-83.

3. SCOPE. The provisions of this Order apply to all Departmental Elements and contractors performing work for the Department as provided by law and/or contract and as implemented by the appropriate contracting officer.

4. REFERENCES. See Attachment 1.

5. POLICY.

   a. It is Departmental policy to manage all projects in accordance with this Order. The chapters of this Order provide instructions, formats, and procedures to implement the project management system.

   b. The Order applies to the Assistant Secretary for Defense Programs to the extent practicable. Where these programs are conducted in response to the mission needs of the Department of Defense and work is accomplished on a classified basis in Government-owned facilities, the procedures followed will be tailored accordingly.

   c. Formality and documentation requirements will be significantly greater for major system acquisitions (MSA) and major projects, but this fact does not

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94. SYSTEM. A collection of interdependent equipment and procedures assembled and integrated to perform a well-defined purpose. It is an assembly of procedures, processes, methods, routines, or techniques united by some form of regulated interaction to form an organized whole.

95. TECHNICAL BASELINE. A configuration identification document or a set of such documents formally designated and approved at a specific time. (The time need not be the same for each document in the set.) Technical baselines, plus approved changes to those baselines, constitute the current configuration identification.

96. TECHNICAL DIRECTION. The monitoring or surveillance of the scientific, engineering, and other technical aspects of a work program, as distinguished from the administrative and business management aspects.

97. TECHNOLOGY. A demonstration by experiment of the technical feasibility of alternative inventive concepts. This category may concern itself with processes, components, equipment, subsystems, or initial system prototype, and may encompass: experimental exploitation and refinement of a known phenomenon; demonstration of the acceptability of the technical and operational characteristics of one or more specific concepts; and preliminary system studies responsive to a particular problem including system analysis, tradeoff, preliminary cost/benefit studies, and planning and programming studies.

98. TECHNOLOGY BASE. The equipment and facilities produced for, and the accumulated results and skills produced by, the conduct of basic research, applied research and technology development.

99. TECHNOLOGY OR EXPLORATORY DEVELOPMENT. The systematic application of knowledge from research toward proof of technology, including development of nonspecific application prototypes and processes.

100. TITLE I DESIGN ESTIMATES. Prepared upon completion of Title I design. Through use of plant engineering and design funds, Title I may be completed prior to inclusion of the project in the budget. If this should occur, the Title I design estimate becomes synonymous with the budget estimate.

101. TITLE I DESIGN SUMMARY. An overview and record document of preliminary engineering and project management planning, reflecting completed Title I design and usually prepared under architect-engineer services or by the operating contractor. Title II design estimates are developed for each project by the designer as part of the Title I design summary. The estimates, since they are based on the definitive design, are the most accurate and have the highest confidence level of any estimate.

102. TITLE II DESIGN. Continues the development of the project based on approved preliminary design (Title I). Definitive design includes any revisions required of the Title I effort; preparation of final working drawings, specifications, bidding documents, cost estimates, and coordination with all parties which might affect the project; development of firm construction and procurement schedules; and assistance in analyzing proposals or bids. For a detailed description of the services provided during definitive design, see DEAR 936.605c and DEAR 952.236.70.

103. TITLE III SERVICES. Those activities required to assure that the project is constructed in accordance with the plans and specifications (e.g., construction inspection), and that the quality of materials and workmanship is consistent with the requirements of the project (e.g., materials testing). (See DEAR 936.605c for additional details.)

104. TOTAL ESTIMATED COSTS. The costs of the project, including the costs of land and land rights, engineering, design and inspection costs, direct and indirect construction costs, and initial equipment necessary to place the plant or installation in operation whether funded out of operating or plant and capital equipment appropriations.

105. TOTAL PROJECT COST. All generic research and development, operating costs associated with Test and Evaluation, and plant and capital equipment costs specifically associated with a project. It is the sum of the total estimated cost plus all other costs identifiable to the project.

a. Plant engineering and design funds are appropriated by Congress at the request of DOE for the performance of Title I and Title II design prior to authorization and appropriation of construction funds for a project. Plant engineering and design funds are limited to requests for projects which will receive high priority in future year budget submittals. Plant engineering and design funds are limited for use on projects with a total design cost of less than $2 million. Completed conceptual design is a prerequisite for allocation of plant engineering and design funds.

b. Conceptual design costs are costs directly related to the formative stage in the design of a facility. The conceptual design is prepared using construction requirements of the project, a budget quality cost estimate, and a schedule of key design and construction activities. Conceptual design is based on user requirements established and accepted by management, and establishes the location, size, capacity, and functional needs of the project.

c. Research and development costs necessary to complete the project. The estimated costs by fiscal year for any project which requires the conduct of a research and development program as a prerequisite to its specific design and construction features and for which research and development funds are included in the operating expenses budget requests.

PART C - EXECUTION

1. PURPOSE.

   a. The execution phase begins upon receipt of the detailed design and/or construction funds at the level responsible for project management, and continues until the completion and closeout of the construction effort.

   b. Since project management is the responsibility of the Head of the Field Element, considerable latitude in the establishment of procedures for the execution phase has been left to the discretion of the Head of the Field Element. Field managers shall establish and update, as required, written procedures their offices will follow in fulfilling their construction project execution responsibilities. Copies shall be furnished to the Office of Project and Facilities Management. Field office adherence to their established procedure shall be an area of concern during routine Headquarters review and assessment visits to the field organizations.

   c. The specific activities and the sequence in which they occur vary depending upon the project characteristics and category. The field elements should consider establishing logic diagrams for each project category and inclusion of these logic diagrams in their project management directives.

2. DESIGN.

   a. Design Objectives. Design objectives shall be:

      (1) Achieving minimum construction costs consistent with programmatic, environmental, security, and safety requirements;

      (2) Achieving technical adequacy;

      (3) Achieving optimum economy in operation and maintenance; and

      (4) Assuring that appropriate consideration is given to the expected period of use; quality construction practices; energy conservation, decontamination, decommissioning, and quality assurance requirements; and the appearance of completed facilities.

   b. Design Methods. Considerable improvements in the method of design accomplishment are emerging with the use of computer aided design. Field organizations shall utilize the advantages of computer-aided design when appropriate.

   c. Tradeoff Studies. Tradeoff studies are an essential element of the design effort required to achieve the design objectives. Construction project

managers shall assure that appropriate use of tradeoff studies is made during the design of facilities.

d. Importance of Criteria, Codes, and Standards. In the past, projects that have had the most problems during the construction phase have been those for which a project design criteria package did not exist, was incomplete, or was prepared after the design had started. Lack of an adequate criteria package prior to the start of design causes delays in the design and construction phases of the project. It is most important that the project design criteria provide a clear, concise, and professional description of the design requirements without the need to provide an extensive list of other documents as a part of the criteria or numerous cross-references to other documents. Project-specific design criteria should, whenever possible, be included entirely within the package, thereby reducing references to other documents to a minimum. This requires that considerable effort be expended on the preparation of the criteria document. Expenditure of this effort during the planning phase, prior to the authorization and appropriation of the funds, can shorten the design and construction time for the project. Architect-Engineer evaluation boards should be assigned, as a task, review of the criteria package. This procedure provides three advantages:

(1) Better assurance that the criteria package is complete and time to improve it, if necessary;

(2) Shortening the time required for the award of the architect-engineer (A-E) contract after receipt of funds; and

(3) Better matching of the required architect-engineer qualifications to the requirement: of the project.

e. Preliminary Design (Title I).

(1) Scope. The preliminary stage of project design utilizes the conceptual design and/or design criteria that have been prepared for the project as a design basis. Sufficient design needs to be performed during Title I work to firmly fix (freeze) the project scope and features and further develop costs and schedules. Title I design generally includes:

(a) Conduct of preliminary (tradeoff) studies, including evaluation of alternative design approaches;

(b) Definition of the project design criteria and establishment of quality levels for systems and components in greater detail or revision to reflect data and information developed (during Title I design), to be applied in the follow-on Title II design;

(c) Expansion of conceptual design drawings in greater detail and development of additional drawings, or development of new drawings based on new design concepts;

(d) Development of outline specifications for construction; and specifications for equipment procurement;

(e) Additional analyses of health, safety, environmental protection, and other program aspects;

(f) Development of preliminary estimates of construction labor, equipment, and material quantities and identification of long-lead procurement or other potential labor or material supply problems;

(g) Development of more accurate project cost estimates, time schedules for project performance, and methods of construction performance;

(h) Further evaluation and selection of energy conservation measures and energy sources of supply;

(i) "Preliminary Safety Analysis Report," if not in conceptual design report;

(j) Preparation of a Title I design summary; and

(k) Other work as required.

(2) Performance.

(a) In Title I, the design criteria are defined in greater detail and drawings for the approved project concept are expanded with more detailed information, together with additional required drawings. Also, further refined descriptive information and more detailed outline specifications are developed that will serve as the firm basis to proceed with definitive design (Title II).

(b) From the more detailed drawings and information developed, more accurate cost estimates and project schedules are developed. This may reveal the need at this stage of design for revisions in scope or project features to keep the project within authorized funds.

(c) The outline specifications should be sufficiently detailed to permit determinations of compliance with DOE 6430.1.

(d) The preliminary estimate of project costs should be sufficiently detailed by components, and in units and unit costs, to facilitate review and evaluation.

(e) An important concern during the preliminary design is to assure that proper considerations are being given to protection of the environment. Project managers shall assure that the project actions concerning the environment (i.e., environmental assessment and/or impact statement) are properly coordinated with the Title I design. Proper integration of the environmental concerns into the Title I design will prevent project delays and design and construction changes later in the project. The above also applies to safety considerations. A preliminary safety analysis report should be a product of the Title I design, if required, and not completed during conceptual design.

(f) Design coordination is needed between the field organization, the operating contractor, and the design contractor, and with Headquarters participation, where appropriate, to assure that the design contractor fully understands the project requirements, cost and schedule constraints, and the operational needs of the project, and to adequately direct and monitor the design contractor's efforts and performance. Periodic progress and manpower reporting by the design contractor is required for management purposes.

(3) Title I Design Summary.

(a) Definition and Purpose. The Title I report (summary) or updated conceptual design report, as appropriate, is an overview and record document of preliminary engineering and project management planning, reflecting completed Title I design and usually prepared under architect-engineer services or by the operating contractor. This document serves two purposes. The first and primary one is to provide the field office manager with summary design information for approval prior to authorizing start of definitive design (Title II). The second is to provide the Headquarters program office and other interested offices with the necessary project information to assist in program planning, improving policy, and criteria guidance for future projects. This summary will allow the field office manager to determine that:

1 The project, as scoped, is consistent with the project as authorized by the Congress or as previously authorized by the field organization.

2 Programmatic or other requirements are being adequately satisfied.

3 Applicable design criteria, incorporating simplicity and economy, are being followed in design.

4 Reasonably uniform standards of size, design, and materials of construction are being applied, and new construction will be compatible with existing structures and facilities where required.

5 Project cost estimates and schedules for performance are reasonable.

6 Safety and environmental impact assessments have been made, hazard and impact prevention measures are being applied, and compliance with environmental health and safety standards and guidelines will be achieved.

7 Applicable energy conservation and provisions for the handicapped regulations and guidelines are being followed.

(b) Projects Requiring Title I Design Summaries. Title I design summaries are required for:

1 Any construction project for which the total estimated cost exceeds $250,000 when financed from the construction projects portion of the budget.

2 Any project involving the design, procurement, fabrication and installation of equipment of experimental facilities in connection with:

a Any equipment project of $1 million or more in estimated cost that is funded from the "capital equipment not related to construction" portion of the budget involving budget installation costs of $250,000 or more.

b Any experimental project or reactor test loop of $1 million or more in estimated cost.

3 Field office managers may, on some projects, elect to utilize a one-step design process without a separate distinction between Title I and Title II design. If this method is utilized, formal periodic review shall be made and properly documented to assure that the project objectives are being met. One of these formal reviews may be substituted for the Title I design summary, provided the project manager or field office manager approves the selected design review documents. The review selected as being the substitute for the Title I design summary shall be performed prior to the design reaching the 50 percent completion milestone. The guidance

provided herein pertaining to Title I design summaries should be considered in determining the format and content of the design review to be substituted for the Title I design summary.

(c) Contents of a Title I Design Summary.

1 For projects above $1.2 million in total estimated cost (TEC), the Title I design summary should contain the applicable information listed in Attachment V-11, arranged as convenient to the field organization.

2 For all projects requiring summaries, the Title I design summary may consist of the completed "Title I Design Report" or "preliminary proposal" submitted by the operating contractor, or any other document or documents utilized by the field organization to make the decision to proceed to Title II, provided it contains the applicable information listed in Attachment V-11, and a procedure is followed that requires the project manager or field office manager's approval.

3 Since the primary purpose of the Title I design summary is to provide a decision basis for the Head of the Field Organization, the contents of the summary must be determined by the that individual. Attachment V-11 is provided only as a guideline to assist the field managers in selecting the contents of the summary. Field managers shall establish procedures that allow for determination of the summary contents for each project. It is suggested that the project management plan specify the form, source, and contents of the design summary.

(d) Dividing or Grouping Project for Title I Design Summaries. If desired, preparation and review of Title I design summaries for large or urgent projects may be handled in stages with the initial proposal covering the concept and general layout of the overall project, and proposals on the components being submitted as soon as preliminary design is completed on each.

1 The scheduling of summaries for components of a major project may be arranged to fit the proposed construction schedule. The information furnished at each stage should include the data needed for authorizing the start of preparation of working drawings and specifications for the components and should show how the component fits into the overall project.

2 Related portions of several projects may be grouped into a single summary if this provides a logical distribution of the work and simplifies preparation and review of the summaries.

(e) Design Summary Procedures.

1 Field office managers should establish procedures for review and approval of all design summaries. Design summaries should be approved prior to authorization of detailed (Title II) design. A copy of the approved design summary shall be contained in the project files.

2 Copies of each design summary for major projects and major system acquisitions shall be submitted to each of the following Headquarters organizations immediately upon approval of the summary by the field organization.

a Appropriate program division;

b Director of Project and Facilities Management; and

c Deputy Assistant Secretary for Environment, Safety, and Health.

3 Headquarters submission of design summary for line item projects (over $1 million) other than major system acquisitions and major projects shall be on an as-requested basis by the Headquarters Elements. Design summaries for GPP shall not be submitted to Headquarters.

4 Design summaries provide the Headquarters offices with a source of information that will assist them in improving policy and criteria and should enable more enlightened program decisions. Summaries shall be submitted by cover letter providing information considered by the field office manager to be of importance to the Headquarters Elements in programming and policy actions. The letter serves as a "lessons learned" report during the project's execution and allows early application of the "lessons learned" to other projects and timely changes to be made to policy criteria and methods.

5 If modifications in a project involve significant changes in scope, TEC, schedules, or type of construction, a revised design summary shall be prepared and approved by the field office manager. Procedures for revised summaries shall be the same as for the basic summary.

f. Definitive Design (Title II).

(1) Scope. Title II definitive design (sometimes referred to as "final" or "detailed" design) is performed by an architect-engineer firm or, in limited circumstances, by the operating contractor who utilizes the approved Title I design and the revised project design criteria as the design base. Completion of the definitive design ends the design phase of a project and normally allows the beginning of the construction phase. Definitive design normally includes:

(a) Restudy and redesign work resulting from changes as may be required from the preliminary design;

(b) Development of final (working) drawings and specifications for procurement and construction;

(c) Estimate development of construction, labor, equipment, and material quantities;

(d) Development of detailed estimates of the cost of construction, procurement and construction schedules, methods of performance, and identification of work packages;

(e) Preparation of analyses of health, safety, environmental, and other project aspects;

(f) Identification of test plan and permit requirements, preparation of procurement plan, and determination of utility service requirements in coordination with the operating contractor and/or the supplying utility companies; and

(g) Other work as required.

(2) Performance.

(a) The scheduling of definitive design shall be based upon a detailed analysis of a project and its component parts. Engineering work involved in defining equipment and materials having long-lead procurement time shall be scheduled for early completion, in order that procurement can be initiated prior to the construction contracting when timing would make inclusion of the procurement as part of the contract infeasible. When construction is to be performed under a number of fixed-price contracts or under a cost-plus-fixed-fee contract, construction drawings and related documents should be scheduled in the sequence required for construction operations.

(b) Of major assistance in scheduling the performance of definitive design is the early establishment of detailed schedules of the need for drawings and specifications to support construction and procurement. Such detailed schedules assist in determining engineering manpower requirements and assure that completion of individual documents meet procurement and construction schedules.

g. Periodic and Final Design Reviews. As a vital part of the overall management of the project, periodic design reviews need to be performed during the preliminary (Title I) and definitive (Title II) design to assure that project development and design are proceeding in an orderly manner; assure that the project will satisfy program and operating objectives; review performance, schedules, and costs; identify potential and real problem areas; and initiate action for timely solutions and corrective measures. Procedures for conducting, monitoring, and controlling these necessary design reviews must be developed by the Heads of the Field Elements. In addition to procedures for design review, Heads of the Field Element shall develop procedures for the distribution and approval of design documents.

h. Design and Construction Scheduling and Methods of Performance.

(1) Scheduling.

(a) Considerations Pertaining to Performance Time of Contractors and Effects on Cost. To the extent possible, schedules for engineering, procurement, and construction services shall be established concurrently to assure assignment of adequate time for performance and to properly coordinate the accomplishment of the services. Construction completion of project elements shall satisfy operating requirements, including time for tests and adjustments prior to operation. If required completion dates do not permit normal performance periods, the available time must be allocated to achieve maximum overall economy, based on a careful determination of the feasibility and cost of performance of each service in less than normal time (i.e., with premium time). Sometimes the total time available may not, by any reasonable allocation, allow completion of all design prior to starting construction. Under such conditions, the design shall be scheduled so that logically separable portions of the work, such as sitework, foundations, superstructure, mechanical, and equipment installation can be awarded as separate contracts, bearing in mind that for maximum effectiveness a contractor should have, subject to security limitations, full control of the area in which he is working. However, it may be necessary to perform both engineering and construction on a cost-plus-fixed-fee basis so that both can proceed concurrently. Where plans involve use of more than one fixed-price contract for

construction, special care should be taken to assure that the plans and specifications clearly and completely define the scope of work to be accomplished under each contract. Sequential fixed-price contracts should be scheduled to permit orderly progress and timely completion.

(b) Considerations Pertaining to Performance Times Required to Accomplish Administrative Actions. Past experience indicates that schedule delays have occurred on many projects due to the insufficient allowance for the time required to accomplish the administrative functions on the project. In scheduling the work, proper consideration shall be given to the time required for such activities as the selection of the architect-engineer selection of a cost-plus-fixed-fee construction contractor, administrative approval requirements, and bidding and award of fixed-price construction or procurement contract(s). The field office manager shall determine the type and number of architect-engineer contracts to be used and the most appropriate type of contractual arrangements required. During the course of preliminary and definitive design, the field office manager reviews and firms up the prelimminary determination as to the type and number of construction contracts to be used. Field office managers should ensure that realistic times are scheduled for selection of architect-engineer and construction managers, appropriate administrative approvals, and award of procurement and construction contracts. Appropriate procedures and controls shall be established and utilized for the accomplishment of these administrative functions that will ensure on-time completion of these actions.

(c) Use of Logic Diagrams. During the entire process of scheduling, the use of logic diagrams can be extremely helpful to the planner or scheduler to recognize the relationships between the various actions required on a particular project. It must be recognized that perhaps the largest benefit from the use of the performance evaluation review technique (PERT) or critical path method (CPM) can be gained during the early phases of project design. Design decisions and regulatory requirements during the design phase may create considerable changes to the project logic. In some cases, a design or other decisions may have such an effect on the project cost and schedule to require a modification or reversal of the decision. For this reason, the project manager must continually revise and utilize the logic diagram.

(2) Methods of Performance.

(a) General. In determining the manner and method of performance, consideration should be given to constantly evolving innovations which may result in improvements in the traditional methods of

design and construction of buildings and facilities required for accomplishment of programs. New techniques and new ways of doing things may provide solutions to new challenges and problems which may arise. New practices should be adopted which will reduce design and construction time; use of other cost saving techniques should be maximized; and new methods of contracting should be considered which will produce economies in construction costs. Use of performance-type specifications may permit the application of new technology and produce improved designs to meet requirements. In adopting any new techniques or methods, care should be exercised to assure that the design criteria are satisfied, and that the results will be achieved without any decrease in desired quality and without any sacrifice in essential requirements. Methods of performance and scheduling must be considered together, comparing the advantages of a method with the effect it has on the schedule and cost. During the design phase of a project, this interaction between these two important actions must be continually considered. Construction contracting and erection methods can greatly affect the design method and sequence and should be determined early in the design phase. Field office managers must ensure that provisions for the above considerations are included in the project management plan.

(b) Cost Estimates. The importance of continual development of the project cost cannot be overemphasized particularly under the current market conditions of rapidly rising costs. Inclusion of "nice to have" features in the design, and failure to consider improved construction methods will contribute to excessive project cost growth. Consideration of cost during design evaluations can limit this growth, as well as facilitate the preparation of the formal cost estimates required during the life of a project. Further information and guidance on cost estimates is contained in Chapter II of this Order and DOE 5700.2C.

(c) Bidding and Award Activities. Projects may be delayed by the failure of bidding and award activities to be timely. The reasons for this delay can be a result of unrealistic allowance of time in the schedule for these activities or lack of attention to the accomplishment of these functions. Both of these reasons can be negated by the establishment of advance planning procedures within the field organizations for accomplishment of these tasks. The procedures established must contain controls or milestones to inform the project manager of delays so that immediate corrective action may be taken. Since these activities are of short duration in relation to the total schedule, many of the possible problem areas must be anticipated prior to

the start of the actual bid and award functions. A useful technique is the utilization of a checklist by the project manager prior to the start of the bidding and award containing such items as availability of funds, bids containing proper information to allow preaward actions, availability of personnel for preaward audit, and possibility of bidding time being extended. In many cases, extension of the bidding and award activities are just accepted as fact without corrective actions attempted. Proper procedures and prior planning can allow the bidding and award activities to be accomplished in the least possible time.

(d) Change Control Procedures.

1 Change control procedures for both design and construction must be established early in the execution process. Delays in processing design changes can seriously affect the project progress. The planned or desired procedures should be included or referenced in the project management plan prior to the start of the execution phase. If consideration for contractor's method of change control is given and his method accepted, the modifications must be included in an update of the project management plan. The adopted procedures for changes should include rigid provisions for reporting the progress of changes timewise by the project manager's organization, in addition to the normal change control reporting provisions. Standard change controls procedures shall be established for projects not having specific project management plans. These procedures shall include authorities and responsibilities for changes during both design and construction.

2 Particular attention must be paid to the time when certain changes should be prohibited to allow completion of the work. Failure to establish design change procedures will almost guarantee delay of the project. During construction, the project manager should have the authority to prevent changes. During this period, changes should not be allowed unless they are operationally required, to meet safety requirements, and/or result in cost savings.

i. Traditional Engineering Services. These services which encompass Titles I and II as defined above, are normally performed by architect-engineer firms under DOE prime or subcontract arrangements. To obtain the highest qualified professional services available, Departmental Elements shall comply with the policy and procedure set forth by the Brooks Bill, (40 U.S.C. 471, et seq.); DOE implementing regulations; and OMB Circular A-76. Operating contractors may perform Titles I and II work when it is determined by the field office manager to be in the best interest of the Government and is not a violation of the policy and procedures set forth by the references cited above.

Projects for which the operating contractor might perform design services include those for which the design involves a high degree of interfacing with existing equipment, operations and/or facilities; work is closely tied to ongoing research and development; and/or special expertise and knowledge is required which is generally only available to the operating contractor.

3. CONSTRUCTION.

a. Fixed-Price Construction Contracts. As previously mentioned, allowance shall be made for the time required for bidding, bid evaluation, award, and subsequent mobilization by the contractor. The contractor must be assured adequate work space and free access to his work area within security limitations. In situations where several independent contractors will be performing work in the same area at the same time, detailed planning must be performed prior to the award of the contract to develop procedures to handle the unavoidable conflicts. These procedures should be included within the contract. The construction planning effort should attempt to minimize these situations. Government efforts should be devoted to ensuring that the contractor is free to manage his effort. Government functions should be done on time with no unnecessary disruption to the contractor's plan.

(1) Equipment Furnished by Others. When equipment or materials are to be installed by a fixed-price construction contractor but are procured by other participants, the field organization shall take necessary actions to assure that deliveries comply with schedule set forth in the construction contract, to minimize requests for time extensions and cost increases.

(2) Indoctrination of Contractor. After the contract has been awarded, the contractor should be advised as to:

(a) The extent of authority and responsibility of the contract administrator, the operating contractor and the architect-engineer, and any other project participant;

(b) The administrative procedures for review and approval of shop drawings;

(c) The administrative procedures for progress payments;

(d) The administrative procedures for changes to the contract;

(e) Contract provisions for special safety, environmental protection, security, quality assurance, and other requirements for performance;

(f) The conditions specified by the contract under which work shall be performed and accepted; and

(g) The reporting procedures required by the contract, and coordination and understanding of the contractor's cost and schedule control system by all appropriate project management personnel.

(3) Cost and Schedule Breakdown. After the award of the contract, the contractor shall be required to submit proposed schedules for the major features of the work and for the overall project, as well as a cost breakdown covering each element or subdivision of the schedule. The schedules and the breakdown estimates shall be reviewed by the project manager and/or the architect-engineer and approved by the contracting officer. Upon approval, the breakdown estimates and the weight factors incorporated in the schedules shall be used as a basis for progress payments. Fixed-price incentive fee contracts normally will be governed by cost and schedule control requirements.

b. Cost Reimbursement Construction Contracts (Fixed or Incentive Fee).

(1) Equipment Furnished by Others. As with the fixed-price contract, it is necessary to assure that equipment or materials furnished by others is supplied in accordance with delivery schedules. The cost reimbursement contract is more flexible in this respect; however, the flexibility has a cost associated with it. Rescheduling work, shifting personnel, and disrupting plans as a result of missed deliveries all cause an increase in the total project cost and possibly extend the project completion date. It must be recognized that the responsibility for assuring that availability of equipment and supplies not furnished by the contractor remains with the Government project personnel or the construction manager and not on the contractor.

(2) Advisory Services to the Architect-Engineer. Early selection of a cost-reimbursement contractor is desired because he can contribute practical and economical suggestions for inclusion in the plans and specifications, and can aid in establishing a coordinated design and construction schedule. If a construction manager is employed for the above purposes, then early selection of the cost-reimbursement construction contractor may not be necessary or appropriate.

(3) Separation of Work. If it is determined that cost-plus-fixed-fee construction contract should be utilized, buildings or elements should be separated whenever practicable from the main contract and handled on a fixed-price basis, either as prime contracts with DOE or a subcontract under the cost-reimbursement contractor. As many elements of the contract as practicable, such as subassemblies, reinforcing steel and ductwork, should be obtained on a fixed-price basis utilizing established industry sources. These elements should be fabricated off site whenever operationally and economically advantageous.

(4) Experience Gained on Similar Project. In cost-reimbursement contracts, Government experience or "lessons learned" on similar projects should be freely provided to the cost-reimbursement contractor. This is desired since any problems avoided by use of this experience by the contractor results in a direct benefit to the Government.

(5) Indoctrination of Contractors.

(a) Initial discussion, after the contract is awarded, with the construction contractor should cover the following topics:

1 Indoctrination of the contractor's key personnel with policies, procedures and discussion of Government management interface with contractor's management plan;

2 Clarification and understanding of the responsibilities and authorities of the various participants.

3 The architect-engineer, DOE representatives or others who are authorized to issue field instructions and the limitations thereon;

4 Procedures for progress payments;

5 Procedures for changes to the contract;

6 Procedures for review and approval of shop drawings, equipment, and material;

7 Conditions specified by the contract under which the work shall be performed and accepted, to include environmental, health, safety, security, quality assurance, special safety, and other requirements for performance; and

8 Administrative requirements including personnel, supply, fiscal and progress reports, and records.

(b) During these discussions, items such as organizational pattern, key personnel to be assigned initially, schedule of assignments for additional personnel, and recruitment program are resolved. The contractor shall be furnished with applicable Departmental regulations and procedures.

(c) Emphasis should be placed on the contractor's management plan. Specific requirements such as functional organization and personnel requirements, reporting and records procedures, subcontract procurement, construction plan, quality assurance plan, manpower scheduling, cost control, and estimates should be discussed. Discussion and resolution of problems early in the contract help assure that the contractor establishes a sound

plan at an early date. A sound plan understood by both the Government and the contractor helps assure orderly and economical construction.

(d) Contractor personnel and industrial relations reporting must be discussed for those projects to which this reporting system is applicable. Generally, these reports are applicable only to projects being accomplished by onsite contractors. Project applicability and contracts requiring reports are defined in DOE 3230.2.

(6) Contractor's Procedures.

(a) The contractor should be required to develop subcontracts, purchase orders and related document forms as soon as possible after award of the contract. He may be requested to prepare other procedures covering the work to be accomplished within organization units, and indicate the distribution of documents such as construction drawings and specifications, subcontracts, requisitions, purchase orders, shop drawings, cost estimates, cost reports, progress reports, and results of safety inspections and meetings. The procedures may be especially tailored for the project or may be the contractor's standard procedures, provided that they meet the needs of the project manager.

(b) The contractor must assure that his accounting and reporting systems provide current cost data to management in accordance with the contract. The contractor's accounting system must be capable of providing the necessary costs to allow the field office to report completion costs and recording of capital investment for both facilities and installed equipment in accordance with applicable procedures.

(c) The contractor shall develop and furnish his plans and procedures on quality assurance as directed by the field element.

(d) The field organization, with assistance from Headquarters as required, shall review all of the procedures for adequacy and compliance with Departmental policies and procedures and, if satisfactory, approve the procedures. Revisions shall be made by the contractor as appropriate and shall also be reviewed and approved by the field element.

(7) Subcontract Planning and Scheduling. As design develops, the construction contractor or construction manager, depending upon the project team structure, analyzes the elements of the project to determine the most feasible method of construction. Based on design

schedule, necessary construction period, established completion dates, and nature of the work, the contractor usually recommends to the field element the type (fixed-price or cost), scope, and scheduled starting and completion dates of each proposed subcontract. The field element shall review these recommendations for compliance with the Federal and DOE procurement regulations, coordinate the subcontract requirements with design schedule, and approve the types and numbers of subcontracts to be utilized.

(a) Fixed-Price Construction Subcontracts are to be utilized to the maximum extent feasible. Such subcontracts may cover a complete building, group of buildings, or such work as excavating, steel erection, elevator installation, roofing, and so forth. In subcontracting to fixed-price contractors, consideration should be given to the factors covered in paragraph 3a, above.

(b) Cost-Reimbursement Construction Subcontractors should be utilized for specialty work when fixed-price subcontracts are not feasible. If cost-reimbursement subcontractors are to be used, their early selection is desirable to assist the prime contractor in planning, to initiate material takeoffs, and to initiate requisitions and purchase orders.

(8) Procurement Planning and Scheduling.

(a) The orderly delivery of equipment and materials at the site of the construction work, in a sequence that meshes with the installation schedule, is of major importance in meeting the required project completion dates at minimum cost. Receipt of equipment and materials subsequent to the time scheduled for installation tends to decrease the drive and effort of construction forces and thereby becomes a major contributing factor to decreases in labor productivity.

(b) The contractor determines equipment and material delivery schedules necessary to meet the required completion dates, taking into consideration times required for such activities as preparation of bid invitations and requisitions, bidding, shop drawing preparation, reviews and approval, fabrication, and transportation. The contractor provides the field elements with a schedule of milestones in his plan for completing the construction.

(c) If scheduled deliveries of items procured by other participants do not meet scheduled installation requirements, the contractor advises the field element as to the required delivery dates. The field element then takes action to expedite delivery to meet the installation requirements.

(d) To coordinate deliveries to the project, the administration of purchase orders placed by other participants for long lead-time items may be assigned to a contractor or subcontractor. This administration may include expediting, receiving, inspection and acceptance, and recommendations for partial and final payments.

(e) Prompt receipt and approval of shop drawings are essential to orderly fabrication of equipment and timely detailing of foundations and connections.

(f) For projects involving a considerable number of items procured by other participants, the procurement management function could most likely be best accomplished by a construction manager.

(g) For projects in which excess Government equipment and materials could be utilized, the project manager should require the contractor to establish procedures for reviewing "excess" tabulations and obtaining excess items.

(h) Priority and allocation authority shall be exercised in accordance with the defense materials and priorities system regulations. Assistance in exercising this system can be obtained from the Director of Procurement and Assistance Management. Special assistance should be requested from the Director of Procurement and Assistance Management when the defense materials and priorities system procedures have proven ineffective.

(9) Construction Equipment Requirements. Delivery and installation schedules for building equipment and materials assist in determining construction equipment requirements. The contractor establishes the construction equipment required by his own forces and by any cost-reimbursement subcontractor. If the field organization approves these requirements, equipment may be made available from excess stocks of the Department and other Government agencies, by rental from the contractor, or by rental or purchase by the contractor. The appropriateness of rental versus purchase requires detailed analysis of requirements. (See Federal Property Management Regulation, Chapter 101-25.5.)

(10) Construction Plant.

(a) The contractor recommends for field element approval locations for shops, warehouses, and other temporary construction facilities. These facilities should be located to minimize congestion within the construction area and to permit efficient flow of materials. The field element will consider the requirements of other participants and activities in the area when reviewing the recommendations.

(b) Project facilities such as roads, railroads, water supply, sewage collection and disposal, electrical, telecommunications, alarm systems, shops, and warehouses that can be utilized by the construction forces should be completed early to permit construction force utilization.

(11) Manpower Planning and Scheduling.

(a) As a guide to establishing and scheduling manpower requirements, the field element should assure that the contractor analyzes existing labor conditions, anticipated productivity, availability of housing, and other factors. Considering required completion dates, the contractor recommends the length of the basic workweek and the number of shifts. Every effort should be made to avoid extended workweeks. The field element shall approve the basic workweek and the number of shifts to be used on the project. This effort should be reflected in the contractor's manpower plan.

(b) The contractor develops overall manpower schedules by trades covering his own work and the work to be performed under the cost-reimbursement and fixed-price subcontracts. To the extent possible, manpower peaks of short duration should be leveled. The manpower schedules by trades will dictate the supervisory personnel required.

(c) The field element shall assure that the contractor establishes procedures for, and complies with, all mandated labor laws and regulations such as equal opportunity in employment and minority employee goals. All labor relation aspects shall be given consideration.

(12) Cost and Schedule Control.

(a) Since the contractor may utilize his own cost and schedule control system, which may have been established prior to award of the contract as meeting the DOE criteria, the field element should ensure that project personnel understand the contractor's system. On some large projects, assuring this understanding may require that the contractor provide some training to the Government, architect-engineer, construction manager, and operating contractor personnel as the case may be. Initial understanding of the system by all personnel involved can help minimize problems during the completion of the project.

(b) The contractor prepares his subcontract, procurement, construction, and manpower schedules, and when directed by the field element, consolidates these schedules with those of other participants to develop overall project schedules, including

networks such as CPM and PERT. Work of the contractor's own forces is integrated with the work of subcontractors and offsite fabricators, and with the scheduled deliveries of equipment and materials.

(c) The contractor estimates direct labor costs, direct equipment and materials costs, and indirect costs, including administration, to determine the estimated total costs he will incur. This process is applied to each physical unit (work package) of the project as established by the project management plan.

(d) The field element shall review the contractor's cost estimates for adequacy, and after approval, consolidate the estimated costs of the work of all participants to arrive at the overall project estimate. In establishing this estimate, the field element shall reconcile any difference between estimates prepared by the architect-engineer, construction, and operating contractors.

(e) Depending on the complexity of the project and the field elements management plan, the greater portion of the above work may be assigned to a construction manager.

c. Inspection (Title III).

(1) The organization or project manager may elect to have inspection services performed by the architect-engineer construction manager, or with in-house personnel. Inspection services shall not be performed by the construction contractor, and special conditions apply to the performance of inspection services by the architect-engineer.

(2) Inspection Services. Under Title III contract services, the contractor generally will:

(a) Furnish and maintain governing lines and benchmarks to provide horizontal and vertical controls to which construction may be referred;

(b) Verify all vendors' shop drawings to assure conformity with the approved design and working drawings and specifications;

(c) Inspect construction workmanship, materials, and equipment, and report on their conformity or nonconformity to the approved drawings and specifications;

(d) Make or procure such field or laboratory tests of construction workmanship, materials, and equipment as may be required.

(e) Prepare estimates of reasonable amounts of increase or decrease in contract price and/or contract completion time for contract modifications, evaluate proposals submitted by the construction contractor for such contract adjustments, and make recommendations for use in negotiating;

(f) Prepare reports and make recommendations on status of deliveries of materials and equivalent as may be required;

(g) Prepare monthly and other reports of the progress of construction, as may be required, and partial, interim, and final estimates and reports of quantities and values of construction work performed for payment or other purposes; and

(h) Furnish reproducible "as built" record drawings and marked-up specifications showing construction as actually accomplished.

(3) Performance of Inspection.

(a) Scheduling. Inspection schedules shall be based on the construction schedules and the quality assurance requirements of the project as set forth in the project quality assurance plan.

(b) General Procedures.

1 Inspection of construction work, including procurement and installation of associated equipment, shall be conducted in all cases prior to acceptance, and shall be consistent with the practices and procedures set forth in this section.

2 Inspection should be made at such times and places as may be necessary to provide the degree of assurance required to determine that the materials of services comply with contract and specification requirements, including quality level requirements.

3 The type and extent of inspection needed will depend on the nature, value, and functional importance of the project and its component parts. In determining whether inspection of manufactured articles should be made at the source (vendor's plants) or destination (construction site), the criteria contained in FAR 46.402 and 46.403 shall be followed.

4 Inspection requirements and testing required to be performed by the contractor or vendor shall be clearly established in the contract documents. Specific instructions shall be issued to define the scope of authority delegated to inspectors and the specific duties and responsibilities assigned to

them, and concerned contractors and vendors shall be furnished copies of such instructions to avoid disputes concerning inspection or acceptance of services or supplies.

(c) Types of Inspection. Because of the variety of types of contracts and subcontracts and the degree of responsibility assigned to the operating contractors, the architect-engineer, the construction contractors, and individual vendors, specific rules covering all phases of inspection cannot be prescribed. In general, inspection activities are divided into three types--functional, general, and detailed--as described below:

1 Functional Inspection is performed to determine overall compliance with contract drawings and specifications. It may vary from inspection of minor items to extensive testing of operating equipment (which must be provided for in the contract). It may also serve in making initial determination of the adequacy of the design effort. The field element and the operating contractor participate in functional inspections from the viewpoints of owner and user.

2 General Inspection is the fundamental and comprehensive inspection to ascertain that workmanship and kind and quality of materials conform to the contract specifications.

3 Detailed Inspection includes, but is not limited to, verification of details, such as checking location and size of reinforcing bars, maintaining records of concrete batching plant operations, verifying the use of proper welding rods, checking riveting and welding, and performing other inspection for quality assurance purposes. It starts with initial construction operations and extends through all construction stages.

(d) Assignment of Inspection Functions. Field offices shall:

1 Assure adequate and properly coordinated inspection of construction; and

2 Determine who will perform required inspection services. In addition to means at their immediate disposal, field offices may utilize the inspection services of other Government agencies.

a Inspection by Contractors.

(1) Normally, the architect-engineer should have responsibility for inspection to assure conformance with the contract drawings and specifications.

(2) The operating contractor may have responsibility for inspection of any construction when advantageous to the Government.

(3) In unusual cases, the best interest of the Government may be served by having a single contractor perform design, construction, and inspection. In these cases, it is usually advantageous to the Government to obtain a construction manager as part of the project team and the construction manager perform the inspection services. If, in these cases, the "design-construct" contractor is to perform the inspection services, his organization and procedures for inspection must be carefully reviewed to assure that a department of the contractor, separate and distinct from the department furnishing construction services, performs the inspection services. The inspection performed under these conditions shall not constitute final inspection and acceptance by the Government.

b Departmental Inspection. General and detailed inspection by DOE personnel should be held to a minimum and should not duplicate competent inspection by contractors. Self-inspection of construction should be avoided whenever practicable. Inspection performed by DOE should, however, be sufficient to ascertain that the party or parties responsible for inspection are adequately qualified and are doing their jobs properly, and that proper coordination is attained. Participation in functional inspection by DOE personnel is of primary importance.

(e) General Practices. In carrying out the procedures set forth above, field organizations shall observe the following additional general practices:

1 At a minimum, inspection shall conform to accepted practices/methods used in private industry, and shall be supplemented, as necessary, commensurate with the quality assurance standards and objectives applicable to the particular construction project.

2 Inspection services shall not be procured from construction contractors with respect to their own work, since this would represent self-inspection.

3 A level of supervision partially equivalent to detailed inspection shall be furnished by cost-type contractors, as appropriate to reduce the requirements and costs of other detailed inspection services.

4 Sufficient inspection shall be provided for all work to assure minimum compliance with safety standards contained in DOE 5480.1A.

(f) Inspection Criteria and Recommended Practices.

1 Field inspection, in its general and detailed phases, frequently paces construction progress. It shall be scheduled so that inspection will not hinder the construction effort.

2 When one contractor is to inspect the work of another, written instructions should be furnished to the inspecting contractor defining responsibilities and stating that he is not authorized to modify the terms and conditions of the contract, nor to direct additional work, nor to waive any requirements of the contract, nor to settle any claim or dispute. Copies of these instructions should be furnished to the contractor whose work is to be inspected, with a request that he acknowledge receipt on a copy to be returned to the contract ng officer. In this manner, both contractors are on express notice of the authority, and limitations on the authority, of the inspecting contractor.

3 For fixed-price construction contracts, inspection provisions are set forth in SF-23A, "General Provisions" of the contract. For both cost-reimbursement and fixed-price contracts, the extent of inspection is largely subject to determination by the project manager. He or she shall require thorough inspection with adequate documentation for all important phases and details of a construction job. Inspection is one of the prerequisites upon which final payment of the contractor is based.

4 Fundamentally, the construction contractor is responsible for the quality of his work. He must furnish detailed supervision of construction and be able to show that material, equipment, and workmanship conform to the contract. This requires coordination with design and inspection forces, the

scope and details of which shall be reviewed and approved by the field element. For complex quality level facilities, it may be necessary for construction contractors to provide their own inspection services to assure the quality of their work.

5 Continuous inspection and testing should be provided for all work for which the quality of workmanship cannot be determined by subsequent inspection or testing without detriment to the work as a whole. Classes of work in this category include pile driving, concrete work, testing of pipe and welding in enclosed or radiation-hazard areas, and verification of vital measured distances.

6 Frequently, special items must be inspected at the mill or fabrication shop to determine, in advance, that materials and workmanship are in accord with specifications. A requirement placed on the vendor for mill certification and certificates of vendor inspection, when properly identifiable with the special items, will often expedite matters. The contracting officer shall require that personnel assigned to offsite inspections be qualified both to interpret and obtain adherence to the specifications.

7 Field elements should assure that inspection procedures, instructions, and/or checklists, as a minimum, provide for the following:

a Statement of quality characteristics to be inspected;

b Organization or individual responsible for performing the inspection;

c Acceptance and rejection criteria;

d Method of inspection description;

e Evidence that inspection has been completed; and

f Records of the inspection.

8 An effective management practice for inspection is the use of a list of items that must be completed or corrected, normally referred to as a punch list. Punch lists are normally initiated shortly after the start of the physical construction and maintained throughout the work effort. The punch list may include major items that require completion before other work can proceed and both major and minor items on which

additional and/or corrective work must be performed prior to acceptance. The punch list is updated as inspections are performed and items added or deleted as appropriate. Normally, deletion of all items from the punch list results in the project being ready for final acceptance.

d. Acceptance of Completed Facilities. The following procedures for the acceptance of completed facilities, and the orderly transfer of these facilities from construction to operating responsibility, are intended to be a guide for the field element to use in the establishment of detailed procedures and responsibilities for accomplishment of these functions:

(1) Definitions.

(a) Acceptance Testing is the performance of all necessary testing to demonstrate that installed equipment will operate satisfactorily and safely in accordance with the plans and specifications. It includes required hydrostatic, pneumatic, electrical, ventilation, mechanical functioning, and run-in tests of portions of systems, and finally of completed systems.

(b) Inspection as used herein means the survey of a unit, facility, or area to determine status of acceptability. It includes a preliminary inspection to fix the number of work items remaining to be completed (list of exceptions or punch list), and a final inspection to accept the completed construction.

(c) Conditional or Provisional Acceptance is the acceptance of a unit or facility with a documented listing of the specific testing to be accomplished or work remaining, including furnishing of any outstanding submittals of technical and record data, to be completed by the construction contractor, and on or by what date the actions are scheduled to be complete.

(d) Final Acceptance is a written statement by the field element or its designee that the work performed by the construction contractor has been accepted as being in accordance with approved plans and specifications. The final acceptance also should be signed by the operating contractor, if applicable, indicating his acceptance of the facilities as constructed and the date the facilities are to be occupied or available for the use of the operating contractor.

(2) Assignment of Test and Acceptance Functions. Field elements shall assure that adequate test and acceptance procedures, defining the respective roles of the field organizations and its contractor participants to the fullest extent possible, are established and followed, and the requirements are included in the contractual arrangements.

QUALITY ASSURANCE - REPOSITORY PROGRAM

James T. Conway
December 13, 1989

Attachment 13

PROBLEM

- SOME SCIENTISTS FEEL THAT IMPLEMENTATION OF QA REQUIREMENTS DURING SITE CHARACTERIZATION IS COUNTERPRODUCTIVE TO THE REPOSITORY PROGRAM

- "THE ORGANIZATIONS AFFECTED--PRINCIPALLY DOE, BUT ALSO NRC TO A SIGNIFICANT EXTENT--SHOULD GIVE SERIOUS AND IMMEDIATE ATTENTION TO EVALUATING AND RESOLVING THE PROBLEMS SUGGESTED BY THE CONFLICTING THEMES."

POTENTIAL SOLUTIONS

NRC

- WORKSHOP - SPRING 1990
- TECHNICAL PAPERS
- ASSIST DOE EFFORTS

DOE

- WORKSHOP
- TECHNICAL PAPERS
- QA REQUIREMENTS
- PERSONNEL

COLLOQUIUM ON QUALITY ASSURANCE, 8-88

BACKGROUND

- o REPORT WAS PREPARED BY AN EDITOR USING A TRANSCRIPT OF THE MEETING
- o PREFACE TO REPORT STATED OPINIONS AND CONCERNS RELATED TO SEVERAL REPOSITORY AND YUCCA MOUNTAIN QA "PROBLEMS"

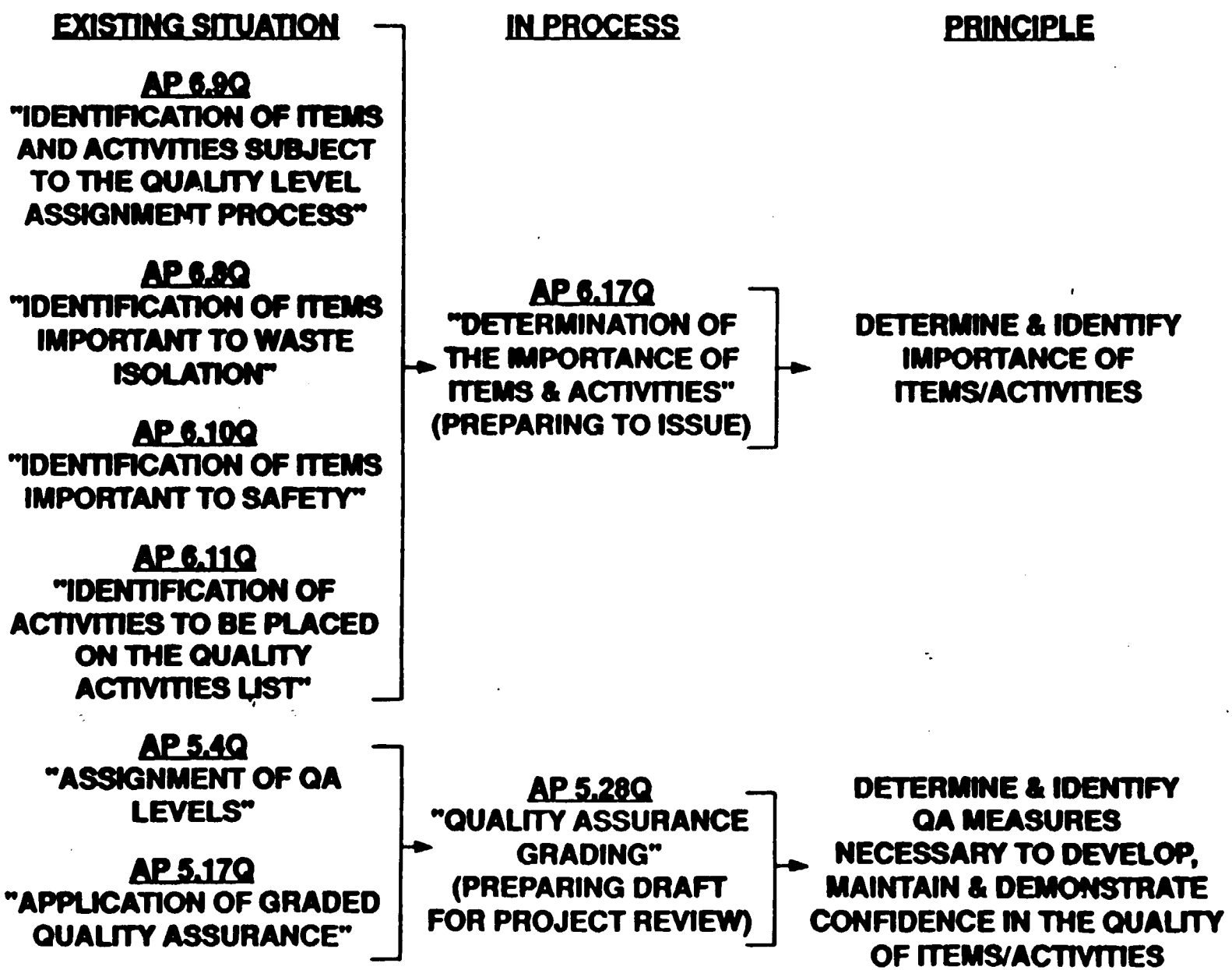
DISCUSSION

- o CONTENT, ACCURACY, AND COMPLETENESS OF REPORT ARE SOMEWHAT CONFUSING

RECOMMENDATIONS

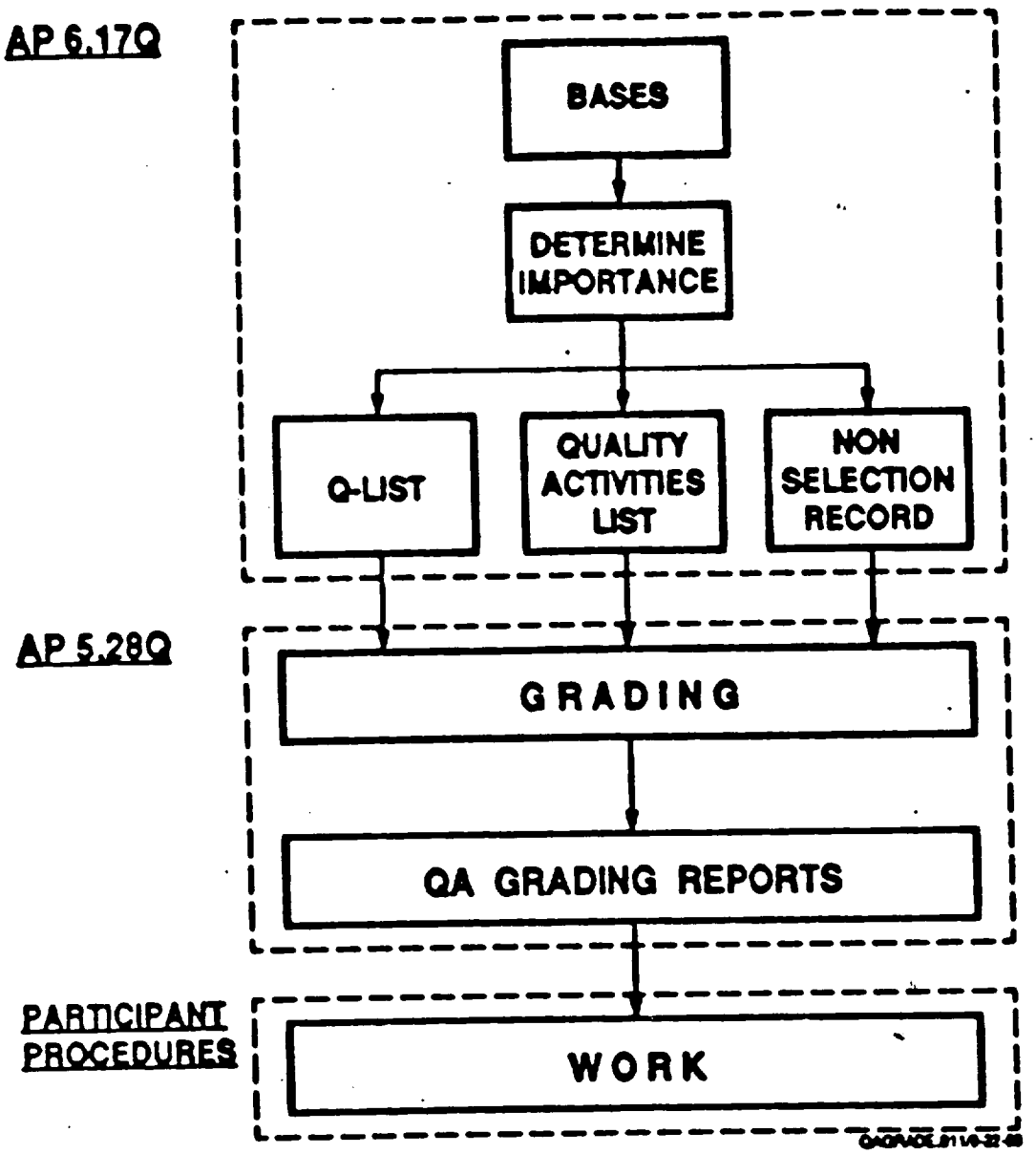
- o POTENTIAL ISSUES RAISED IN THE REPORT SHOULD NOT BE LEFT UNRESOLVED, ALTHOUGH THEIR VALIDITY IS UNCERTAIN
- o EFFORTS SHOULD BE MADE TO IDENTIFY AND/OR RESOLVE ANY POTENTIAL PROBLEMS THAT MAY STILL EXIST (QA PROGRESS MAY HAVE RESOLVED SOME OF THE ISSUES)

CONSOLIDATION OF "Q-LIST" RELATED PROCEDURES

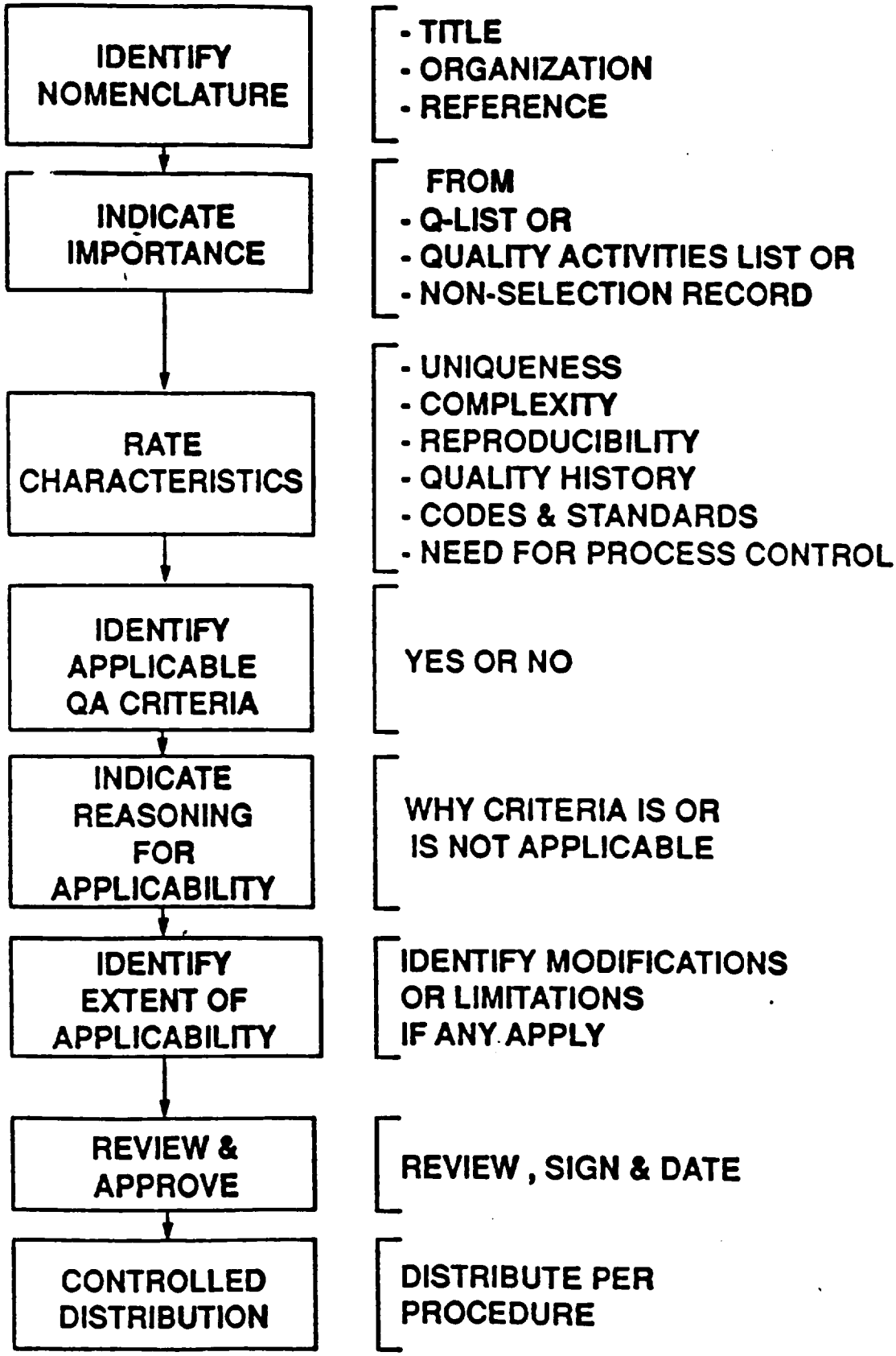


Attachment 15

SIMPLIFIED LOGIC OF THE YMP PROGRAM TO IMPLEMENT NUREG 1318



FLOW OF QA GRADING (AP5.28Q)



EEIQ9CG.CPG/10-17/89

CHARACTERISTIC RATING

1 = LOW
2 = MEDIUM LOW
3 = MEDIUM HIGH
4 = HIGH

- UNIQUENESS
  - PRECEDENT
  - STRONG SIMILARITY TO PRECEDENT
- REPRODUCIBILITY OR REPLACEMENT
  - EXISTENCE OF "BACK UP"
  - TIME AND EXPENSE REQUIRED TO PRODUCE ORIGINAL ITEM OR CONDUCT ORIGINAL ACTIVITY
- COMPLEXITY
  - NUMBER OF PARTS AND/OR PROCESSES
  - SEQUENCE OF ASSEMBLY OR CONDUCT
- QUALITY HISTORY
  - LENGTH OF TIME ITEM OR ACTIVITY HAS EXISTED IN PRESENT OR SIMILAR FORM
  - EVIDENCE OF DIFFICULTY OR FAILURE

CHARACTERISTIC RATING

1 = LOW
2 = MEDIUM LOW
3 = MEDIUM HIGH
4 = HIGH

- DEGREE OF STANDARDIZATION
  - NUMBER OF SOURCES OF SUPPLY
- AVAILABLE CODES AND STANDARDS
  - NUMBER OF CODES/STANDARDS INVOKED
  - EXTENT OF COVERAGE
- NEED FOR PROCESS CONTROL
  - EXTENT TO WHICH QUALITY CAN BE VERIFIED BY INSPECTION AND/OR TEST OF FINISHED ITEM
  - PROPER SEQUENCE OF OPERATIONS IS ESSENTIAL
  - SPECIAL PROCESSES INVOLVED
- SPECIAL HANDLING, SHIPPING AND STORAGE
  - DELICACY OF ITEM
  - SHELF LIFE
  - PROTECTIVE ENVIRONMENTS

Exhibit 4. Instructions for Completion of the QAG Report (Continued)

QUALITY ASSURANCE GRADING REPORT PAGE ___ OF ___

REPORT NO. _____ REV. NO ___

PART I - IDENTIFICATION:
TITLE OF ITEM [ ] OR ACTIVITY [ ] _____
RESPONSIBLE ORGANIZATION _____
VERSION(S) OF Q-LIST, QUALITY ACTIVITIES LIST, NON-SELECTION RECORD, AND/OR TURNOVER RECORD USED: _____

PART II - STATEMENT OF IMPORTANCE, Section A: (Check the appropriate areas)
[ ] PUBLIC RADIOLOGICAL SAFETY
[ ] WASTE ISOLATION
[ ] POTENTIAL ADVERSE IMPACT ON NATURAL BARRIER(S)
[ ] NA (Complete Section B)
[ ] SITE CHARACTERIZATION
[ ] PERFORMANCE ASSESSMENT _____

PART II - STATEMENT OF IMPORTANCE, Section B: (Provide the required information)
[X] WORKER RADIOLOGICAL SAFETY
[ ] OTHER (Provide explanation) _____
[X] OPERATIONAL RELIABILITY

PART III - CHARACTERISTIC RATING: (Indicate selected rating for each characteristic listed below.)
(1 = Low, 2 = Medium Low, 3 = Medium High, and 4 = High.)**

___ UNIQUENESS
___ REPRODUCIBILITY OR EASE OF REPLACEMENT
___ COMPLEXITY
___ QUALITY HISTORY
___ DEGREE OF STANDARDIZATION
___ AVAILABLE CODES AND STANDARDS NEED FOR PROCESS CONTROL
___ SPECIAL HANDLING, SHIPPING, AND STORAGE

PART IV - GRADING:

	QA CRITERIA	APPLICABLE (YES or NO)	REASON FOR APPLICABILITY (CODE)**	EXTENT OF APPLICABILITY (Reference)
I	ORGANIZATION			
II	QA PROGRAM			
III	SCIENTIFIC INVESTIGATIONS AND DESIGN CONTROL			
IV	PROCUREMENT DOCUMENT CONTROL			
V	INSTRUCTIONS, PROCEDURES, PLANS, AND DRAWINGS			
VI	DOCUMENT CONTROL			
VII	CONTROL OF PURCHASED ITEMS AND SERVICES			
VIII	IDENTIFICATION AND CONTROL OF ITEMS			
IX	CONTROL OF PROCESSES			
X	INSPECTION			
XI	TEST CONTROL			
XII	CONTROL OF MEASURING AND TESTING EQUIPMENT			
XIII	HANDLING, SHIPPING, AND STORAGE			
XIV	INSPECTION, TEST, AND OPERATING STATUS			
XV	CONTROL OF NONCONFORMING ITEMS			
XVI	CORRECTIVE ACTION			
XVII	QA RECORDS			
XVIII	AUDITS			

PART V - APPROVALS:
_____
INITIALS OF INDIVIDUALS INVOLVED IN QAG REPORT PREPARATION
_____
TPO (Signature and Date)
_____
QA Manager (Signature and Date)

QRB ACCEPTANCE:
_____
INITIALS OF APPROVING QRB MEMBERS
_____
QRB SECRETARY (Signature and Date)
_____
QRB LEADER (Signature and Date)

APPLICABILITY CODES

1. REQUIREMENTS GIVEN BY THE QA CRITERIA ARE NOT RELEVANT TO THE ACQUISITION OR USE OF THE ITEM OR CONDUCT OF THE ACTIVITY BECAUSE NO EFFORT OF THIS KIND IS INVOLVED.

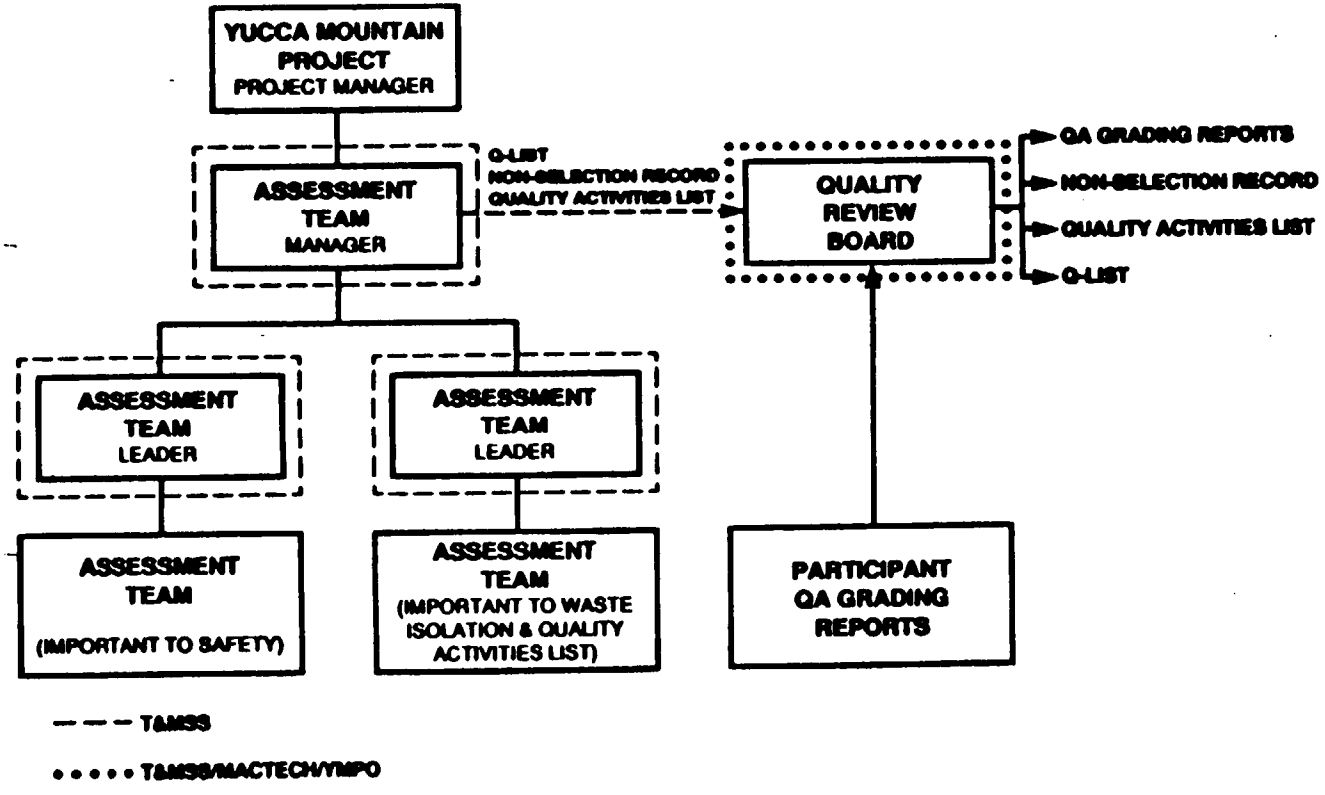
2. IMPORTANCE AND CHARACTERISTICS OF THE ITEM OR ACTIVITY DO NOT INDICATE QA MEASURES BEYOND THOSE PROVIDED BY STANDARD PRACTICE ARE NECESSARY TO DEVELOP, MAINTAIN AND DEMONSTRATE CONFIDENCE IN THE QUALITY OF THE ITEM OR ACTIVITY.

3. INSPECTION AND/OR TEST FOLLOWING INSTALLATION IS SUFFICIENT TO DEVELOP AND DEMONSTRATE CONFIDENCE IN THE QUALITY OF THE ITEM.

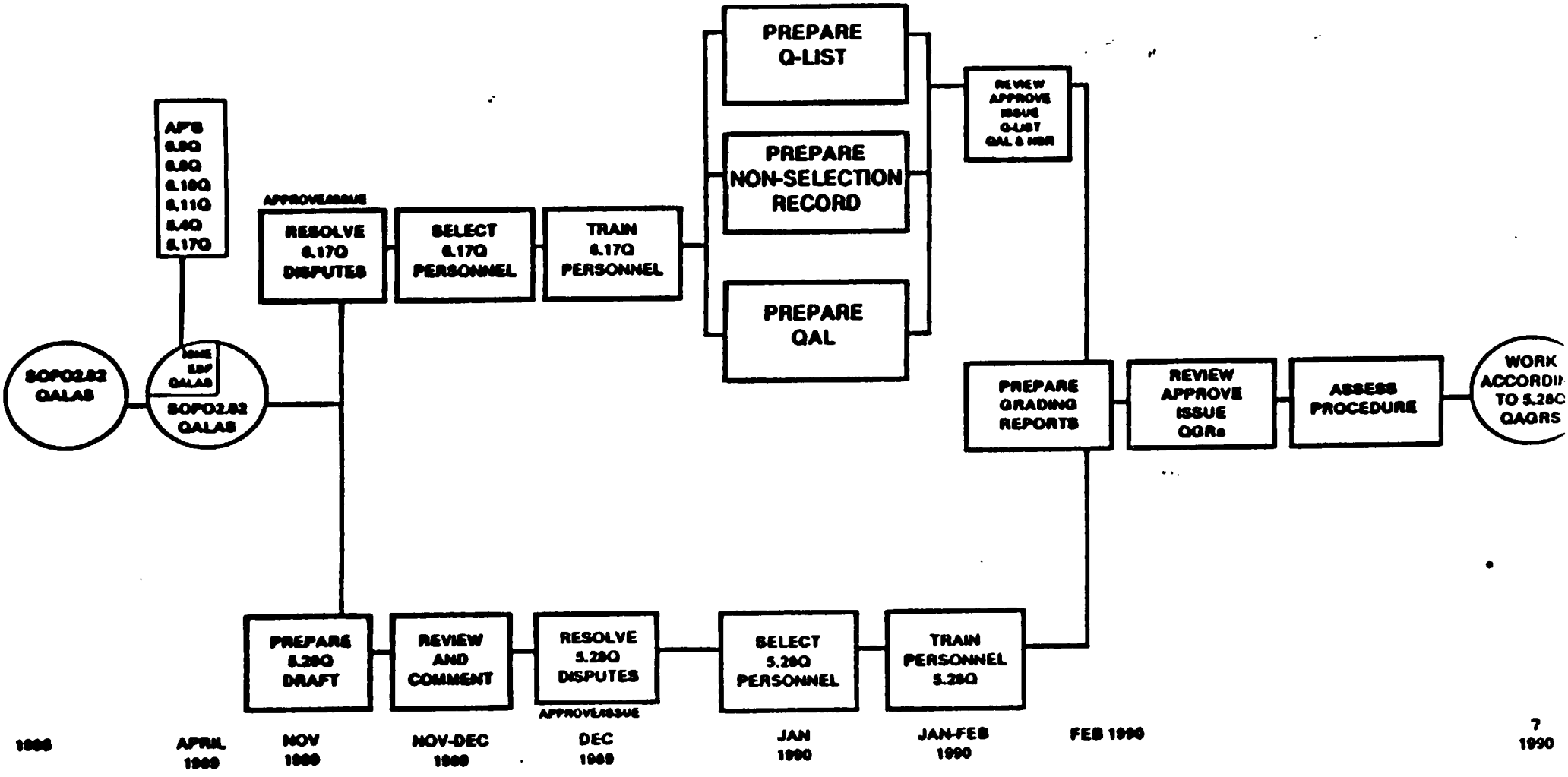
4. IMPORTANCE AND/OR CHARACTERISTICS INDICATE QA MEASURES BEYOND STANDARD PRACTICE ARE NECESSARY TO DEVELOP, DEMONSTRATE AND MAINTAIN CONFIDENCE IN THE QUALITY OF THE ITEM/ACTIVITY.

5. PERIODIC SURVEILLANCES AND/OR AUDITS ARE SUFFICIENT TO DEVELOP AND MAINTAIN CONFIDENCE IN THE QUALITY OF THE ITEM/ ACTIVITY.

ORGANIZATION STRUCTURE FOR AP 6.17Q AND AP 5.28Q



SCHEDULE LOGIC FOR IMPLEMENTATION OF AP'S 6.17Q AND 5.28Q



SCHEDULE 11-87/89

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

AUDIT

"AN AUDIT IS A PLANNED AND DOCUMENTED ACTIVITY PERFORMED TO DETERMINE....THE ADEQUACY OF AND COMPLIANCE WITH ESTABLISHED PROCEDURES....AND THE EFFECTIVENESS OF IMPLEMENTATION. AN AUDIT SHOULD NOT BE CONFUSED WITH SURVEILLANCE OR INSPECTION ACTIVITIES PERFORMED FOR THE PURPOSE OF PROCESS CONTROL OR PRODUCT ACCEPTANCE." (QMP-18-01, PARA 3.1)

Attachment 16

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

1. PURPOSE OF TECHNICAL SPECIALIST

- TO ASSIST WITH THE AUDIT PROCESS AND TO PERFORM THE TECHNICAL PHASE OF AN AUDIT IN ACCORDANCE WITH APPROVED TECHNICAL CHECKLISTS. (QMP-18-01, PARA 3.18)

- TO PROVIDE TECHNICAL ASSISTANCE TO THE AUDIT TEAM MEMBERS WHEN TECHNICAL EXPERTISE IS REQUIRED. (QMP-18-01, PARA 4.8)

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

2. TECHNICAL AUDIT CRITERIA AND OBJECTIVES (QMP-18-01, Figure 5)

- ARE SUFFICIENT PROCEDURES IN PLACE?
- ARE PROCEDURES TECHNICALLY ADEQUATE?
- ARE METHODOLOGIES APPROPRIATE?
- HAVE PEER REVIEWS BEEN PERFORMED FOR "CONTROVERSIAL" METHODOLOGIES?
- ARE PERSONNEL EDUCATION AND EXPERIENCE ADEQUATE?
- IS THE LEVEL OF EFFORT ADEQUATE?
- HAVE TECHNICAL REVIEWS BEEN PERFORMED?
- ARE INTERIM ANALYSIS AND INTERPRETATION PROCESSES ADEQUATE?
- ARE DESIGN CALCULATIONS AND DESIGN ANALYSES APPROPRIATE?

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

3. SELECTION OF TECHNICAL SUBJECT AREAS FOR AUDIT

- SUBJECTS CHOSEN FOR AN AUDIT MAY VARY DEPENDING ON ACTIVITY STATUS, IMPORTANCE OF ACTIVITY TO PROJECT SCHEDULE, POTENTIAL PROBLEM AREAS IDENTIFIED BY PROJECT REVIEWS AND SURVEILLANCE, AND OTHER FACTORS.

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

4. SELECTION OF TECHNICAL SPECIALISTS

- TECHNICAL SPECIALISTS ARE SELECTED BASED ON EXPERTISE IN THE TECHNICAL SUBJECT ACTIVITIES CHOSEN FOR AN AUDIT.

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

5. TRAINING AND INDOCTRINATION OF TECHNICAL SPECIALISTS

- A FORMAL TRAINING COURSE, TECHNICAL SPECIALIST AUDIT TRAINING, WAS PRESENTED TO NEARLY ALL ANTICIPATED TECHNICAL SPECIALISTS ON 3/30-31/89 BY BATTELLE PNL - DOE RICHLAND OPERATIONS/QTRC.

- PRIOR TO PARTICIPATING IN AN AUDIT, THE TECHNICAL SPECIALISTS ARE INDOCTRINATED IN THE AUDIT PROCESS AND ACKNOWLEDGE BY SIGN OFF OF "AUDIT GUIDE FOR TECHNICAL SPECIALISTS."

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

6. RESPONSIBILITIES OF TECHNICAL SPECIALISTS (CONTINUED)

- EVALUATE RESPONSES
- PARTICIPATE IN FOLLOW-UP

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

6. RESPONSIBILITIES OF TECHNICAL SPECIALISTS

- PREPARE FOR AUDITS - REVIEW HISTORY FILES
- PREPARE AUDIT CHECKLIST - IDENTIFY TECHNICAL ACTIVITIES TO BE REVIEWED AND AUDITED
- ATTEND TEAM BRIEFING/ORIENTATION
- RECEIVE TRAINING IN AUDIT REQUIREMENTS (COURSE AND READING)
- ATTEND PRE-AUDIT CONFERENCE
- CONDUCT TECHNICAL PORTION OF AUDIT - COMPLETE CHECK-LIST BASED ON EVALUATION OF OBJECTIVE DOCUMENTATION
- ATTEND DAILY DEBRIEFING SESSION(S)
- ATTEND POST-AUDIT CONFERENCE
- WRITE PORTION(S) OF THE AUDIT REPORT

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

7. DOCUMENTATION OF TECHNICAL EVALUATION

a. AUDIT REPORT

- SPECIFIC PARAGRAPH - 4.2 SUMMARY OF TECHNICAL ACTIVITIES

b. TECHNICAL CHECKLIST

- COMPLETED BY TECHNICAL SPECIALISTS

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

8. INTEGRATION OF TECHNICAL AND PROGRAMMATIC AUDIT TEAM MEMBERS

- CURRENT QMP-18-01 (REV. 3, 10/3/88) IMPLIES SEPARATE "TECHNICAL" AND "PROGRAMMATIC" SUBTEAMS
- PRINCIPAL AREA OF INTERFACE IS CRITERION 3
  - SCIENTIFIC INVESTIGATION AND SITE CHARACTERIZATION STUDIES
  - DESIGN CONTROL AND SYSTEM ENGINEERING
  - SOFTWARE QA (DEVELOPMENT, V&V, USE)
- SECONDARY INTERFACES - CRITERIA 2, 5, 8, 12
- NRC RECOMMENDATION - USGS AUDIT 89-4 (8/89)
  a. SNL AUDIT 89-3 (9/89) - NRC OBSERVATION AUDIT REPORT IDENTIFIED TECHNICAL/PROGRAMMATIC INTERACTION AS A "GOOD PRACTICE"
  b. LANL AUDIT 89-7 (11/89) - NRC EXIT MEETING COMMENTS INDICATED THAT THE TECHNICAL EVALUATION AND TECHNICAL/PROGRAMMATIC INTERACTION WAS CONSIDERED A WEAKNESS OF THE AUDIT

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

9. SUMMARY

- AUDITS ARE VERIFICATION ACTIVITIES TO DETERMINE PROGRAM EFFECTIVENESS NOT TO PERFORM IN-LINE ACCEPTANCE OF TECHNICAL PRODUCTS
- TECHNICAL SPECIALISTS ARE USED TO SUPPORT THE AUDIT PROCESS
- TECHNICAL AUDIT OBJECTIVES ARE A PART OF QMP-18-01
- TECHNICAL SUBJECTS AND TECHNICAL SPECIALISTS ARE SELECTED ON A CASE BY CASE BASIS DEPENDING ON THE PARTICIPANTS STATUS OF ACTIVITIES PRIOR TO THE AUDIT
- TECHNICAL SPECIALISTS HAVE RECEIVED FORMAL TRAINING AND INDOCTRINATION ON THE AUDIT PROCESS AND THE TECHNICAL SPECIALISTS' ROLE IN THAT PROCESS
- TECHNICAL SPECIALISTS' RESPONSIBILITIES HAVE BEEN IDENTIFIED
- RESULTS OF TECHNICAL EVALUATIONS ARE DOCUMENTED

CRITERIA FOR TECHNICAL ASPECTS OF AUDITS

(CONTINUED)

9. SUMMARY (CONTINUED)

- INTEGRATION OF TECHNICAL AND PROGRAMMATIC AUDITORS HAS ONLY RECENTLY BEEN INITIATED AND IS STILL SOMEWHAT EVOLUTIONARY

(3) Roles of Contractors. The roles of the contractors normally are as follows:

(a) The architect-engineer, as part of Title II services, usually prepares the performance specifications for equipment and systems. Title III services include test scheduling and arrangements for preliminary and final inspection. The field office manager or designee should approve these procedures and schedules prior to distribution to all parties involved.

(b) The construction contractor usually participates in inspections and schedules and conducts acceptance tests. Allowing beneficial occupancy by the operating contractor after the acceptance test relieves the construction contractor from liability for damage caused by persons or operations not under his control. The construction contractor's conditional responsibility continues until all exceptions are cleared and final acceptance is signed by the field element or its designee. The contractor's responsibilities continue for any guarantees or warranties required by the terms of the contract.

(c) The operating contractor, rather than the architect-engineer, may be assigned the responsibility for preparation of acceptance test procedures, schedule, and testing of process equipment. The field element should approve these procedures and schedules. Representatives of the operating contractor generally will participate in final inspections, observe tests, and sign acceptance papers when the facilities are to be occupied by, or for the use of, the operating contractor.

(d) Test and acceptance functions may also be assigned to a construction manager when one is utilized for the project. The functions are normally assigned to a construction manager when the "design-construct" approach is utilized.

(4) Procedures.

(a) Establishment of Procedures.

1 In preparing a procedure for the acceptance and transfer of construction, field elements shall carefully evaluate the role of each organization. Each party involved in the acceptance procedures must have a clear understanding beforehand of the responsibilities and functions of the other participants.

2 Procedures will vary according to the complexity of facilities, and responsibilities will vary according to the methods of construction management. Buildings or facilities not involving operating equipment may require only preliminary

and final inspections, completion of punch list items, and signing of acceptance documents. Facilities involving operating equipment also will require acceptance testing. This may be complicated and extensive, requiring written detailed procedures, planning, and scheduling.

(b) Beneficial Occupancy.

1 Acceptance of a completed facility as a unit may be desirable. Construction forces are then completely removed, and interferences involved in having construction and operating labor in a common area are avoided.

2 It may be necessary, or more practicable, to turn over for beneficial occupancy, by operators, portions of a facility as they are substantially completed prior to final acceptance. A list of items remaining to be completed or corrected by the construction contractor shall be prepared to define fully the items that remain as the construction contractor's responsibility. The operating contractor can train personnel in these portions, proceed with dry runs, or, in some types of facilities, start operating in initially completed units.

3 Under beneficial occupancy, the field element may assign to the operating contractor prime responsibility for the facility and may limit access of construction forces to those engaged in cleanup of exceptions. Responsibility for maintenance of permanent facilities generally transfers to the operating contractor upon occupancy.

(c) Acceptance Testing of Equipment.

1 If procedures for acceptance testing of equipment are not covered by the specifications and detailed written procedures are required, they shall be prepared as early as practicable in the construction period so that portions of a system may be tested as construction progresses. The construction contractor usually will arrange the acceptance tests, and the field element will assure that tests are conducted promptly.

2 Acceptance tests may be made both on portions of systems and on completed systems. Such tests usually will be witnessed by the architect-engineer, the construction contractor, the operating contractor, and the construction manager, if applicable. The field element may, as appropriate, assign personnel to witness acceptance tests. All responsible witnesses shall sign the final test report.

(d) Final Inspection and Acceptance.

1 Upon substantial completion of construction and acceptance testing, a preliminary inspection usually should be made. This will establish the number of work items remaining to be completed and permit preparation of a list of exceptions. The A-E, construction manager, construction, and operating contractors should participate in the inspection. The field element may, as appropriate, assign Departmental personnel to participate in the inspection. A date should be set for the performance of the final inspection, allowing time for completion of exceptions.

2 Final inspection should be made by all parties who participated in the preliminary inspections. They shall indicate in writing that such inspection was made and note any further exceptions. Upon cleanup of such exceptions, the work is finally accepted through the signing of documents by the field element, construction manager, A-E, and construction and operating contractors, as appropriate.

(e) Testing, Inspection, and Acceptance Documents. Appropriate forms shall be developed and used for acceptance testing and final inspection. Forms shall be signed by all responsible individuals involved in tests and inspections. Documents for final inspection and acceptance may be combined in a single form.

4. MANAGEMENT TECHNIQUES FOR CONSTRUCTION ECONOMICS.

a. General. Construction by its very nature presents a very difficult problem in controlling costs and preventing waste and error. A principal problem is that the project can always be analyzed after completion and better ways theorized as to how it should have been done. Every well-run project, regardless of size, utilizes a program or method to control construction costs and reduce waste and error. Again, the methods and programs that will be effective vary with each individual project. Some of the major cost reduction and efficiency measurement methods used on past projects are summarized herein. Utilization of one or more of the techniques outlined will assist in reducing costs, preventing waste and error, and keeping management currently informed as to those features of the project which need corrective action.

b. Cost Reduction Methods for Cost-Plus-Fixed-Fee Construction Contracts.

(1) Force Account Construction Productivity Assessment. When major portions of the construction of a project are to be accomplished by

force account cost-plus-fixed-fee labor, provision should be made for monitoring and assessing labor productivity. A system should be employed which compiles data on actual productivity experience and enables comparison with estimated or budgeted unit labor costs for the activity. The forecasting of labor productivity on the balance of the work should flow from this system and the current working estimate should be maintained accordingly. Specifically, data should be provided on unit and total labor experience for such work elements as concrete forming, placement, reinforcing, piping, and electrical installation units. Summaries of productivity experiences versus budget estimates for civil/structural, piping, and electrical costs also should be available to enable overall assessment of trade performance. This productivity assessment system should accomplish the following:

(a) It should identify specific and general productivity problems in order to allow measurement of improvement.

(b) It should enable maintenance of a current project estimate reflecting force account labor experience.

(c) It should provide updated experience data weekly or biweekly.

(2) Foreman Training Program is designed to transmit policy and information through to the working level, train foremen to handle their assignments, increase overall job efficiency and safety, effect economies, and minimize labor difficulties.

(3) On-The-Job Worker Surveillance Program is the so-called "head count" which determines the number of employees gainfully occupied at a given time. It provides a valuable tool to relative productivity of workers and to locate areas where improvement is necessary. Its regular use is recommended for all cost-reimbursable, construction work. In comparing data for separate projects, allowance must be made for differences in jobs and job conditions, and in judgment of those making the counts.

(4) Other Methods. On moderate- and large-size jobs, periodic meetings should be held of supervisory and key staffs of the A-E, the construction contractor, DOE and, if desired, the operating contractor. At these meetings, the participants should discuss problems with which they are confronted. If solutions are not immediately available, efforts should be made to provide answers as soon as possible. Informal or round table meetings of craft and area superintendents also may be held. This permits the dissemination of new methods and information more rapidly than by formal programs. There also is a possibility that an accomplishment in one area that provided an outstanding competitive record for its originators can be passed on and utilized in all areas.

(5) Productivity Comparisons with Prior Work. The in-place value of work per person-month of labor for projects which have been completed can be used to check overall efficiency of the job. These figures are particularly useful for checking overall estimates in those limited instances where duplicate or similar projects are being constructed. Direct cost comparisons of cost-plus jobs are impractical unless similar facilities are being constructed, since numerous adjustments must be made for local situations before the relative efficiency of the work can be determined. Despite local variations, it is possible to compare features of projects on a unit basis and against estimates prepared by the A-E prior to start of work. Current cost data and records compared with the amount of work accomplished also will indicate areas where corrections or adjustments are needed for economical construction.

c. Cost Reduction Methods for Fixed-Price Construction Projects.

(1) Prevention of numerous change orders to the contract is the most important aspect of cost reduction on fixed-price contracts. This prevention is best accomplished during the design phase by having personnel with extensive construction experience review the plans and specifications in order to eliminate the possibility for changes once the contract is executed.

(2) Rapid action on problems that arise during construction will also reduce the total cost of the changes. Delay in providing the design modifications and providing instructions to the fixed-price contractor always increases the total project cost and, in most instances, the completion date. Project managers/field elements should assure that the proper procedures are established to rapidly satisfy Government responsibilities when changes or problems occur during construction.

(3) Value engineering incentive programs are being used widely in Federal construction to effect cost reductions in fixed-price construction jobs. The technique invites construction contractors to submit suggested changes in contract requirements which will result in reducing costs without sacrificing required quality or function, and to share in such savings. Such a program may not be very practical on complex and unique projects which are specifically tailored to meet special and unusual requirements. However, it may produce savings on more conventional construction projects to be accomplished under fixed-price contracts, and DOE field organizations should, whenever possible, use the technique.

d. Construction Performance Evaluation Based on Installation Rates. From the project schedule and work packages, the weekly bulk quantity installation rates for concrete piping and electrical work can be determined. Weekly installation experience can be observed and recorded. Continued analysis of installation performance will provide a check on the reasonableness of

the schedule and a good method for assessing work progress and forecasts. This method can also assist in isolating areas in which problems are occurring and further analysis of that specific area can determine specific cause, whether it be productivity supervision or lack of supplies. The continued monitoring of installation rates will also assist in determining the effectiveness of corrective actions applied to the perceived problem. This method can be applied to cost reimbursement contracts and, to a limited extent, to fixed-price contracts.

5. CONSTRUCTION COMPLETION REPORTS.

a. General.

(1) Construction completion reports are required to ensure that the necessary information on the completed construction is entered into the Real Property Inventory System upon occupancy or acceptance of the new facilities.

(2) These reports are also helpful for purposes of project history, as references for future project planning and execution, use in training project personnel, and for recording benefits attained from innovative approaches to the project.

(3) The form, content and procedures for preparation of the report are the responsibility of the Head of the Field Element. Heads of Field Elements shall ensure that their use of this management tool is appropriate to ensure that the proper information is entered into the Real Property Inventory System.

b. Preparation and Disposition of Reports.

(1) The Head of the Field Element, in determining the form, content, procedures and timing of the construction completion report, shall comply with the Real Property Inventory System requirements that facility data be entered into this system upon occupancy or acceptance by DOE of the facility. Normally, this requirement will not allow combining the construction completion report with the cost completion report.

(2) The Real Property Inventory System timeliness of data entry requirement will require subproject completion reports for large projects where the construction is occupied or accepted in stages. The Heads of the Field Elements shall provide for this situation in their procedures regarding construction completion reports.

(3) Suggested contents of the construction completion report are contained in Attachment V-12. Use of these suggested contents would maximize the usefulness of the construction completion report.

UNITED STATES
DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE
P. O. BOX E
OAK RIDGE, TENNESSEE 37830

DIRECTIVE NO. CEM-31
MODIFICATION NO 2
DATE 9/27/82

SYMBOL CE-522:GAN DIRECTIVE AUTHORIZATION

PLANT Gaseous Diffusion Plants
LOCATION Oak Ridge, TN; Paducah, KY; & Piketon, OH

1. TITLE
UTILITIES UPGRADING, GDP'S (PHASE I)

2. TO
Manager, CEMT, ORGDP
Director, Engineering Division, DOE
Director, Construction Division, DOE
Manager, PAO, DOE
General Plant Manager, GAT
Plant Manager, ORGDP; Plant Mgr., PGDP

3. WORK AUTHORIZED FOR USDOE BY
(Signature)
Name John T. Hilloway, Assistant Manager
Title for Construction and Engineering

4a. Previous Directive Action: Mod. 1 Date 2/24/82
4b. Request for Directive Action: See 4e. Date
4c. Preliminary Proposal: Date
4d Action Memorandum: EOD Endorsement Date 9/14/82

4e. Other References
Project In-Depth Review (June 1981); Engineering Change Request ECR UU105 (5/17/82)
Discussions with ORO Budget staff (August 17, 1982)
Engineering Change Request ECR 15646-1 (July 16, 1982)
Engineering Change Request ECR UU103 (March 31, 1982)

5. PRELIMINARY PROPOSAL APPROVED
☐ As Submitted ☐ With Exception as Noted on Reverse ☐ For Design Only
Date

6a. Current Start Date	6b. Current Completion Date	6c. Difference in Months
Design November 14, 1980	Design January 15, 1983	+4 1/2
Constr March 1, 1981	Constr September 30, 1984	MC

7. AUTHORIZED COST BY PARTICIPANTS

	ORGDP	Paducah	Portsmouth		
A. Participant					
B. Type of Contract					
C. Contract No					
D. Con. Administrator	(See attachment for authorized costs by participant).				
E. Authorized Costs					Total
(1) Engineering	$ 1,333,159	$ 1,025,000	$ 825,000	$	$ 3,183,159
(2) Constr. Cost	424,453	1,350,000	3,300,000		5,074,453
(3) Std. Equip.	-	-	-		-
(4) Contingencies	125,000	400,000	575,000		1,100,000
(5) Total	$ 1,882,612	$ 2,775,000	$4,700,000	$	$ 9,357,612
RESERVE	13,642,388	-	-		13,642,388
TOTAL AUTH. THRU 9/30/82	$15,525,000	$2,775,000	$4,700,000		$23,000,000

8. SUMMARY OF FUNDING REQUIREMENTS

	Classification	Item Number	Item Name		Amount
A.	LI (N89)	39CD100181R503	Utilities Upgrading, GDP's (Phase I)	ORGDP	$15,525,000
B.	LI (N90)			PAD	2,775,000
C.	LI (N91)			GAT	4,700,000
D. Change This Action (If Applicable) $ N/A				$ Total Authorized	$23,000,000
F. Remarks					

Form OR-637 (8-72) (over) Page 1

EXAMPLE OF A PROJECT AUTHORIZATION

DIRECTIVE CEM-31 MODIFICATION 1 DATE 9/27/82

9. This Space to Be Used as Required for Description of Facility, Statement of Authorized Work, Participant Scope, Remarks, Special Notes, Etc.

Directive CEM-31 is modified to reallocate costs by participants and to revise scope and method of accomplishment per approved engineering change requests.

General Description of Overall Project Scope Where Changed

At Oak Ridge, the construction of the sanitary water tank has been deferred. Also, due to the deteriorated condition of the K-892-H cooling tower, approval has been requested from Headquarters DOE to add the cooling tower replacement to this project using the funds freed by deferral of the sanitary water tank and the anticipated project underrun.

At Paducah, the fixed filtration system proposed for C-637-2A&2B as a result of the budgetary reduction of last fall has been replaced by a header flushing system using a portable filtration device. The cost savings for this system will permit filtering of RCW water on C-631, C-635, and C-637 cooling towers.

There are no changes to the work to be accomplished at Portsmouth.

Method of Accomplishment Where Changed

Procurement

At Oak Ridge, the operating contractor shall procure the two 1250 Hp, 5000 SCFM air compressors and deliver them to the FPPC for installation. This will enable ORO to obtain the benefits and comply with DOE regulations governing life cycle costing of energy consuming equipment.

Schedule

Revision of the schedule reflects authorized AE design schedule resulting from the approvals of the engineering change requests.

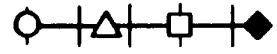
All other provisions of the directive are unchanged.

SPECIAL NOTE

No field work authorized.

NRC ACCEPTANCE OF WASTE FORM PRODUCERS' QUALITY ASSURANCE PROGRAMS

OCRWM QAR (Rev. 2)



DWPF

DOE/SRPO

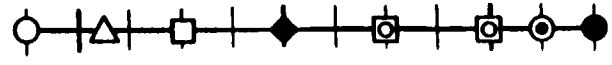
CONTRACTOR

LEGEND

- ○ - DOE Submits QA Plan to NRC
- △ - NRC Submits comments to DOE
- □ - DOE Submits revised QA Plan
- ◆ - NRC Accepts QA Plan
- ⊡ - DOE Audit/NRC observation
- ⊙ - DOE Accepts QA Program
- ● - NRC Accepts QA Program for continued implementation

WVDP

DOE/WVPO



CONTRACTOR

Attachment 11

WASTE ACCEPTANCE PROCESS ACTIVITIES
HIGH-LEVEL WASTE FORM PRODUCTION

Quality Assurance Requirements Document (QARD) Modifications

- Sections 1 through 18 will contain requirements applicable to all program elements including High-Level Waste Form Producers (HLWFP)
- Appendices for HLWFP, MGDS, Transportation, and MRS program elements establish specific requirements
- Appendix B incorporates OGR/B-14 requirements and replaces OGR/B-14

HLWFP Quality Assurance Program Description (QAPDs) Modifications

- QARD modifications submitted to HLWFP
- The QARD HLWFP Appendix will reflect a bilateral understanding of HLWFP quality assurance program amplifications

Attachment 12

WASTE ACCEPTANCE PROCESS ACTIVITIES
HIGH-LEVEL WASTE FORM PRODUCTION

Major Program Milestones

- **HLWFPs submittal of QAPDs to OCRWM**
- **OCRWM concurrence with QAPDs and submittal to NRC**
- **NRC acceptance and comment on QAPDs**
- **OCRWM audit of HLWFP**