U. S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
OFFICE OF QUALITY ASSURANCE

SURVEILLANCE

OF

M&O CONTRACTOR (TRW)

Vienna, VA (September 8 - 10, 1993)

Las Vegas, NV (September 13-17, 1993)

SURVEILLANCE NUMBER HQ-SR-93-07

BILL BELKE

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SURVEILLANCE HQ-SR-93-07

Department of Energy
Washington, DC 20585

AUG 27 1993

Mr. R.L. Robertson
General Manager
CRWMS, M&O
TRW Environmental Safety Systems, Inc.
2650 Park Tower Drive, Suite 800
Vienna, VA 22180

Subject: Office of Civilian Radioactive Waste Management (OCRWM) Quality Assurance (QA) Surveillance HQ-SR-93-07 of M&O Preparation and Flowdown of "Dispose Waste" Requirements Documents

Dear Mr. Robertson:

Please be advised that a team from OCRWM, Office of Quality Assurance (OQA), will conduct a QA surveillance of the (M&O) QA Program and implementation during the periods September 8-10, 1993 in the M&O Offices in Vienna, VA and September 13-17, 1993 in the M&O Offices in Las Vegas. The surveillance team will hold a pre-surveillance meeting on Wednesday, September 8, 1993, beginning at 9:00 a.m. at the M&O Offices in Vienna, VA. Please arrange for the appropriate personnel to attend the meeting. The post-surveillance meeting is tentatively scheduled for 9:00 a.m. on Friday, September 17, 1993 at the M&O Offices in Las Vegas, NV.

The surveillance will focus on the preparation, review, and issue and the requirements flowdown from the CRD to other "Dispose Waste" documents.

The surveillance of implementation and effectiveness will be based upon the current revisions of the governing documents.

If the team identifies a need to verify additional programmatic or technical areas during the surveillance, they will be added to the checklist and verified accordingly.

If you have any questions, please contact Bob Clark at (202) 586-1238 or Marlin Horseman at (703) 276-9304.

Sincerely,

for Donald G. Horton, Director
Office of Quality Assurance

Enlcosure: Surveillance Plan HQ-93-07

cc:
L. Barrett, RW-1
C. Weber, RW-3.1
T. Johnson, RW-3.1
D. Spence, RW-3.2
R. Morgan, M&O, Vienna
R. Constable, RW-3.2
M. Horseman, QATSS
C. Gertz, YMPO
D. Foust, M&O/Las Vegas

SURVEILLANCE PLAN
SURVEILLANCE NUMBER: HQ-SR-93-07
SURVEILLANCE OF M&O PREPARATION AND FLOWDOWN OF "DISPOSE OF WASTE" REQUIREMENTS DOCUMENTS

A surveillance of the flowdown, preparation, review, comment resolution, and issuance of documents associated with the "Dispose of Waste" function will be conducted on September 8-10 at the M&O offices in Vienna, VA and continued on September 13-17 at the M&O offices in Las Vegas, NV.

The surveillance will be conducted by:

Marlin Horseman	QATSS, Arlington, VA	Surveillance Team Leader
Dennis Threatt	QATSS, Arlington, VA	Team Member
Jim George	QATSS, Arlington, VA	Team Member
Neil Cox	QATSS, Las Vegas, NV	Team Member
Rob Howard	QATSS, Las Vegas, NV	Team Member
Terry Grant	SAIC, Las Vegas, NV	Technical Specialist
Dean Stucker	DOE/RW-22	Technical Specialist

Surveillance Scope

The surveillance will (reference attached charts):

1. Evaluate the analyses performed as noted in Baseline Change Proposal (BCP) #00-93-002, dated 7/21/93 (page 4 of 7, paragraphs (1) a, b, and c).

2. Evaluate the flowdown of requirements from:

    A. The CRD to the MGDS-RD
    B. The MGDS-RD to the SD&TRD
    C. The SD&TRD to
        1) The ESFDR to
            a. Design Packages
        2) The SBTFRD to
            a. Test Planning Packages
            b. Job Packages

3. Evaluate the document preparation, review, comment resolution, issuance, and storage for each requirements document in the flowdown, in accordance with the governing document preparation and review procedures.

4. Review requirements identified in documents being superseded to ensure that requirements in those documents are being adequately addressed.

Governing Documents

DOE/RW, 0406P, *CRWMS Requirements Document* (CRD), Revision 0

DOE/RW, 0404P, *Mined Geological Disposal System Requirements Document* (MGDS-RD), Revision 0 - For Lower Tier Documents.

YMP/CM-0021, *Site Design & Test Requirements Document* (SD&TRD), Revision 0 - For Lower-Tier Documents.

DOE/RW, 0333P, *Quality Assurance Requirements and Description* (QARD), Revision 0

DOE/RW, QAP 3.5, *Technical Document Preparation*, Revision 2, 5/18/92

DOE/RW, QAP 6.2, *Document Review*, Revision 0, 5/18/92

Attachment: Basis for Surveillance HQ-SR-93-07 Flow Chart - 3 pages

Prepared by: Marlin Horseman Date: 8-20-93

Marlin Horseman, QATSS
Surveillance Team Leader

BASIS FOR SURVEILLANCE HQ-SR-93-07

LEGEND

CRD Civilian RadioActive Waste Management System Requirements Document

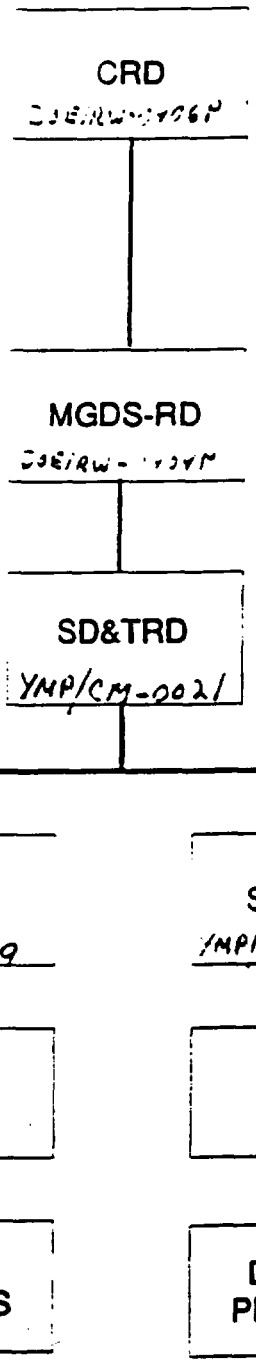
MGDS-RD Mined Geological Disposal System Requirements Document

SD&TRD Site Design & Test Requirements Document

ESFDR Exploritory Studies Facility Design Requirements

SBTFRD Surface Based Testing Facilities Requirements Document

BFD Basis for Design Document



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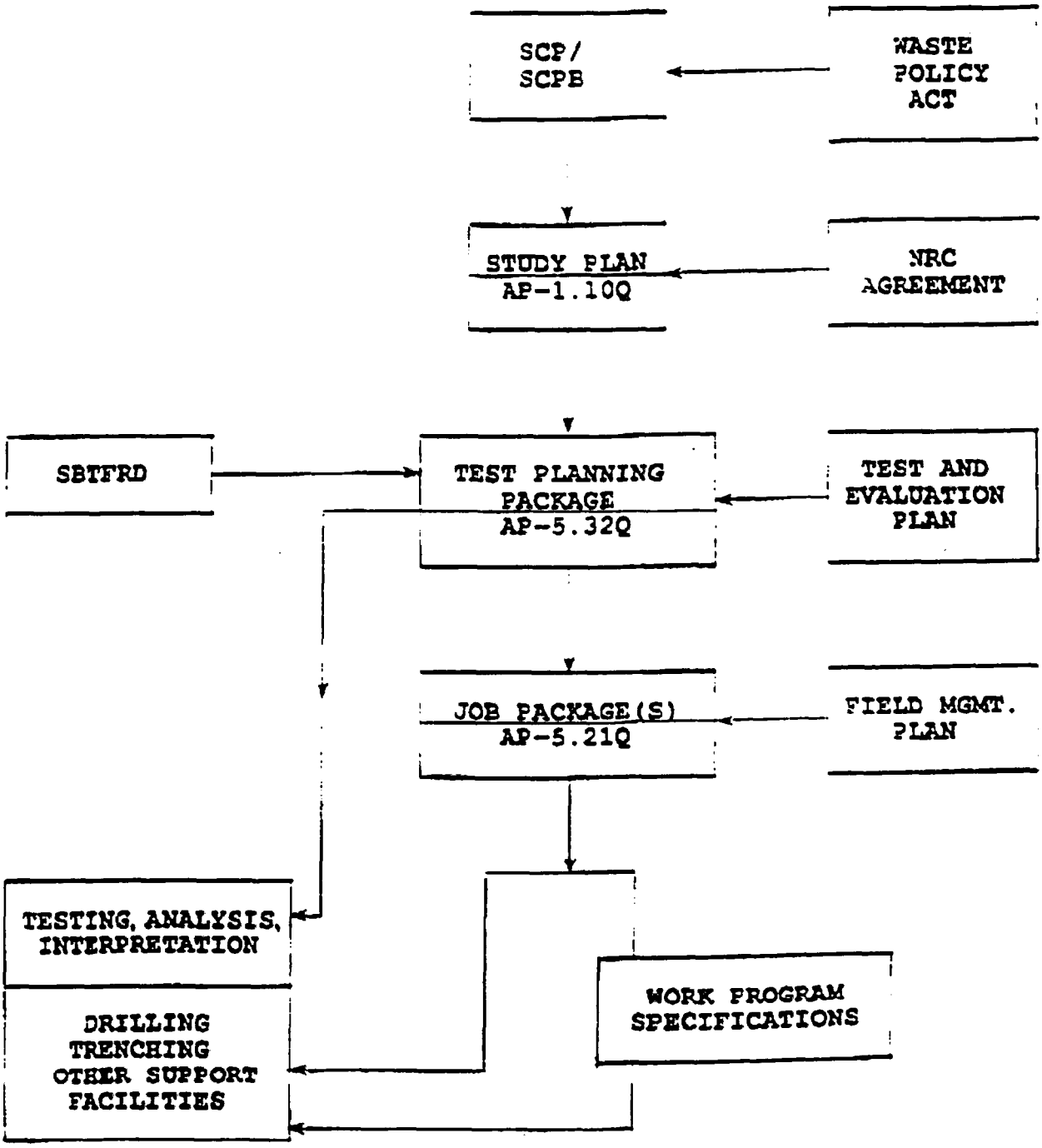
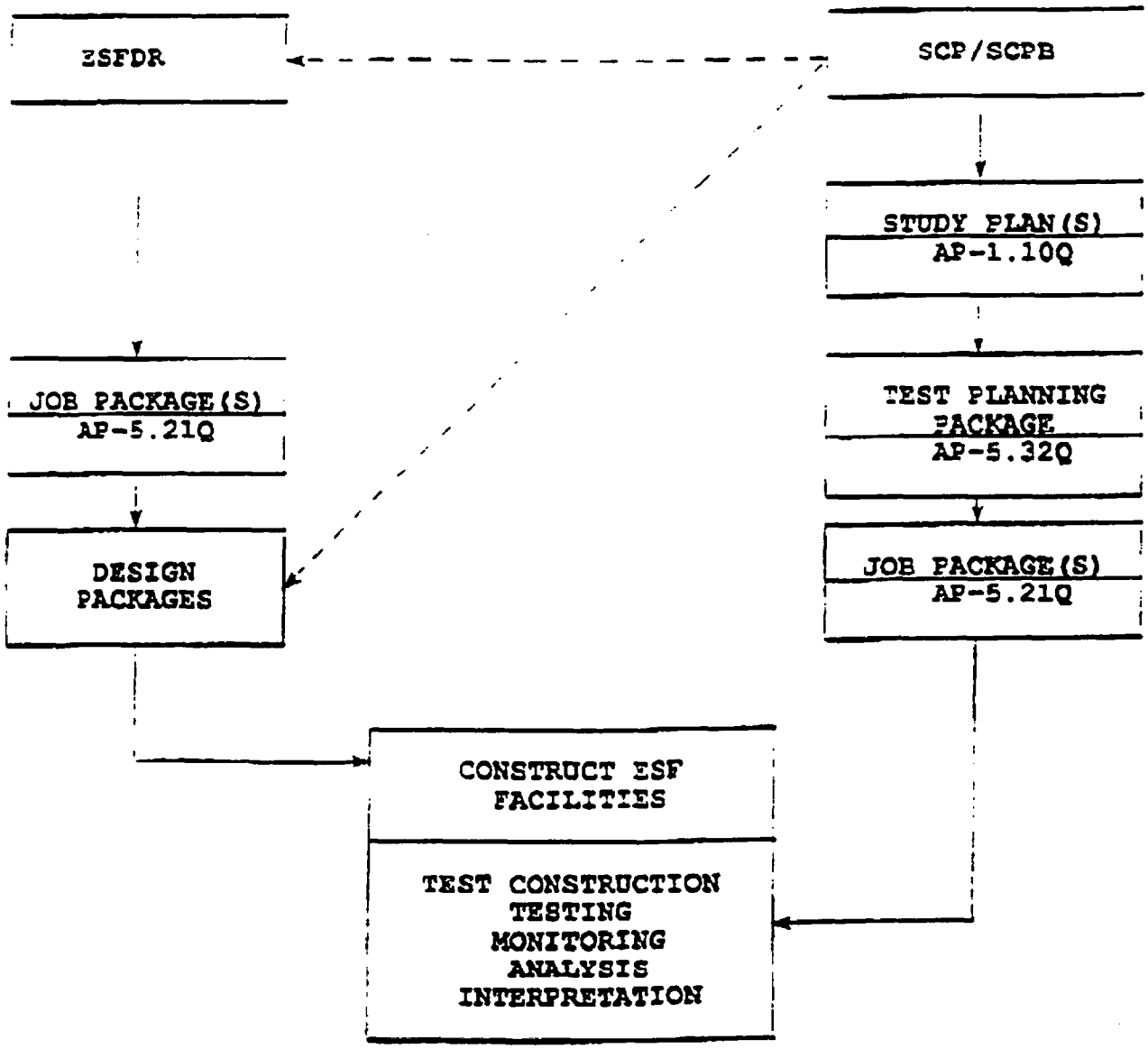


EXPLORATORY STUDIES FACILITY



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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED M&O, Vienna, VA M&O, Las Vegas, NV	[x] EXTERNAL [ ] INTERNAL	[ ] AUDIT [x] SURVEILLANCE	PREPARED BY A. Mohzi/T. Grant DATE 9/7/93 mkH.
DATES OF EVALUATION September 8-10, 1993 September 13-17, 1993			
CONTROLLING DOCUMENT (Title, Number, Revision) TDPP for the Preparation of MGDS-SRD			ACTIVITY EVALUATED Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Ensure CRD requirements, applicable to the MGDS, trace down to the MGDS-SRD. (At Vienna) a) Review a sample of Table 6-3, Section 6.6, Pages 182-192, which provides a cross-reference between the CRD requirements and where they are addressed in the MGDS-RD. b) Check if QAP 6.2 review criteria includes vertical traceability. Review a sample of the QAP 6.2 DRR forms to determine if reviewers made comments on vertical traceability and how they were resolved. c) If specific requirements are not simple transcriptions of requirements in higher-level document(s), review documentation and analyses supporting (a) selection of derived requirement, (b) selection of specific values used in derived requirement, and (c) rationale or justification showing that derived requirement(s) fully encompass the scope of the high-level requirement.		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1 cont	d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting requirements.		
2	Ensure WMSR-Vol. 1 and WMSD technical requirements, applicable to the MGDS, trace to the CRD. (At Vienna). a) Check the QA Record Package for the CRD and review a sample of the entries in the cross-reference between the WMSR-Vol. I and WMSD requirements and where they are addressed in the CRD. b) Review how requirements were transferred from documents being replaced into MGDS-SRD and whether transfer completely encompassed and old requirements set. (Transfer form old hierarchy). c) Review analyses or justifications for selecting, modifying, or deleting requirements contained in superseded documents. Review analysis or justifications adding new requirements that were not contained in the superseded document to the new requirements document. (Transfer form from old hierarchy) d) Review RAS, DCS, Issue Clarification and Derived Requirements Document forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting old requirements for inclusion in new documents. (Transfer from old hierarchy)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS *Record objective evidence reviewed, method of verification, personnel contacted*	RESULTS
3	Ensure WMSR-Vol. IV technical requirements trace to the MGDS-RD. (At Vienna). a) Check the QA Record Package for the MGDS-RD and review a sample of the entries to the cross-reference between the WMSR-Vol. IV requirements and where they are addressed in the MGDS-RD. b) Review how requirements were transferred from documents being replaced into MGDS-SRD and whether transfer completely encompassed and old requirements set. (Transfer from old hierarchy) c) Review analyses or justifications for selecting, modifying, or deleting requirements contained in superseded documents. Review analysis or justifications adding new requirements that were not contained in the superseded document to the new requirements document. (Transfer from old hierarchy) d) Review RAS, DCS, Issue Clarification and Derived Requirements Document forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting old requirements for inclusion in new documents. (Transfer from old hierarchy)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
4	Ensure MGDS-RD requirements, applicable to the Site Segment, trace down to the SD&TRD. (At Vienna & Las Vegas) a) Review a sample of the Table in the SD&TRD which provides a cross-reference between the MGDS-RD requirements and where they are addressed in the SD&TRD. b) Check if QAP 6.2 review criteria includes vertical traceability. Review a sample of the QAP 6.2 DRR forms to determine if reviewers mad comments on vertical traceability and how they were resolved. c) If specific requirements are not dimple transcriptions of requirement in higher-level document(s), review documentation and analyses supporting (a) selection of derived requirement, (b) selection of specific values used in derived requirement, an (c) rationale or justification showing that derived requirement(s) fully encompass the scope of the high-level requirement. d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting requirements.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
5	Ensure SD&T requirements from the old baseline trace to the new SD&TRD. (At Las Vegas). a) Check the QA Record Package for the SD&TRD and Section 6 of the SD&TRD; and review the sample of the entries in the cross-reference between the old SD&T requirements and where they are addressed in the new SD&TRD. b) Review how requirements were transferred from documents being replaced into SD TRD and whether transfer completely encompassed the old requirements set. (Transfer from old hierarchy) c) Review analyses or justifications for selecting, modifying, or deleting requirements contained in superseded documents. Review analyses or justifications adding new requirements that were not contained in the superseded document to the SD&TRD. (Transfer from hold hierarchy) d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting old requirements for inclusion in the SD&TRD.		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Ensure SD&TRD requirements, applicable to the ESF trace down to the ESFDR. (At Las Vegas) a) review a sample of the Table in the ESFDR which provides a cross-reference between the SD&TRD requirements and where they are addressed in the ESFDR. b) Check if QAP 6.2 review criteria includes vertical traceability. Review a sample of the QAP 6.2 DRR forms to determine if reviewers made comments on vertical traceability and how they were resolved. c) If specific requirements are not simple transcriptions of requirement in high-level document(s), review documentation and analyses supporting (a) selection of derived requirement, (b) selection of specific values used in derived requirement, and (c) rationale or justification showing that derived requirement(s) fully encompass the scope of the high-level requirement. d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting requirements.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
7	Ensure ESF requirements from the old baseline trace to the new ESFDR. (At Las Vegas). a) Check the QA Record Package for the ESFDR and review a sample of the entries in the cross-reference between the old ESFDR requirements and where they are addressed to the new ESFDR. b) Review how requirements were transferred from documents being replaced into and whether transfer completely encompassed the old requirements set. c) Review analyses or justifications for selecting, modifying, or deleting requirements contained in superseded documents. Review analysis or justifications adding new requirements that were not contained in the superseded document to the new ESFDR. d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting old requirements for inclusion in the ESFDR.		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
8	*Ensure SD&TRD requirements, applicable to SBT trace down to the* SBTFDR. (At Las Vegas) a) Review a sample of the Table in the SBTFDR which provides a cross-reference between the SD&TRD requirements and where they are addressed in the SBTFDR. b) Check if QAP 6.2 review criteria includes vertical traceability. Review a sample of the QAP 6.2 DRR forms to determine if reviewers made comments on vertical traceability and how they were resolved. c) If specific requirements are not simple transcriptions of requirement in higher-level document(s), review documentation and analyses of specific values used in derived requirement, and (c) rationale or justification showing that derived requirement(s) fully encompass the scope of the higher-level requirement. d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting requirements.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
9	Ensure SBT requirements from the old baseline trace to the new SBTFRD. (At Las Vegas). a) Check the QA Record Package for the SBTFRD and review a sample of the entries in the cross-reference between the old SBTFRD requirements and where they are addressed in the new SBTFRD. b) Review how requirements were transferred from documents being replaced into SBTFRD and whether transfer completely encompassed the old requirements set. c) Review analyses or justifications for selecting, modifying, or deleting requirements contained in superseded documents. Review analyses or justifications adding new requirements that were not contained in the superseded document to the SBTFRD. d) Review RAS, DCS, Issue Clarification and Derived Requirements Documentation forms, Technical Document Input Control forms, and any other documentation to evaluate technical defensibility of process of selecting old requirements inclusion in SBTFRD.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
10	Ensure ESFDR requirements trace down to the BFD. (At Las Vegas) a) Ensure ESFDR requirements, applicable to Package 1A, trace down to the BFD of Package 1A. 1. Review a sample of entries in the cross-reference (should be contained in the BFD) between the ESFDR requirements and where they are addressed in the BFD. 2. Check if review criteria, for the BFD, includes vertical traceability. Review a sample of the 90% Design Review DRR forms to determine if reviewers mad comments on vertical traceability and how they were resolved. b) Ensure ESFDR requirements, applicable to Package 1B, trace down to the BFD of Package 1B. 1. Review a sample of entries in the cross-reference (contained in the BFD) between the ESFDR requirements and where they are addressed in the BFD. 2. Check if review Criteria, for the BFD, includes vertical traceability. Review a sample of the 90% Design Review DRR forms to determine if reviewers made comments on vertical traceability and how they were resolved.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
10 cont	c) Ensure ESFDR requirements, applicable to Package 2A, trace down to the BFD of Package 2A. 1. Review a sample of entries in the cross-reference (contained in the BFD) between the ESFDR requirements and where they are addressed in the BFD. 2. Check if review criteria, for the BFD, includes vertical traceability. Review a sample of the 90% Design Review DRR forms to determine if reviewers made comment on vertical traceability and how they were resolved.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
11	Ensure BFD criteria are implemented in the ESF design packages. (At Las Vegas) a) Ensure BFD criteria, applicable to Package 1A, are implemented in Design Package 1A. 1. Review a sample of entries in the cross-reference (should be contained in the Design Package) between the BFD criteria and which ESF design feature implements it and in which design output document is described. 2. Check if review criteria, for the Design Package, includes requirements implementation. Review a sample of the 90% Design Review DRR forms to determine if reviewers made comments on requirements implementation and how they were resolved. b) Ensure BFD criteria, applicable to Package 1B, are implemented in Design Package 1B. 1. Review a sample of entries in the cross-reference (should be contained in the Design Package) between the BFD criteria and which ESF design feature implements it and in which design output document is it described. 2. Check if review criteria, for Design Package, include requirements implementation. Review a sample of the 90% Design Review DRR forms to determine if reviewers made comments on requirements implementation and how they were resolved.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
11 cont	c) Ensure BFD criteria, applicable to Package 2A, are implemented in Design Package 2A. 1. Review a sample of entries in the cross-reference (should be contained in the Design Package) between the BFD criteria and which ESF design feature implements it and in which design output document is it described. 2. Check if review criteria, for the Design Package, includes requirements implementation. Review a sample of the 90% Design Review DRR forms to determine if reviewers made comments on requirements implementation and how they were resolved.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
12	Review flowdown of objectives for site characterization studies and activities to lower level documents. (SD&TRD) a. Review the documentation showing the pathway by which objectives flowdown to eventual implementation in the field. b. If the flowdown of objectives involves requirements or implementing documents prepared by other participants, review how interface between participants operates including: (a) training or other processes by which other participants are made aware of document and their responsibilities for implementing it, (b) how feedback processes from participants operate to provide verification that objectives have been completed. (SD & TRD) c. Review processes by which other documents (Study Plans, SCP baseline) are monitored so that timely revisions to statements of objectives are made in document to keep all documents consistent. (SD&TRD)		
13	Review procedures or methods by which the verification of objectives discussed in Section 4 and listed on Table 4.1 is to be carried out and documented. (SF&TRD)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
14	Review process for determining the selection of verification methods shown on Table 4.1. (SD&TRD)		
15	Review process or procedures for the flowdown of requirements from document to field implementing documents (job packages and test planning packages). a) Review provisions for training preparers of job packages and test planning packages in contents of document and their responsibilities for carrying out the flowdown of requirements into their documents. b) Review process for determining and documenting which of the SBTFRD requirements listed in Tables 4.1 & T.1 (i.e., those discussed in Section 3) are applicable to a particular job package or test planning package.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
16	Review process for flowdown of verification of requirements (Section 4 of SBTFRD) to participants preparing and implementing job packages, test planning packages, and field verification plans including: (a) identification of documents and procedures affected by verification requirements, (b) requirements for how documentation of verification is to be made (c) interface requirements for feedback to SBTFRD level on verification that requirements were met.		
17	Review process for analyzing, justifying, and documenting upper-tier requirements to produce lower-tier SBTFRD requirements including: (a) analyses that show SBTFRD requirements fully meet the intent of upper-tier requirements, (b) that the set of lower-tier requirements related to an upper-tier requirement cover the full scope of that requirement.		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
18	Review the consistency in requirements for similar facilities in the SBTFRD.		
19	Review documentation that determined whether requirements in SBTFRD conform or conflict with current requirements/practices for completed, ongoing, or planned activities		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
20	Review mechanisms (if any) for allowing variances from SBTFRD requirements for specific field activities and how such variances are reflected in the SBTFRD.		
21	Verify that a document analysis was performed to determine if completed and ongoing work at YMP is in compliance with the SRD/DRD set of documents. (Item 1c, Page 4 of 7, BCP 0002 dated 7/23/93). a) Review impact analysis on MGDS activities performed as part of the DCP for CRD. (At Vienna). b) Review impact analysis in MGDS activities performed as part of the DCP for MGDS-RD. (At Vienna). c) Review impact analysis on ESF and SBT activities performed as part of the CR 93/329 for SF&TRD. (At Las Vegas). d) Review impact analysis on ESF activities performed as part of the CR 93/422 for ESFDR. (At Las Vegas) e) Review impact analysis on SBT activities performed as part of the CR 93/418 for SBTFRD. (At Las Vegas).		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
22	Review impact analysis performed by the PBCCB Action Officer (Stew Willis, M&O, Vienna) for BCP 0002. (Section 5.4.3 of the PBCCP, Section 3.2.1.C of the QARD). (At Vienna).		
23	Verify that a documented analysis was performed to ensure that vertical traceability exists in the SRD/DRD set of documents. (Item 1a, Page 4 of 7, BCP 0002 dated 7/23/93).		

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ORGANIZATION EVALUATED M&O, Vienna, VA M&O, Las Vegas, NV	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY D. Threatt MLH DATE 09/02/93
DATES OF EVALUATION Sept. 8-10, 1993 & Sept. 13-17, 1993			
CONTROLLING DOCUMENT (Title, Number, Revision) QAAP 2.1, Rev. 2 *Indoctrination and Training*			ACTIVITY EVALUATED Indoctrination and Training

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
	NOTE: Evaluation of the following characteristics is only for those activities associated with the preparation and review of the "Dispose Waste" requirements documents as applicable.		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	Verify that I&T requirements essential to the performance of assigned tasks are identified on the I&T Matrix. (QAAP 2.1, Para. 5.2.1)		
2	Verify that supervisors inform the QA Training Officer, by memo, if any permanent and non-permanent personnel under their supervision are performing duties subject to QA program controls. • Obtain a copy of the memos. (QAAP 2.1, Para. 6.2.1)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3	Verify that supervisors have prepared an initial or revised an existing I&T Matrix whenever: a) New personnel are assigned; or b) Previously assigned personnel receive a new position or changes to job duties within a position. (QAAP 2.1, Para. 6.5.11)		
4	Verify that the employee enters the date reading was done, effective date of revision (or revision number, if no effective date exists), and the employee's initials to indicate completion of self-study, requirements and signs all pages of the I&T Matrix to indicate completion of all self-study and classroom training assignments. (QAAP 2.1, Para. 6.5.6, 6.5.8)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
5	Verify that subsequent documentation of completed self-study and classroom training is made on a separate I&T Matrix and that the QA Training Officer enters the data into the training database. (QAAP 2.1, Para. 6.5.11)		
6	Verify that training requirements for a job duty have been completed prior to performing the duty. (QAAP 2.1, Para. 6.5.1)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
7	Verify that employees have attended assigned classroom training. (QAAP 2.1, Paras. 6.5.2, 6.5.4)		
8	Verify that completed I&T Matrices, Attendance Records, and lesson plans are collected and maintained per QAAP 17.1 (Para. 7.1)		

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AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED M&O, Vienna, VA M&O, Las Vegas, NV	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY D. Threatt MJA DATE 09/02/93
DATES OF EVALUATION Sept. 8-10, 1993 & Sept. 13-17, 1993			
CONTROLLING DOCUMENT (Title, Number, Revision) QAAP 2.2, Rev. 2 *Verification of Personnel Qualifications*			ACTIVITY EVALUATED Indoctrination and Training

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
	NOTE: Evaluation of the following characteristics is only for those activities associated with the preparation and review of the "Dispose Waste" requirements documents as applicable.		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	Verify that position descriptions, describing the major duties and responsibilities, have been developed by the supervisors for each of their staff members who perform activities subject to QA program controls and are included in each employees training and qualification file. (QAAP 2.2, Para. 5.1)		
2	Verify that minimum education and experience requirements are contained in each position description. (QAAP 2.2, Para. 6.2.1)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3	Verify that education and experience meet the minimum required for the position. (QAAP 2.2, Para. 6.2.1)		
4	Verify completion of the Position Qualification Statement by the Supervisor: • Assure objective evidence of verification of education and experience is attached • If education and experience wasn't verified, assure the supervisor provided a written statement with justification for the assignment (QAAP 2.2, Paras. 6.2.2, 6.2.3)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
5	Verify that the supervisor transmitted the completed PQS with supporting documentation to the QRC. (QAAP 2.2, Para. 6.3.2)		
6	Verify that the supervisor maintains a copy of each PQS with supporting documentation in a locked cabinet. (QAAP 2.2, Para. 6.3.3)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
7	Verify that employees reassigned to perform new duties (that require different qualifications) have been requalified. • Check status of position descriptions (QAAP 2.2, Para. 6.5)		

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ORGANIZATION EVALUATED M&O, Vienna, VA M&O, Las Vegas, NV	[x] EXTERNAL [ ] INTERNAL	[ ] AUDIT [x] SURVEILLANCE	PREPARED BY D. Threatt DATE 9/7/93
DATES OF EVALUATION September 8-10, 1993 September 13-17, 1993			
CONTROLLING DOCUMENT (Title, Number, Revision) QAAP 17.1, *QA Records Management*			ACTIVITY EVALUATED QA Records Management

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify that the originating organization maintains a log of specific QRPs and QRP identification number (QAAP 17.1, Para. 6.2.1)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
2	Verify that record originators are marking QA Records with "QA" in upper right hand corner of the first page. (QAAP 17.1, Para. 6.3.2)		
3	Verify that record originators are meeting the following requirements: a) QA Record is authenticated by signature/initials and date or attached cover letter. b) QA Record is complete/all attachments c) Written/typed records are legible, reproducible, and microfilmable. d) all drafts are marked "Draft" (QAAP 17.1, Para. 6.3.3)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
4	Verify that record transmittals include the following: (Para. 6.3.4) a) Package identification number b) Record title c) Record date d) Number of pages e) Special instructions f) Name/location of the person submitting record g) One-of-a-kind/special process information (Para. 6.4) (QAAP 17.1, Paras. 6.3.4 and 6.4)		
5	Verify that formal (no preliminary) draft of documents comply with the following: a) Marked draft on the front page b) Comments on drafts recorded on separate document c) Copies of draft comments are filed with final approved document (QAAP 17.1, Para. 6.5)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Verify that the QRP validator is complying with the following: a) Arrange document in a sequence b) Purge duplicates, etc. c) identifies missing records (slip sheets) d) Identifies one-of-a-kind/special processing e) Verifies each record is properly marked (authenticated, correct, reproducible) f) Corrections are made IAW para. 6.8 g) Completed Table of Contents 1. logical order 2. One-of-a-kind/special processing 3. QRP No./Rev. in upper right corner h) Signs/Dates "validated by" (QAAP 17.1, Paras. 6.7.2, 6.7.3, 6.7.4, 6.7.5, 6.7.6, 6.7.7)		
7	Verify that corrections to records are being accomplished IAW para. 6.8 of QAAP 17.1.		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
8	Verify that QA Records are protected from deterioration, loss, or damage. (QAAP 17.1, Para. 6.9)		
9	Verify that the record originator replaces, restores, or develops a substitute QA record following determination that a record has been lost or damaged to a degree that is no longer complete or legible. (QAAP 17.1, Para. 6.10)		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED			
M&O, Vienna VA & Las Vegas, NV	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY D. Threatt mkH DATE 09/02/93
DATES OF EVALUATION 9/8-10/93 & 9/13-17/93			

CONTROLLING DOCUMENT (Title, Number, Revision) Revision 2, effective 05/18/92	ACTIVITY EVALUATED
Quality Assurance Procedure (QAP) 3.5, *Technical Document Preparation*	Technical Document Preparation

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
	NOTE: This checklist is for evaluation of the preparation of the following documents: 1) Mined Geological Disposal System Requirements Document (MGDS-RD) 2) Site Design & Test Requirements Document (SD&TRD) 3) Exploratory Studies Facility Design Requirements (ESFDR) 4) Surface Based Testing Facilities Requirements Document (SBTFRD) 5) Basis for Design Document (BFD)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	Verify that a Technical Document Preparation Plan (TDPP) ia approved and issued to support the preparation of System Requirements Documents. (QAP 3.5, Para. 5.2)		
2	Verify that the preparer evaluates potential inputs identified in the TDPP, determines applicability, and documents rationale for the decision. (QAP 3.5, Para. 5.3.2a)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
3	Verify that the preparer determines whether inputs were developed under QA Program controls commensurate with the technical document. (QAP 3.5, Para. 5.3.2b)		
4	Verify that the preparer determines those steps necessary to use "unqualified" inputs, as appropriate. (QAP 3.5, Para. 5.3.2c)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
5	Verify that the preparer considers the review criteria outlined in the TDPP during development of the technical document. QAP 3.5, Para. 5.3.3b)		
6	Verify that "unqualified" inputs are designated with an asterisk on the technical document input listing. (QAP 3.5, Para. 5.3.3c)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
7	Verify that the technical document identifies, describes, and assigns responsibilities for interfaces. (QAP 3.5, Para. 5.3.3d)		
8	Verify that the responsible director initiates and coordinates a Technical Review in accordance with QAP 6.2. (QAP 3.5, Para. 5.5a)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
9	Verify that the review is assigned to those organizations listed in the TDPP as having responsibility for reviewing the document. (QAP 3.5, Para. 5.5b)		
10	Verify that the review criteria in the TDPP is specified and that additional review criteria is established, as necessary. (QAP 3.5, Para. 5.5c)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
11	Verify that the review package is forwarded to the training organization for use in developing training materials if training is specified in the TDPP. (QAP 3.5, Para. 5.5d)		
12	Verify that final documents are prepared and all changes are identified on document pages with a vertical line in the margin adjacent to the change unless it is indicated that the entire document has been revised. (QAP 3.5, Para. 5.6a)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
13	Verify that the technical document is approved by the Responsible Director. (QAP 3.5, Para. 5.6d)		
14	Verify that the technical document is submitted for Change Control Board (CCB) action as needed, assigned a document identification number, and submitted for distribution in accordance with applicable procedures. (QAP 3.5, Para. 5.6g)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
15	Verify that a QA Records package is assembled for the technical document and records of document review activities are maintained in the same QA Records package. (QAP 3.5, Para. 5.6h, 7.0)		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED			
M&O, Vienna VA & Las Vegas, NV	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY D. Threatt DATE 09/02/93
DATES OF EVALUATION 9/8-10/93 & 9/13-17/93			

CONTROLLING DOCUMENT (Title, Number, Revision) Revision 2, effective 05/18/92
Quality Assurance Procedure (QAP) 6.2, *Document Review*

ACTIVITY EVALUATED
Document Review

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
	NOTE: This checklist is for evaluation of the review of the following documents: 1) Mined Geological Disposal System Requirements Document (MGDS-RD) 2) Site Design & Test Requirements Document (SD&TRD) 3) Exploratory Studies Facility Design Requirements (ESFDR) 4) Surface Based Testing Facilities Requirements Document (SBTFRD) 5) Basis for Design Document (BFD)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	Verify that the review coordinator prepares the Document Review Record (DRR) and Comment Sheet consistent with instructions provided. (QAP 6.2, Para. 5.1a)		
2	Verify that the review criteria, including standard review criteria and any additional review criteria specific for the document being reviewed, is documented on the DRR. (QAP 6.2, Para. 5.1b)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3	Verify that the review organizations are identified and that the applicable review criteria are specified for each reviewer. (QAP 6.2, Paras. 5.1.c, d)		
4	Verify that a reasonable review date has been established for return of the DRRs and Comment Sheets. (QAP 6.2, Para. 5.1e)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	• RESULTS
5	Verify that the DRR and Comment Sheet are signed, dated and forwarded to the appropriate reviewing organizations. (QAP 6.2, Para. 5.1e)		
6	Verify that the document reviewer performs the review using the assigned review criteria. (QAP 6.2, Para. 5.2a)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
7	Verify that comments are documented on the Comment Sheet and that mandatory comments are identified with an asterisk (*). (QAP 6.2, Paras. 5.2b, c)		
8	Verify that the DRR is appropriately signed off and returned with Comment Sheets to the Review Coordinator. (QAP 6.2, Paras. 5.2d, e)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
9	Verify that the Review Coordinator reviews comments, develops responses, and modifies the document as appropriate. (QAP 6.2, Paras. 5.3.1a, b, c)		
10	Verify the modified document and copies of all DRRs and Comment Sheets, with responses, are forwarded to the document reviewers for acceptance. (QAP 6.2, Para. 5.3.1d)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
11	Verify that the document reviewers appropriately disposition the responses to their mandatory comments and return the DRRs and Comment Sheets to the review coordinator. (QAP 6.2, Paras. 5.3.2a, b, c, d)		
12	Verify that the review coordinator reviews the returned DRRs and Comment Sheets to ensure all mandatory comments have been accepted and concurrence signatures obtained. (QAP 6.2, Para. 5.3.3a)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
13	Verify that disputes are adequately resolved. (QAP 6.2, Paras. 5.3.3b, c)		
14	Perform a detailed review of the DRRs and Comment Sheets to determine the adequacy and technical depth of the review. (N/A)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
15	Verify that the completed DRRs and copies of the documents reviewed are collected and maintained as QA records. (QAP 6.2, Para. 7.0)		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED	[x] EXTERNAL	[ ] AUDIT	PREPARED BY James George MCH DATE 9/1/93
M&O	[ ] INTERNAL	[x] SURVEILLANCE	
DATES OF EVALUATION September 8-17, 1993			

CONTROLLING DOCUMENT (Title, Number, Revision)	ACTIVITY EVALUATED
Project Office Indoctrination & Qualification Training, QMP-02-01, Rev. 6	Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify by review of objective evidence that all requirements document preparers and reviewers have had their education and experience verified and received documented training in accordance with QMP-02-01 as specified by the TDPP for Preparation of MGDS Design Requirements Documents, 9/17/92, Section 4.3.1E.		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1 (cont.)	a. Supervisor documents training assignment on a Training Assignment form (Attachments 3 and 4); enters an assignment completion date; and, for special activities groups, coordinates training requirements for members of these groups with the Training Manager; or, for Real-Time training not on Attachment 3, ensures that training is documented directly on the record produced as a result of quality affecting activities, or on a Procedure Compliance Documentation Form (Attachment 6). (Section 5.0, Item 7, paragraphs 1, 2 and 2nd and 4th notes, pages, 5, 6 and 7)		
	b. Training Manager obtains documented statement from Personnel or designee attesting to completion of verification of education and experience. (5.0, Item 11, pg. 7)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1 (cont.)	c. Employee (preparer/reviewer) completed training assignment and has documented evidence of training to the applicable document governing the work performed prior to performing quality affecting activities. (5.0, Item 13, pg. 7)		
	d. If applicable, completion of Self-Study Assignment forms (Attachment 5) were used to document training. (5.0, Item 30, pg. 11)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1 (cont.)	e. Training records generated by this activity are maintained in accordance with DOE System 80 requirements. (Section 8.0, 2nd paragraph, pg. 14)		

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ORGANIZATION EVALUATED	[x] EXTERNAL	[ ] AUDIT	PREPARED BY James George MLR DATE 9/1/93
M&O	[ ] INTERNAL	[x] SURVEILLANCE	
DATES OF EVALUATION: September 8-17, 1993			

CONTROLLING DOCUMENT (Title, Number, Revision)	ACTIVITY EVALUATED
AP-1.18Q, Rev. 1 Records Management: Las Vegas Record Source Responsibilities	Preparation and Flowdown of "Dispose Waste" Requirements Documents.

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify by review of objective evidence that the following documents directing the conduct of quality affecting activities identify records and/or records packages: 1. Technical Document Preparation Plan and any Revisions; 2. Requirements Documents for QAP 6.2 Review a) draft for review b) revised after review with resolved comments c) final after CCB review with resolved comments; 3. Document Change Proposal 4. QMP-02-01 documentation for all preparers and reviewers a) Education and Experience Verification Form b) I&T matrices; 5. All documentation associated with the QAP 6.2 review; and 6. Requirements Allocation Sheets (RAS) used to develop Requirements Documents. (Section 5.0, Item 1, Page 7)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
2	Verify by review of Objective Evidence that Record Sources (individuals or organizations responsible for generating records or for receiving YMP records from outside entities) are 1) trained to AP-1.18Q and 2) technically qualified before preparing or submitting YMP records to the LRC. (Section 5.0, Item 2, page 7)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
3	Verify by review of objective evidence the following: 1. draft Requirements Documents marked "Draft" on first page (Appendix A, Item 1, pg. 13); 2. privileged records are identified and labeled as such (App. A, Item 4, Pg. 13); 3. record packages include a table of contents that list the records, includes a page count, has been signed and dated, and table of contents has a records package identifier in the upper right-hand corner of the first page of the Table of Contents (App. A, Items 9&10, pg. 14); 4. WBS and configuration item identifiers (CI) have been assigned and placed in the upper right-hand corner of the first page of individual records and as part of the identifier for record packages, and "QA" placed in the upper right-hand corner of the firs page of individual QA records and on first page of Table of Contents (App. A, Items 11 &13, pg. 14).		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED M&O	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY Robert Howard MLA DATE 9/2/93
DATES OF EVALUATION			

CONTROLLING DOCUMENT (Title, Number, Revision) AP1.10Q, Preparation, Review, Approval, and Revision of Site Characterization Plan Study Plans.

ACTIVITY EVALUATED
Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify the Project Manager identifies YMP Participant Organizations responsible for preparing specific Study Plans. [5.1.1]		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
2	Verify the Technical Project Officer assigns a qualified Principal Investigator to write the Study Plan for each Study Plan assigned to his/her organization. [5.1.2]		
3	Verify the Principal Investigator drafts the Study Plan in accordance with Subsection 6.1 of AP1.10Q. [5.1.3]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS *Record objective evidence reviewed, method of verification, personnel contacted*	RESULTS
4	Verify the Technical Project Officer initiates a review of the draft Study Plan, including a quality assurance review, in accordance with the criteria in Para 6.3.2 of AP1.10Q. Verify the review is documented in accordance with the internal review procedures of the YMP Participating organization. [5.1.4]		
5	Verify the Technical Project Officer forwards the draft Study Plan, along with a statement that QA and technical reviews are complete, copies of any references cited in the draft Study Plan and ac copy of any required DARs to change the YMP RD, to the Director, RSED, for YMP review. [5.1.4.b]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Verify the Regulatory Interactions Branch Chief ensures that a screening review is conducted upon receipt of the Study Plan to determine whether a QA review has been completed and whether the Study Plan is adequate for technical review. [5.2.1a]		
7	Verify the Regulatory Interactions Branch Chief documents the results of the screening review in a letter, and submits the letter to the Director, RSED. [5.2.1.e]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
8	Verify the Regulatory Interactions Branch Chief prepares and sends a written request for the Director, RSED, to sign for the initiation of the YMP technical and QA review of the Study Plan. [5.2.1.c]		
9	Verify the Technical and QA Reviewers: a) review the study plan in accordance with the criteria as described in subsection 6.3 of AP-1.10Q b) identify comments and determine whether they are editorial, mandatory, or nonmandatory. c) complete lines 1-10 of the comment resolution form, if a comment is mandatory or nonmandatory. d) write a comment in block 11 and suggest a proposed resolution for the comment in Block 12. e) prepare and sign the Study Plan Review Checklist by completing Blocks 1 and 2. [5.2.2]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
10	Verify the Regulatory Interactions Branch Chief forwards a consolidated set of all draft Study Plan Comment Response Sheets to the Technical Project Officer and the Principal Investigator [5.2.3]		
11	Verify the Principal Investigator responds to the review comments, resolves mandatory comments and prepares a verification draft of the Study Plan [5.2.6]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
12	Verify the technical and quality assurance reviewers: [5.2.9] a) review and verify resolutions of there mandatory comments in the verification draft Study Plan. b) sign the Study Plan Review Checklist in Block 3.		
13	Verify the Director, RSED obtains YMQAD signature and approves the final Study Plan by signing the Study Plan Approval Form [5.2.13]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
14	Verify the Regulatory Integration Branch Chief: a) authorizes the issuance of controlled copies of the Study Plan under applicable procedures. [5.1.2.14] b) compiles a records package to document the completed review process in accordance with the requirements of AP-1.18Q. [5.1.2.14]		
15	REVISIONS TO APPROVED STUDY PLANS Verify that the Principal Investigator and the Technical Project Officer: a) submit the proposed revised text, any required DARs, and a statement that QA and Technical Reviews are complete to the Director, RSED b) use vertical change bars in the margins of affected pages, including the table of contents, of the proposed revised text. [5.3.1]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
16	Verify the Regulatory Integration Branch Chief: a) checks whether unresolved commitments that affect the Study Plan exist from responses to Site Characterization Plan or Study Plan comments. [5.3.2] b) reviews the request and determines the category of the revision (revision categories are described in section 6.4 of AP-1.10Q), and documents the results of the review in a letter to the Director, RSED. c) initiates a review in accordance with para 5.2.1c through 5.2.14b if a technical review is required. d) initiates a review in accordance with paragraphs 5.2.13 through 5.2.14b if the revision is a minor change.		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED			
M&O	[X] EXTERNAL	[ ] AUDIT	
DATES OF EVALUATION	[ ] INTERNAL	[X] SURVEILLANCE	PREPARED BY Robert Howard DATE 9/2/93

CONTROLLING DOCUMENT (Title, Number, Revision)	ACTIVITY EVALUATED
AP-5.21Q, Field Work Activation	Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify the YMPO Division Director Completes Section I of the Job Package initiation Form and forwards the form to the Project Control Branch. [1]		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
2	Verify the Project Control Branch: a. Assigns a unique number to the Job Package b. Completes Section II of the Job Package Initiation Form c. Updates the job package Log.[2]		
3	Verify the Job Package Coordinator prepares a job package outline using the initiation package in accordance with the guidelines provided in the Attachment 2 of AP-5.21Q.[4]		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
4	Verify the Project Control Branch reviews the Job Package for completeness and conformance with the job package outline.[8]		
5	Verify the Job Package Coordinator prepares a Job Package Approval Form (attachment 3 of AP-5.21 Q).[11]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Verify the job package Coordinator obtains appropriate concurrence signatures from affected TPOs, Division Directors, and the Site Manager. [12]		
7	Verify the YMP Manager Approves the Job Package. [13]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
8	Verify the Project Controls Branch submits a records package to the las Vegas Local Records Center in accordance with AP-1.18Q [15]		
9	Verify the Project Controls Branch submits approved Job Packages to the YMSO DRC for distribution. [15]		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS *Record objective evidence reviewed, method of verification, personnel contacted*	RESULTS
10	Verify the Project Controls Branch updates the Job package Log.[16]		
11	Verify the YMP Manager approves the Notice to Proceed and forwards the Notice to the Site Manager. [17]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
12	Verify the Site Manager approves a Job Package cover letter authorizing affected Participants to commence assigned field work in the attached Job Package. [19]		
13	Verify the Site Manager Submits the Notice to Proceed and the Job Package Cover letter in accordance with AP-6.22Q, Job Package Completion and Records. [19]		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
14	Verify the Site Manager submits the Job Package to the YMSO DRC for distribution in accordance with AP-1.5Q. [19]		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED	[X] EXTERNAL	[ ] AUDIT	PREPARED BY Robert Howard MdH DATE 9/2/93
M&O	[ ] INTERNAL	[X] SURVEILLANCE	
DATES OF EVALUATION			

CONTROLLING DOCUMENT (Title, Number, Revision)	ACTIVITY EVALUATED
AP-5.32Q Test Planning and Implementation Requirements.	Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify the Regulatory and Site Evaluation Director: a. issues a Test Planning Package Request b. assigns a project engineer c. maintains a log of test planning packages [5.1.1]		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
2	Verify the Project Engineer submits a Job Package initiation request in accordance with AP-5.21Q, Field Work Activation for field tests. [5.1.2a]		
3	Verify the Project Engineer prepares a test planning package using attachment 8.2, Test Planning Package Outline, for guidance. [5.1.2.c]		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
4	Verify the Project Engineer checks for items and activities in the High level Waste Geologic repository Program subject to quality assurance requirements in accordance with AP-6.17Q. (This requirement is contained in a note in the procedure...poor practice)		
5	Verify the Project Engineer provides division directors and participants a copy of the test planning package outline.		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS *Record objective evidence reviewed, method of verification, personnel contacted*	* RESULTS
6	Verify Technical Project Officers provide necessary planning information to the project engineer.		
7	Verify the Project Engineer assembles the planning information and delivers it the appropriate DDs and TPOs.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
8	Verify the DDs/TPOs provide planning information and documentation of appropriate required activities identified in the test planning package outline or additional test-specific required activities, if any, to the Project Engineer. [5.2.3] (Is this step redundant to 5.2.1)		
9	Verify the Project Engineer: a) incorporates the documentation of required activities into the test planning package. b) prepares a written statement of test controls and instructions (governing procedure?) c) obtains test control and instructions approval from the RSED Director [5.2.4]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
10	Verify the Project Engineer: a) coordinates the development of design requirements with the Engineering and Development Division and Rased in accordance with the appropriate design requirements document. b) incorporates requirements in appropriate design requirements documents in accordance with AP-6.1Q, Project Office Document Development Review, Approval, and Revision Control. [5.3]		
11	Verify the Project Engineer: a) compiles the test planning package using the test planning package outline b) initiates a readiness review process, if required, per QAAP 2.6, Readiness Review.		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
12	Verify the Regulatory and Site Evaluation Division reviews the test planning package for completeness using Attachment 8.3, Guidelines for Evaluating Planning Adequacy. [5.4.2]		
13	Verify the Director, Quality Assurance approves the Test Planning Package on the Test Planning Package Approval Sheet. [5.4.2]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
14	Verify that affected Division Directors approve the Test Planning Package on the Test Planning Package Approval Sheet. [5.4.2]		
15	Verify the Regulatory and Site Evaluation Division releases the package to TPO/PE (or the PCB for field actives for AP-5.21Q processing), in accordance with AP-1.5Q, Issuance and Maintenance of Controlled Documents. [5.4.2]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
16	Verify the Principal Investigator submits a records package to the Las Vegas Local Records Center in accordance with AP-1.18Q. [5.4.5]		
17	Verify the Principal Investigator implements the test as described in subsection 6.3 of AP-5.32Q. [5.5.1]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
18	Verify the Project Engineer monitors test implementation as described in subsection 6.3 of AP-5.32Q. [5.5.2]		
19	Verify the Field Test Coordinator compiles reports, submits data on controls as required, and distributes, in accordance with Field Operating Instructions, test planning packages, and AP-5.1Q. [5.5.3]		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
20	TEST PLANNING PACKAGE REVISION Verify that the Responsible Division Director evaluates proposed changes in concert with the affected parties (division directors and participants) and approves the revision by either: a) adding an annotated approval page signed by the responsible division director, the Director of QA, and the affected parties to the revised version of the test package; or b) directing the Project Engineer to perform a revision of the test package starting at section 5.1.2e through 5.4.5 of AP-5.32Q. [5.6.2]		

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ORGANIZATION EVALUATED			
M&O Vienna, VA & Las Vegas, NV	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY D. Threatt MAN DATE 09/03/93
DATES OF EVALUATION 9/8-10/93 & 9/13-17/93			

CONTROLLING DOCUMENT (Title, Number, Revision) Revision 1, effective 06/15/93 *Technical Document Preparation Plan (TDPP) for the Preparation of MGDS Design Requirements Documents*

ACTIVITY EVALUATED Preparation of the Mined Geological Disposal System Design Requirements Documents (MGDS-DRDs)

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify format for the Requirements Document conforms to the requirements (TDPP, Para. 3.2)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
2	Verify that functions defined in the MGDS-DRDs are based on functions as identified in the System Requirements document (MGDS-RD). Ensure modifications or amendments are proposed where appropriate. (TDPP, Para. 4.1.1)		
3	Verify that a Requirements Allocation Sheet (RAS) is developed for each function identified and that the RAS is maintained as a permanent record of requirements traceability. (TDPP, Para. 4.1.3)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
4	Verify that the function description on the RAS is reviewed by the engineering task leader as indicated by initials in column 5 of the form and approved by the appropriate manager as indicated by signature on the bottom of the form. Ensure the RAS is then subjected to QAP 6.2 review. (TDPP, Para. 4.1.3)		
5	Verify that Design Constraint Sheets (DCSs) document requirements designated as "engineering constraints" (i.e., human factors, construction standards, safety, etc.) and the DCSs are reviewed by system engineering staff as indicated by initials in column 5 of the form, approved by the appropriate manager from System Integration, and submitted for QAP 6.2 review. (TDPP, Para. 4.1.4)		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Verify that the document preparer ensures that inputs were developed under quality assurance program controls consistent with those needed for the technical document. (TDPP, Para. 4.4.2)		
7	Review the Verification Matrices for validity and reasonableness. (TDPP, Para. 4.1.5)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
8	Verify that a Systems Branch Review was conducted prior to the QAP 6.2 review. (TDPP, Para. 4.2.1)		
9	Review the QAP 6.2 technical review package for completeness and appropriateness. (TDPP, Para. 4.2.2)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
10	Verify that the TDPP and any revisions thereto, the draft Requirements Document submitted for QAP 6.2 review, and all documentation associated with the review are maintained as QA Records. (TDPP, Para. 4.3.1)		
11	Verify education and experience of document preparers and reviewers in accordance with QMP-02-01. (TDPP, Para. 4.3.1) See QMP-02-01 checklist.		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
12	Verify QA Indoctrination and Training of document preparers and reviewers in accordance with QMP-02-01. (TDPP, Para. 4.3.1) See QMP-02-01 checklist.		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED M&O Vienna, VA & Las Vegas, NV	[X] EXTERNAL [ ] INTERNAL	[ ] AUDIT [X] SURVEILLANCE	PREPARED BY D. Threatt DATE 09/03/93
DATES OF EVALUATION 9/8-10/93 & 9/13-17/93			
CONTROLLING DOCUMENT (Title, Number, Revision) Revision 0, effective 07/14/92 *Technical Document Preparation Plan (TDPP) for the Preparation of Systems Requirements Documents*			ACTIVITY EVALUATED Preparation of the Mined Geological Disposal System Requirements Document (MGDS-RD)

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify format for the Requirements Document conforms to the requirements (TDPP, Para. 3.2)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	• RESULTS
2	Verify that system functions defined in the MDGS-RD are based on functions as identified in the Physical System Requirements document. Ensure modifications or amendments are proposed where appropriate. (TDPP, Para. 4.1.1)		
3	Verify that a Requirements Allocation Sheet (RAS) is developed for each function identified and that the RAS is maintained as a permanent record of requirements traceability. (TDPP, Para. 4.1.3)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
4	Verify that the function description on the RAS is reviewed by the engineering task leader as indicated by initials in column 5 of the form and approved by the appropriate manager as indicated by signature on the bottom of the form. Ensure the RAS is then subjected to QAP 6.2 review. (TDPP, Para. 4.1.3)		
5	Verify that Design Constraint Sheets (DCSs) document requirements designated as "engineering constraints" (i.e., human factors, construction standards, safety, etc.) and the DCSs are reviewed by system engineering staff as indicated by initials in column 5 of the form, approved by the appropriate manager from System Integration, and submitted for QAP 6.2 review. (TDPP, Para. 4.1.4)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Verify that new or changed inputs to the MDGS-RD are documented on Technical Document Input Control Forms including: a) A description of the inputs or change to inputs and the estimated impact of the change. b) A list of the requirements documents that are affected by the input. c) A list of the QA controls that were used in developing the input and the QA controls that are required for the technical document. d) Indication of whether the QA controls used for the input are adequate or if any actions were required to be able to accept the input. e) Whether the input will be included or excluded (provide rationale) and whether an immediate change to the technical document is needed. (TDPP, Para. 4.1.7)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
7	Review the Verification Matrices for validity and reasonableness. (TDPP, Para. 4.1.8)		
8	Verify that a System Design Review (SDR) and a System Engineering Branch Review (SEBR) was conducted prior to the QAP 6.2 review. (TDPP, Paras. 4.2.1 and 4.2.2)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
9	Review the QAP 6.2 technical review package for completeness and appropriateness. (TDPP, Para. 4.2.3)		
10	Verify that all document preparers and reviewers have been furnished a copy of the TDPP and that is it included on their I&T Matrices for all document developers and reviewers conducting reviews under QAP 6.2. (TDPP, Para. 4.2.5) See QAAP 2.1 checklist.		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
11	Verify that the TDPP and any revisions thereto, the draft Requirements Document submitted for QAP 6.2 review, and all documentation associated with the review are maintained as QA Records. (TDPP, Para. 4.3.1)		
12	Verify education and experience of document preparers and reviewers in accordance with QAAP 2.2. (TDPP, Para. 4.4) See QAAP 2.2 checklist.		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS *Record objective evidence reviewed, method of verification, personnel contacted*	* RESULTS
13	Verify QA Indoctrination and Training of document preparers and reviewers in accordance with QAAP 2.1. (TDPP, Para. 4.4) See QAAP 2.1 checklist.		
14	Verify Education and Experience Verification and Indoctrination and Training forms are included in the QA Records Package. (TDPP, Para. 4.4)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
15	Verify that copies of referenced Source Documents are maintained and that these copies are the most current versions. (TDPP, Para. 4.4.4)		

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED	[X] EXTERNAL	[ ] AUDIT	PREPARED BY James George DATE 8/30/93
M&O	[ ] INTERNAL	[X] SURVEILLANCE	
DATES OF EVALUATION			
September 8-17, 1993			

CONTROLLING DOCUMENT (Title, Number, Revision)	ACTIVITY EVALUATED
Corrective Action Request (CAR) HQ-92-012	Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify through personnel interviews what actions were taken and what, if any, documented objective evidence exists to show how the technical and management reviews were evaluated and determined satisfactory as stated in "Remedial Action (for) Condition A".		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

SHEET 2 OF 4
AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
2	Verify through review of objective evidence that the listing of additions/deletions for each document has been incorporated in next revisions, and associated rationale regarding each requirement's disposition is documented as stated in "Remedial Action (for) Condition B." Specifically verify Recommended Actions B.2, page 3, 30 CFR 36.45(b), missing from Table 2 "Disposition of Requirements Not Found in the ESFDR", WMSR ... not found in ESFDR (bottom of table). Also verify Recommended Actions B.4, page 4, 29 CFR XVII (other than 29 CFR 1910, 1926), which is not adequately explained on Table 4, "Disposition of Requirements not found in the SBTFRD", MGDS ... not found in the SBTFRD (Line C).		

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WASHINGTON, D.C.

SHEET 3 OF 4
AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
3	Verify by review of objective evidence that reviewers, using additional specific review criteria from the TDPP, ensured that all allocated requirements from the next higher level document were flowed down as stated in "Corrective Action to Preclude Recurrence, Conditions A&B," page 3.		

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SHEET 4 OF 4
AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
4	Verify by review of objective evidence that: a) document preparers for each design requirements document have been adequately trained in QAPs 3.5 and 6.2, and b) YMP ensures reviewers are adequately trained to QAP 3.5 and the TDPP as stated in "Action to Preclude Recurrence, Conditions A&B," page 3.		

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U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED	[x] EXTERNAL	[ ] AUDIT	PREPARED BY Dennis Threatt DATE 9/1/93
M&O	[ ] INTERNAL	[x] SURVEILLANCE	
DATES OF EVALUATION			
September 8-17, 1993			

CONTROLLING DOCUMENT (Title, Number, Revision) OCRWM CAR No. HQ-93-19 Date: 2/17/93, M&O CAR No. 92-QA-C-032 Date: 10/9/92

ACTIVITY EVALUATED
Verification of Personnel Qualifications

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Note: This checklist is for evaluation of corrective action and closure of OCRWM CAR No. HQ-93-19. The checklist will be completed for both M&O locations: Vienna, VA and Las Vegas, NV.		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

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AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify M&O training files for personnel performing work subject to the requirements of the QARD for the following: a. Training files contain academic institution supplied letters or transcripts which document the granting of the required diplomas; or b. Training files contain documented evidence (i.e. letter, memo, or notation on qualification form) that personnel files have been reviewed and they contain item a. above; or c. Training files contain documented telephone confirmations which include academic institution, person contacted, date of contact and confirmation of the required education; or d. Training files contain written justification of the basis of qualification where verification of education noted in a. through c. above cannot be accomplished due to the fact the institution is no longer in existence, records are lost or have been destroyed by fire, etc. (OCRWM CAR No. HQ-93-19, Response Para. C)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
2	Verify that new forms documenting the need for reverification of education have been provided to the responsible M&O managers for documentation of verification of education or coordination with M&O or Teammate HR Manager. (OCRWM CAR No. HQ-93-19, Response Para. C)		
3	Verify that, if any individuals are found not to have the required verifiable education and their qualification cannot be justified, a separate CAR is generated for each case. (OCRWM CAR No. HQ-93-19, Response Para. C)		

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
4	Verify that QAP-2-2 is revised to detail the methodology and documentation needed for the verification of education. Note: QAP-2-2 was to be revised by May 14, 1993 with an effective date of June 18, 1993. (OCRWM CAR No. HQ-93-19, Response Para. D)		
5	Verify that any new hires brought on from April 16, 1993 until the effective date of the revised procedure had their education verified and documented as described in items 1, 2, and 3 and the objective evidence filed in the training file. (OCRWM CAR No. HQ-93-19, Response Para. D)		

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WASHINGTON, D.C.

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AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
6	Verify all M&O Training files have been reviewed for objective evidence of verification of experience including the following: a. Verification of Education/Experience from QAP-2-2. b. Documentation, other than resumes, on file that documents the verification of experience. (M&O CAR-92-QA-C-032, Action Plan Para. 1)		
7	Verify, that, where only the form from QAP-2-2 and the resume are on file, the M&O Personnel Qualification form is completed on the individual in question by the individual's supervisor or the HR manager of the respective teammate. (M&O CAR-92-QA-C-032, Action Plan Para. 2, 3)		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
8	Verify a list is maintained of individuals requiring verification of experience to assure receipt of completed forms. (M&O CAR-92-QA-C-032, Action Plan Para. 4)		
9	Verify completed M&O Personnel Qualification forms are returned to M&O Training, reviewed, accepted and placed in the training files. (M&O CAR-92-QA-C-032, Action Plan Para. 5)		

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NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
10	Verify that any personnel identified as not having the required confirmation of experience are individually identified on a new M&O CAR. (M&O CAR-92-QA-C-032, Action Plan Para. 6)		
11	Determine status of documentation according to M&O QAP-16-1, Paragraph 6, *Records*.		

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WASHINGTON, D.C.

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AUDIT/SURVEILLANCE
NO. HQ-SR-93-07

QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED	[x] EXTERNAL	[ ] AUDIT	PREPARED BY James George DATE 9/2/93
M&O	[ ] INTERNAL	[x] SURVEILLANCE	
DATES OF EVALUATION			
September 8-17, 1993			

CONTROLLING DOCUMENT (Title, Number, Revision)	ACTIVITY EVALUATED
Change Control Process, AP-3.3Q, Rev. 5	Preparation and Flowdown of "Dispose Waste" Requirements Documents

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS
1	Verify by review of objective evidence that the Technical Project Officer (TPO) or the Division Director has initialed and completed page 1 of a Change Request (CR), identified documents affected by the change, performed initial impact assessment, and documented change on the Change Impact Checklist for each of the Requirements Documents. (Section 5.1.1.b), c), d), e) and "Note", page 3)		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

Office of Civilian Radioactive Waste Management

WBS:
QA:
Page: 1 of: 7

BASELINE CHANGE PROPOSAL (BCP)

1. BCP NUMBER REV.: 0
00-93-0002

REQUIRED APPROVAL DATE
ASAP

2. ORIGINATOR'S NAME
PRINT: W. Lemeshewsky
SIGN: Tie Nguyen for Lemeshewsky

ORGANIZATION:
Office of Systems and Compliance, RW-30
DATE: July 21, 1993 TELE: (202) 586-9696

3. CONFIGURATION/DOCUMENT IDENTIFIER
N/A
☐ See Continuation Page ____ REV.: ____

4. PRINCIPAL CONFIGURATION ITEM (CI) AFFECTED: N/A ☐ See Continuation Page ____
CI NOMENCLATURE: ____

5. DOC. ID NO. OF IMPACTED DOCUMENT:
REV.: ____

DOCUMENT TITLE OF IMPACTED DOCUMENT: See item no. 11 ☐ See Continuation Page ____

6. RESPONSIBLE BCCB
- ☐ ESAAB
- ☒ Program
- ☐ PO YMP
- ☐ PO MRS Project
- ☐ Field
- ☐ Contractor - ____

7. CHANGE AND PRIORITY LEVELS

☐ 0	☐ Routine
☒ 1	☒ Priority
☐ 2	☐ Urgent
☐ 3	☐ Field
	☐ Emergency

8. BCP JUSTIFICATION
- ☐ Correct Deficiency
- ☐ Improve Sched/Reduce Cost
- ☐ Safety
- ☐ Improve Design
- ☐ Functionally Necessary
- ☒ Replanning

☐ See Continuation Page ____

9. BCP TYPE
- ☐ Baseline
- ☐ Baseline Change
- ☐ Management/Programmatic
- ☒ Management/Programmatic Change

10. OTHER CIs IMPACTED: ☐ N/A ☐ See Continuation Page ____

11. OTHER DOCUMENTS IMPACTED ☐ N/A ☒ See Continuation Page ____

Doc. Number	Rev.	Page(s)

12. DESCRIPTION OF BASELINE, MANAGEMENT/PROGRAMMATIC, OR CHANGE

See Attached

☒ See Continuation Page ____

13. TECHNICAL IMPACT USE CONTINUATION PAGE ____ FOR IMPACT OF NONAPPROVAL

		YES	NO			YES	NO			YES	NO			YES	NO
.1	QA	☐	☒	.4	OMT	☐	☒	.7	Regulatory/Environmental	☐	☒	.10	ALARA	☐	☒
.2	Safety/Health	☐	☒	.5	Design	☐	☒	.8	Construction	☐	☒	.11	Scientific Investigation	☐	☒
.3	RAM	☐	☒	.6	Interface	☐	☒	.9	Waste Isolation	☐	☒				

☐ See Continuation Page ____

14. COST, SCHEDULE, SCOPE, AND OTHER IMPACTS

COST	YES	NO	SCHEDULE	YES	NO	OTHER	YES	NO	SCOPE	YES	NO
TEC	☐	☒	Level 0	☐	☒	Institutional	☐	☐	Level 0	☐	☒
TPC	☐	☒	Level 1	☐	☒	Programmatic	☐	☐	Level 1	☐	☒
Contingency	☐	☒	Level 2	☐	☒	Contractual	☐	☐	Level 2	☐	☒
Funding Profile	☐	☒	Level 3	☐	☒				Level 3	☐	☒

Milestone Name and Date ____ ☐ See Continuation Page ____

15. COGNIZANT BCCB MEMBER NAME (Print)	COGNIZANT BCCB MEMBER SIGNATURE	DATE
Dwight E. Shelor, RW-30	Dwight E Shelor	7/23/93

8. Justification/Benefits

This Baseline Change Proposal (BCP) is needed to expedite implementation of Program and Project-level documents to support ongoing Exploratory Studies Facility (ESF) Title II design work and the development of Basis For Design documents (BFDs) for Advanced Conceptual Design of the repository and waste package. Currently, the Interim Approach for the Technical Baseline (approved Document Change Proposal (DCP) 56) does not allow a phased implementation of the baseline documents for site characterization activities and those for repository and engineered barrier design activities. i.e.. DCP 56 requires a block change of all of the MGDS Design Requirements Documents (DRDs).

This BCP will allow the implementation of the technical baseline in stages, thus allowing ESF design activities to properly transfer to the new technical baseline earlier. This reduces the number of design packages and the amount of ongoing and completed work that must be reviewed and evaluated for potential impacts and potential rework.

11. Other Documents Impacted

System Engineering Management Plan (SEMP), Rev. 2, Appendix A, A-1-A-4
Waste Management System Requirements (WMSR), Volume I, Rev. 2, Appendix E. 26-39
WMSR. Volume IV, Rev. IV. Rev. 2. Appendix H. H-1-H-14
Waste Management System Description (WMSD), Rev. 1, Appendix L. L-1-L-14

12. Description of Change

Scope:

This BCP applies to the Program-level technical baseline documents under the cognizance of the PBCCB (specifically the Civilian Radioactive Waste Management System Requirements Document (CRD)) and the Mined Geological Disposal System Requirements Document (MGDSRD). Lower level MGDS Project documents are also impacted by this BCP.

Specific Change:

This BCP supersedes the Interim Approach for the Technical Baseline (approved DCP 56). as the transition plan from the existing technical baseline to the baseline identified in the *OCRWM Program Management System Manual, Revision 5, and the System Engineering Management Plan, Revision 2.*

Figure 1 illustrates the new MGDS technical baseline. with the ESF and Surface-based testing documents shown as shaded.

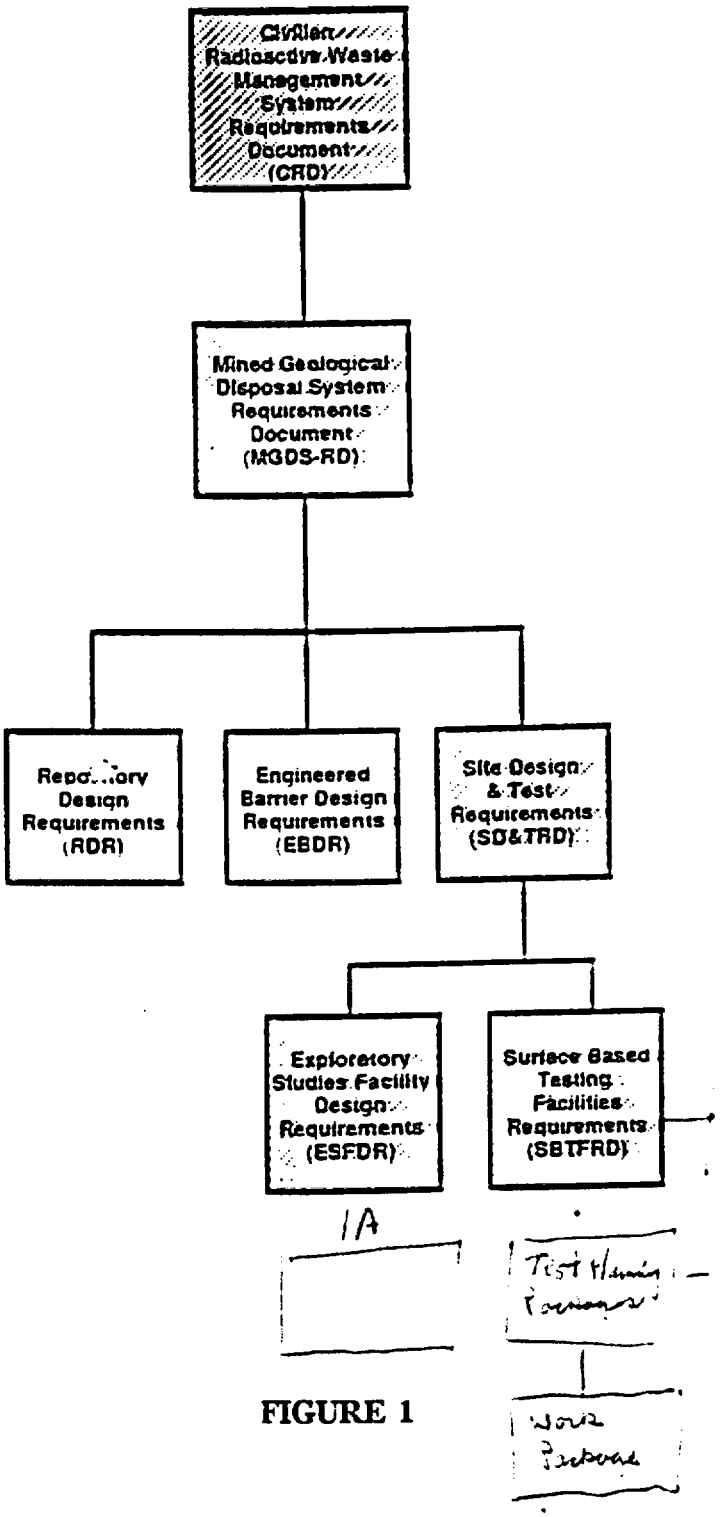
Civilian Radioactive Waste Management System Requirements Document (CRD)
Mined Geological Disposal System Requirements Document (MGDS-RD)
Repository Design Requirements (RDR)
Engineered Barrier Design Requirements (EBDR)
Site Design & Test Requirements (SD&TRD)
Exploratory Studies Facility Design Requirements (ESFDR)
Surface Based Testing Facilities Requirements (SBTFRD)
1A

FIGURE 1

Implementation Instructions:

Implementation of this BCP shall be completed in three steps:

(1) The portion of the CRD applicable to the Mined Geologic Disposal System, the MGDSRD, the Site Design and Test Requirements Document (SD&TRD), the Exploratory Studies Facility Design Requirements (ESFDR) and the Surface-Based Testing Facilities Requirements Document (SBTFRD) shall become effective upon approval of the ESFDR by the Yucca Mountain Project Office Change Control Board (expected by July 23, 1993).

Effectivity of these documents requires the completion of the actions described in the letter from Manager, Yucca Mountain Site Characterization Project (YMP) to RW-30, dated July 14, 1993. As stated in the letter, the following actions will have been accomplished:

(a) A documented analysis to ensure that vertical traceability exists in the System Requirements Documents (SRD)/Design Requirements Documents (DRD) set of documents:

(b) A documented analysis to ensure that the requirements in the current baseline (Waste Management System Requirements) are traceable to the new SRD/DRD set of documents, and

(c) A documented analysis to determine if completed and ongoing work at YMP is in compliance with the SRD/DRD set of documents.

After completion of the above actions for the SD&TRD, the ESFDR and the SBTFRD, and receipt of the referenced letter from the Manager, YMP, the conditions of Quality Assurance (QA) Hold Point #OSC-92-003 will be considered satisfied and is to be closed out. The following actions will then occur:

a. Replace Waste Management System Requirements (WMSR), Volume IV; the remaining portions of WMSR, Volume I; and the Waste Management System Description (WMSD) with the CRD and the MGDSRD.

b. Issue the following DRDs:

Site Design and Test Requirements Document
Exploratory Studies Facility Design Requirements Document
Surface-Based Testing Facilities Requirements Document

These documents replace the following:

Yucca Mountain MGDS System Requirements Document, YMP/CC-0010
Yucca Mountain MGDS System Description Document. YMP/CM-0017
Yucca Mountain Site Characterization Program Baseline, YMP/CM-0011
Yucca Mountain MGDS Exploratory Studies Facility Design Requirements, YMP/CC-0013
Technical Requirements for the Yucca Mountain Site Characterization Project Surface-Based Testing, YMP/CM-0007

(2) The new Repository and Engineered Barrier DRDs to support Advance Conceptual Design shall become effective when approved by the Yucca Mountain Project Office Change Control Board and the actions listed in (1)(a), (b), and (c) above have been completed. The following changes will then be made:

(a) Replace the Yucca Mountain Mined Geological Repository Design Requirements Document, YMP/CM-0018. The ESF/Repository interface requirements are currently contained in the new Repository Design Requirements Document

(b) Issue the Engineered Barrier Design Requirements Document. This document establishes requirements for the engineered barrier subsystem.

(3) The Transportation System Requirements Document (T-SRD) will become effective upon approval by the Program Baseline Change Control Board via a separate BCP. The T-SRD will replace the Physical Requirements-Transport Waste as the technical baseline for the transportation system.

13. Technical Impact

The technical impact of implementing this change is assessed as minimal, based on the following:

(a) The document preparation, review and approval process for the DRDs did not identify any new requirements in the areas of radiological safety, waste isolation, occupational health and safety, or environmental. No technical changes to ongoing or completed work are required in these areas.

(b) Minor administrative impacts such as changing references are required for some project-level documents. e.g., study plans, procedures, and other documents. The BFD for Surface-Based Testing Facilities (SBTF) will need to be revised for future work but no changes are required for current or past activities. The changes to the BFD for SBTF are necessary to incorporate the new specialty engineering requirements and to align the BFD with the new numbering scheme of the SBTFRD. The specialty engineering requirements which have been explicitly identified in the new SRD/DRDs do not present a significant impact on the ongoing and completed work. The designs to date have been to industry standards which meet or exceed the new engineering specialty requirements.

14. Cost, Schedule, Scope and Other Impact

Cost impact of implementing the new technical baseline is assessed to be minimal. Most of the requirements identified in the new requirements documents represent those which have been levied on the system by external agencies and, therefore, must be met. Some additional requirements have been established in the engineering specialty area which must be accommodated in the SBTF BFD. Other than the SBTF BFD revision cost, the incremental cost of implementing these requirements is difficult to ascertain as they are integrated into normal design and construction activities. Failure to implement the new technical baseline in a timely manner will increase the potential impact as more design and construction will be completed: therefore increasing the probability of redesign and rework that would be necessary to come into compliance with the new technical baseline.

No schedule impact is envisioned. The approval and implementation of the new MGDS technical baseline is contingent on a thorough assessment of impacts of changing to the new baseline. Implementation dates will be established so there are no schedule impacts. The change to the MRS System Requirements and Transportation System Requirements will not impact the schedule of activities for these two system elements.

Office of Civilian
Radioactive Waste Management

WBS:
QA:
Page: 7 of: 7

IMPACT ANALYSIS RECORD

1. BCP NUMBER	REV.	2. BCP TITLE
00-93-0002	0	Revision to the Interim Approach for the Technical Baseline

3. DOCUMENT IDENTIFIER	REVISION
N/A	

DOCUMENT TITLE
N/A

4. COGNIZANT ORGANIZATION	5. ACTION OFFICER NAME	TELEPHONE
RW-30	Stu Willis	(703) 204-8811

6. IMPACT	ESTIMATED IMPACT	RESPONSIBLE ORGANIZATION	7. ATTACHMENT	ACCEPT/REJECT. INITIALS & DATE
TECHNICAL (SCOPE)	Minimal	RW-20/RW-30		
REGULATORY & ENVIRONMENTAL	None	RW-33		
COST	Minimal	RW-13		
SCHEDULE	None	RW-13		
INSTITUTIONAL	None	RW-5		
TRAINING & PROCEDURES	None	RW-10		
PROGRAMMATIC	None	RW-20		
HEALTH AND SAFETY	None	RW-33		

8. OTHER DOCUMENTS AFFECTED

SEMP, Revision 2, Appendix A, WMSR,

WMSR, Volume I, Revision 2, Appendix E

WMSR, Volume IV, Revision 2, Appendix H

WMSD, Revision 1, Appendix L

9. DOES COST, SCHEDULE, OR TECHNICAL (SCOPE) IMPACT EXCEED A LEVEL 0 THRESHOLD?

☐ Yes ☒ No

Impacts On Costs:		Impacts On Schedule:	Impacts On Scope:
TPC:		Level 0	
TEC:		Level 1	
Contingency:		Level 2	
Funding Profile:		Level 3	
Other:			
Total Cost		☐ See Continuation Page	

10. MITIGATING OR CORRECTIVE ACTION

None

11. SUBMITTED BY

for W. Lemeshewsky — 21 July 1993
NAME — DATE

SIGNATURE

Attachment 4

Civilian Radioactive Waste Management System

TDPP
FOR THE PREPARATION OF
SYSTEM REQUIREMENTS DOCUMENTS

Attachment 4

Technical Document Preparation Plan (TDPP)

For The

Preparation of System Requirements Documents

Revision 0

July 14, 1992

Approved: _____

W. A. Lemeshewsky
Acting Director, Systems
Engineering and Program
Integration Division
Office of Systems and Compliance
Office of Civilian Radioactive
Waste Management

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LIST OF FIGURES

1. OBJECTIVES AND SCOPE

1.1 OBJECTIVES

This preparation plan provides guidance for the development of system requirements documents and interface specifications for the Civilian Radioactive Waste Management System (CRWMS) in accordance with DOE 4700.1 and OCRWM QAP 3.5. These documents will provide traceability between regulatory requirements and the physical system designs for CRWMS, Waste Acceptance, Transportation, Monitored Retrievable Storage (MRS), Mined Geologic Disposal System (MGDS), and Site Characterization, a subset of the MGDS.

This preparation plan outlines the activities involved in the preparation, review, and approval of the System Requirements Documents (SRDs) and the Interface Specifications (IFSs) and in the program management necessary to incorporate these documents as part of the program-level technical requirements baseline. This plan replaces the "Technical Document Management Plan (TDMP) for the Preparation of Requirements Documents", Revision 0, dated December 3, 1991.

Development of requirements documents and interface specifications in accordance with DOE 4700.1 and OCRWM QAP 3.5 will establish the technical requirements baseline. The Waste Management System Requirements (WMSR) documents and the Physical System Requirements documents are currently serving as the functional requirements baseline. References to "requirements documents" in this plan are considered as reference to "system requirements documents" and "interface specifications".

1.2 SCOPE

The CRWMS, Waste Acceptance, Transportation, MRS, and MGDS (including site characterization activities) Requirements Documents and the Interface Specifications will be program-level documents that describe the technical requirements. They will also allocate subfunctions to major subsystems and facilities and specify all methods (tests, inspections, demonstrations, analyses, etc.) required to verify the achievement of each requirement. Furthermore, the requirements documents will identify all design requirements arrived at through analyses, studies, and reviews of previously generated documents. The requirements documents will be reviewed during a series of management and technical reviews (see Section 1.4.H). Comments and changes occurring as a result of the reviews will be documented in accordance with QA procedures and will be included in updates to the requirements documents. The requirements documents will be reviewed in accordance with QAP 6.2, accepted by the Associate Director of Systems and Compliance and approved by the OCRWM Program Change Control Board (PCCB). The Systems Engineering Branch (SEB) will propose necessary changes to program technical baseline documents by preparing change requests for the PCCB to revise appropriate documents affected by incorporation of the System Requirements Documents and Interface Specifications in the technical baseline for the CRWMS.

1.3 REFERENCE

A. *Quality Assurance Requirements Document* (QARD), DOE/RW-0214

B. *Quality Assurance Program Description Document* (QAPD), DOE/RW-0215

C. *Quality Assurance Controls Document* (QACD), DOE/RW-0289

D. QAAP 2.1, *Indoctrination and Training*

E. QAAP 2.2, *Verification of Personnel Qualifications*

F. QAAP 2.3, *Establishing Quality Assurance Program Controls*

G. QAAP 3.3, *Peer Review*

H. QAAP 6.1, *Document Control*

I. QAAP 7.1, *Control of Purchased Services*

J. QAAP 17.1, *QA Records Management*

K. QAP 3.5, *Document Preparation*

L. QAP 6.2, *Document Review*

M. *Program Change Control Procedure*, DOE/RW-0223

N. *Management Systems Improvement Strategy* (MSIS), OCRWM, August 10, 1990

O. *Program Management System Manual* (PMSM), DOE/RW-0043

P. *Waste Management System Description*, DOE/RW-0270P

Q. *Waste Management System Requirements Document*, DOE/RW-0264, Volume I, (Yucca Mountain Project)

R. *Waste Management System Requirements Document*, DOE/RW-0268P, Volume IV, MGDS Requirements

S. *Physical System Requirements/Functional Analysis Management Plan*

T. *Physical System Requirements - Overall System*, DOE/RW-0334P

U. *Physical System Requirements - Exploratory Studies Facility*

V. *Physical System Requirements - Store Waste*, DOE/RW-0319

W. *Physical System Requirements - Dispose of Waste*

X. *Site Characterization Plan Baseline*, YMP-CM-011

Y. *Physical System Requirements - Transport Waste*, DOE/RW-0352

Z. *Physical System Requirements - Accept Waste*

AA *ESF Design Requirements*, Volumes I and II, YM/CC-013

AB *OCRWM SEMP*, DOE/RW-0051P

AC MIL-STD-490A, *Specification Practices*

AD DOE 4700.1, *Project Management System*

AE DOE 6430.1A, *General Design Criteria*

AF *Waste Acceptance Preliminary Specifications (WAPS) for the Defense Waste Processing Facility High-Level Waste Form*, DOE/RW-0260

AG *WAPS for the West Valley Demonstration Project High-Level Waste Form*, DOE/RW-0261

1.4 DEFINITIONS

A. **Derived Requirement.** A derived requirement is a generic term for requirements which are derived from higher level requirements as requirements are given more detail and specificity.

B. **Design Requirements Documents.** These project-level documents specify the requirements for the design or engineering development of products (configuration items) during the development period. Each design requirements document shall be in sufficient detail to describe effectively the performance characteristics that the configuration item is to achieve when the developed item evolves into a detailed design for construction or production.

C. **Design Synthesis and Integration.** Design synthesis is the point in the systems engineering process at which a design concept is created to satisfy the stated requirements. All system elements should be considered in arriving at a design

concept. Requirements that have been allocated analytically are satisfied through design synthesis. The resulting subsystem and component-level details are then integrated into a consolidated overall design. Sufficient preliminary design is then accomplished to confirm and ensure completeness of the performance and design requirements allocated for detail design. Reallocation of requirements may be required.

D. **Evaluation and Optimization.** Desirable and practical tradeoffs among stated operational needs, engineering design, project schedule and budget, producability, constructability, supportability, affordability, and life cycle costs, as appropriate, should be continually identified and evaluated. Tradeoff studies should be accomplished at the various levels of functional or system detail or as specifically designated and approved by the project manager to support the decision needs.

E. **Functional Allocation.** Each function and subfunction is assigned a set of technical requirements. Derived requirements (those from analyses or other studies not directly traceable to another source) should be stated in sufficient detail for allocation to facilities, hardware, software, personnel, and procedures. When necessary, special skills or peculiar requirements are identified. Allocated requirements should be traceable through the analysis by which they were derived to the system requirement they are designed to fulfill. A set of block diagrams or functional flow diagrams are used to "flow down" the functions and subfunctions until closure is reached at the hardware or procedure level.

F. **Function Analysis.** Function analysis, at the system level, consists of two interrelated activities described below. A third activity, time requirements analysis or timeline analysis is an activity which may be performed as part of Functional Analysis, if required, at the design level. It is an analysis performed to determine the time requirements of functions or functional sequences in which time is critical to mission success, safety, utilization of resources, minimization of downtime, and/or increasing availability. Not all functional sequences require time analysis - only those sequences in which time is a critical factor. Time requirements analysis is outside the scope of this TDPP. The functional analysis activities performed at the system level are as follows:

1. **Function Identification.** Analysis of system objectives to identify functions and subfunctions that should be performed to satisfy the system performance and design parameters.

2. **Functional Performance Requirements.** Development of technical performance requirements for each function identified. These requirements define the input and output functions in sufficient detail for direct use as criteria for equipment design and operation, personnel skill development, computer programming, environmental, safety and health considerations,

logistics support, etc.

G. **Interface Specifications.** System interfaces are identified using N^2 diagrams identified in the activities described in subparagraph 1.4.H. The output of this process results in interface requirements which are documented in system interface specifications. Due to the complexity of CRWMS and the phased approach to developing the system elements (e.g. Transportation, MRS, MGDS, Waste Acceptance) the decision was made to publish the element-to-element interface requirements as separate stand alone specifications. These interface specifications will be referenced in both system element requirements documents to which they apply, although they are published separately. The interface specifications will be developed using the same format as that for the system requirements documents.

H. **Management-Technical Review (DOE 4700.1).** A series of non-QA management-technical reviews are conducted jointly by the department and other project participants to assess the degree of completion, the progress, and status of technical efforts related to technical baseline development. These non-QA reviews should not impact the independent review of technical documents required by NQA-1 and OCRWM. The number and type of reviews are determined by the DOE project office. The following technical reviews are normally utilized at the system level (see OCRWM System Engineering Management Plan (SEMP) for more detail).

1. **System (Conceptual) Design Review (SDR).**

This program level review is conducted to:

a) Evaluate the system requirements for adequacy and risk;

b) Ensure a mutual understanding among all program participants of the system requirements and the corresponding conceptual design;

c) Assess the engineering process that produced the system requirements; and,

d) Provide a forum to adjudicate comments.

2. **System Requirements Review (SRR).**

This review is conducted to ascertain progress in defining system requirements. It also assesses the adequacy of mutual understanding across the program about these requirements. Management agreement on the set of system-level functions to be implemented is required prior to initiating the functional analysis and allocation process described in paragraphs 1.4.E and 1.4.F.

3. In-Process Review (IPR).

This review is conducted to inform management of the progress of the requirements definition or design process, as appropriate. The project or documentation status is briefed as is a schedule of major milestones and decision points.

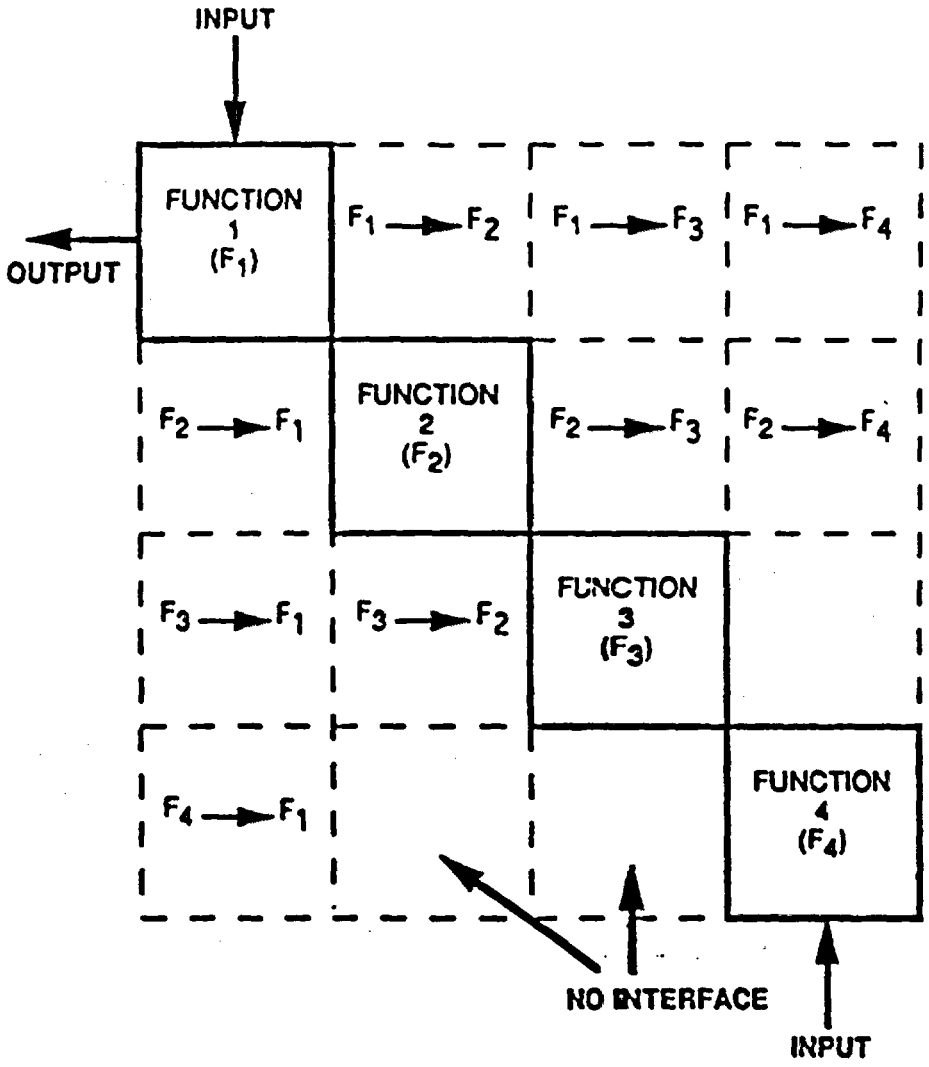
I. **N-Square (N^2) Diagrams.** The N^2 diagram has been used extensively to develop data interfaces. The system functions are placed on the diagonal of an N-by-N matrix. The remainder of the squares of the matrix represent interface inputs and outputs. Where a blank square exists there is no interface between the respective functions. N^2 diagrams are used in the requirements documents and interface specifications to develop and document system and system element interfaces. An example of N^2 diagrams is shown in Figure 1-1. The N^2 diagrams may also be used to document hardware-to-hardware interfaces where hardware items are placed on the diagonal and their interfaces shown in the remaining squares of the matrix. N-square diagrams, as a tool for identifying system interfaces, may be used to describe physical, functional, programmatic or data interfaces.

J. **Performance Requirements.** Performance requirements generally provide an extension of the requirements for functions by expressing an acceptable level or range of performance for a function.

K. **Physical System Requirements (PSR) Document.** As described in the Physical System Requirements Management Plan, the PSR documents "analyze, identify, and describe all necessary functions and their requirements for the Physical System ... and will serve as a basis for updating the technical baseline requirements for each of the physical system elements."

L. **System Requirements Document (Type-A).** This document states the technical, mission, statutory and regulatory requirements for a system/system element as an entity, allocates those requirements to functional areas, documents design constraints, and defines the interfaces between or among the functional areas. Normally, the initial version of this document is based on parameters developed during the Concept Exploration phase. The requirements document (initial version) is used to establish the general nature of the system that is to be further defined and finalized during the conceptual design phase. The System Requirements Document reflects the system conceptual design and its approval provides the requirements for proceeding with preliminary (Title I) design.

M. **Specialty Engineering Integration.** The timely and appropriate intermeshing of engineering efforts such as reliability, maintainability, logistics engineering, human factors, safety, value engineering, standardization, etc., to ensure their influence on design.



BASIC RULES

- ALL FUNCTIONS ARE ON DIAGONAL
- ALL OUTPUTS ARE HORIZONTAL (LEFT OR RIGHT)
- ALL INOUTS ARE VERTICAL (UP OR DOWN)
- ALL NONFUNCTION SQUARES DEFINE ONE WAY INTERFACES BETWEEN ASSOCIATED FUNCTIONS

Figure 1-1. N^2 Chart Definition

N. **System.** For purposes of clarity and consistency within the system requirements documents, the use of "system" refers to the CRWMS which, in turn, is composed of system elements, e.g., Waste Acceptance, Transportation, MRS, MGDS.

O. **System Definition.** The performance, configuration, and arrangement of a chosen system and its elements are portrayed in suitable forms which may include schematic diagrams, physical and mathematical models, computer simulations, layouts, detailed drawings, and similar engineering graphics. These portrayals illustrate system and item interfaces, permit traceability between the elements at various levels of system detail, and provide means for complete and comprehensive change control.

P. **System Element.** One of the physical elements of the CRWMS (e.g., Waste Acceptance, Transportation, MRS, MGDS). This differs from a "project" that may be initiated by DOE to manage and control development of one or more System Elements (e.g., the Yucca Mountain Project or the MRS Project).

Q. **Systems Engineering.** Systems engineering encompasses management of the engineering and technical effort required to transform the project objectives into an operational system. It includes the engineering required to define the system performance parameters and the configuration to best satisfy the project objectives. It also includes the planning and control of technical tasks, integration of the engineering specialties, and the management of a totally integrated design effort to meet cost, schedule, and technical objectives of the systems engineering process.

R. **Systems Engineering Process.** The systems engineering process is an iterative one encompassing changes at any point in the process. Possible impacts of change to the system should be analyzed during the conduct of the project. These impacts should be examined for validity, consistency, desirability, and attainability with respect to current technology, physical resources, human performance capabilities, life-cycle costs, and other constraints. The output of this analysis should either verify the existing requirements or lead to the development of new requirements that are more appropriate for the mission (see Figure 1-2).

S. **System Hierarchy.** For the sake of standardization and to provide common naming conventions for the various parts that comprise the CRWMS, a system hierarchy has been developed. Below the system element level, the hierarchy is divided between hardware and software. Figure 1-3 depicts the CRWMS hierarchy which is used in the system requirements documents.

T. **System Integration (or Engineering Integration).** The integration of engineering specialties and the management of a totally integrated effort of design engineering, specialty engineering, and production (or construction) engineering to ensure their influence on design.

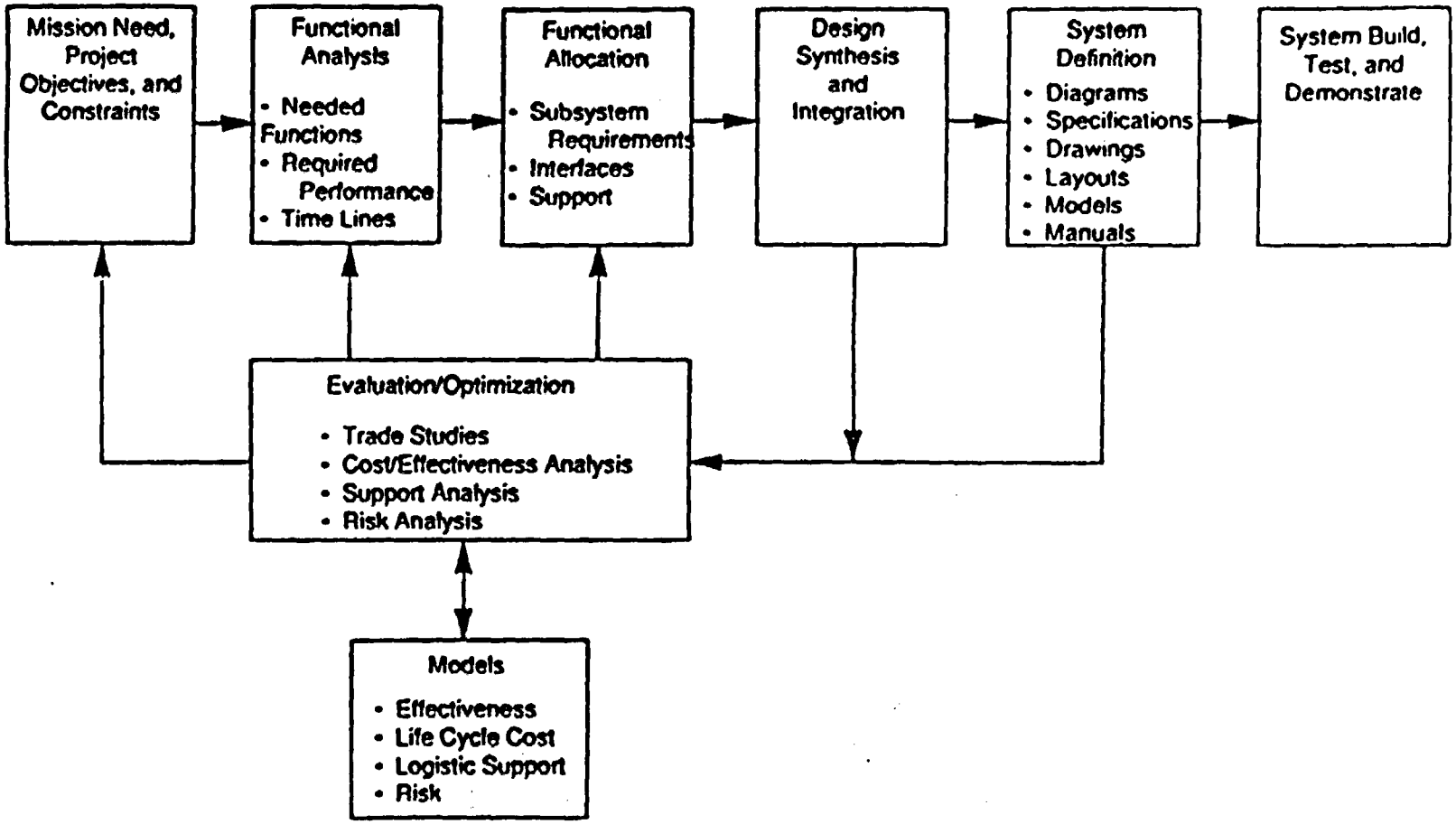


Figure 1-2. System Engineering Process (DOE 4700.1)

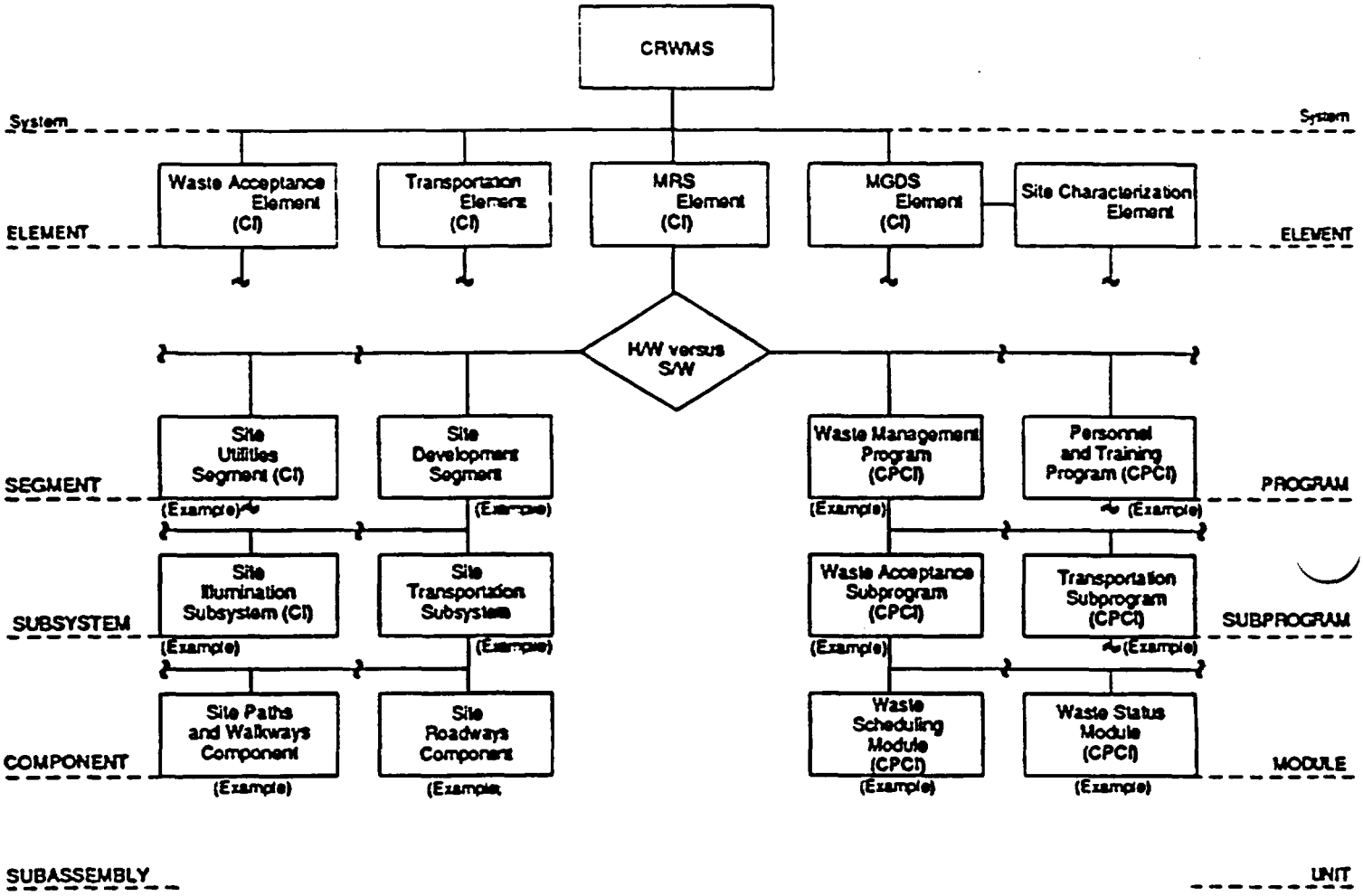


Figure 1-3. CRWMS Hierarchy

U. **Traceability.** The capability to track system requirements from the higher-level system functional analysis document or other source to all elements of the system that, collectively or individually, perform the function (e.g., an element of the system to all functions that it performs; or a specific requirement to a specific source analysis or constraint which originated the requirements). Traceability also includes the capability to trace from an element of the system back to the source.

For a listing of other quality assurance-related definitions, please refer to DOE/RW-0214, QARD (Reference 1.3.A), Appendix E, Glossary.

1.5 BACKGROUND

The Nuclear Waste Policy Act of 1982 (NWPA) assigned to the Department of Energy (DOE) the responsibility for managing the disposal of spent nuclear fuel (SNF) and high-level nuclear waste (HLW) and established the Office of Civilian Radioactive Waste Management (OCRWM) for that purpose. The mission of the CRWMS is to permanently isolate SNF and HLW in a geologic repository in a timely manner that protects the health and safety of the public and maintains the quality of the environment. In order to accomplish this mission, DOE is developing a waste management system that will accept, transport, store, and dispose of SNF and HLW. The management and control of this system is provided by the OCRWM Program.

For planning, systems analysis, and conceptual design purposes, the CRWMS has been identified as having four major functions which are Accept Waste, Transport Waste, Store Waste, and Dispose of Waste.

To accomplish the above functions, four physical elements have been planned. The Waste Acceptance system element will have the responsibility of interfacing the CRWMS with the user community at the nuclear reactor and waste sites. Responsibilities of Waste Acceptance will be to maintain records of the CRWMS waste capacity, maintain records of the waste locations and characteristics, verify that the waste has been properly described,
and finally accept title to the waste from the user community or producers.

The radioactive waste will then be handed over to the Transportation element that will be responsible, under the Transport Waste function, for transporting the waste to the MRS or the MGDS as appropriate. The Transportation element will also have the responsibility for developing and maintaining the transportation casks.

The Monitored Retrievable Storage (MRS) facility (Store Waste function) will act as a temporary retention site for waste with the intention to recover such waste for subsequent disposal. The Mined Geologic Disposal System (MGDS) facility (Dispose of Waste function) will permanently emplace waste in an isolated geologic medium in such a manner that such waste may be retrieved, if necessary, in accordance with 10CFR60.111. All of these facilities and systems will operate to fulfill a variety of functional requirements intended to make the storage and transport

of waste environmentally safe and allow appropriately documented traceability of the trail of the waste from initial acceptance to closure of the MGDS.

Site characterization, a subset of the MGDS element, is an activity that will develop data necessary to assess the suitability of the disposal site and support the MGDS licensing and design processes.

To document and summarize regulatory requirements applicable to these top-level functions, OCRWM is developing a series of Physical System Requirements documents that will serve as references for the development of the System Requirements documents (SRDs) and Interface Specifications (IFSs) addressed in this plan. The SRDs will serve as the link for traceability and direction between regulatory requirements and Design Requirements to be developed at the project level.

2. RESPONSIBILITIES

In order to facilitate the preparation of the technical baseline system requirements documents for the CRWMS, two separate task forces have been established (see Figure 2-1).

The CRWMS Requirements Task Force has been formed by the M&O to facilitate internal M&O coordination and cooperation in the development and review of system and design requirements documents and is co-chaired by the AGM Systems and the AGM Operations. This M&O task force will develop the System Requirements Documents and Interface Specifications (IFSs) for the overall Civilian Radioactive Waste Management System (CRWMS), the Monitored Retrievable Storage (MRS) Facility, the Transportation System, and the Mined Geologic Disposal System (MGDS).

A separate Waste Acceptance System Requirements Task Force has been established to develop the System Requirements Document for the Waste Acceptance Process. It is co-chaired by OCRWM's Chief, Systems Planning and Integration Branch and the M&O's Manager of Systems Planning and Integration.

2.1 **The Associate Director, Office of Systems and Compliance (OSC)** has overall responsibility for this Technical Document Preparation Plan and for the Program Requirements Documents.

2.2 **The Division Director, Systems Engineering and Program Integration Division (SEPID)** is responsible for approval of this Technical Document Preparation Plan and its revisions.

2.3 **The Chief, Systems Engineering Branch (SEB),** is responsible for reviewing change requests to the Requirements Documents submitted by the M&O for approval by the OCRWM PCCB.

2.4 **Other OCRWM Offices and Divisions** will be responsible for designating appropriate technical experts to participate in the review and resolution of comments on the resulting Requirements Documents. Reviewers must be independent of those who prepare the documents.

2.5 **Co-chairmen, CRWMS Requirements Task Force** are responsible for executive direction of completion of the documents assigned to each individual task force, provision of resources required by each individual task force and closure of issues which an individual task force cannot resolve. The co-chairman and the individual task forces will be supported in the areas of OCRWM Document Hierarchy, format and policy, by the Manager, Systems Engineering. No change will occur in the responsibilities for document preparation discussed in sub-paragraph 2.7.

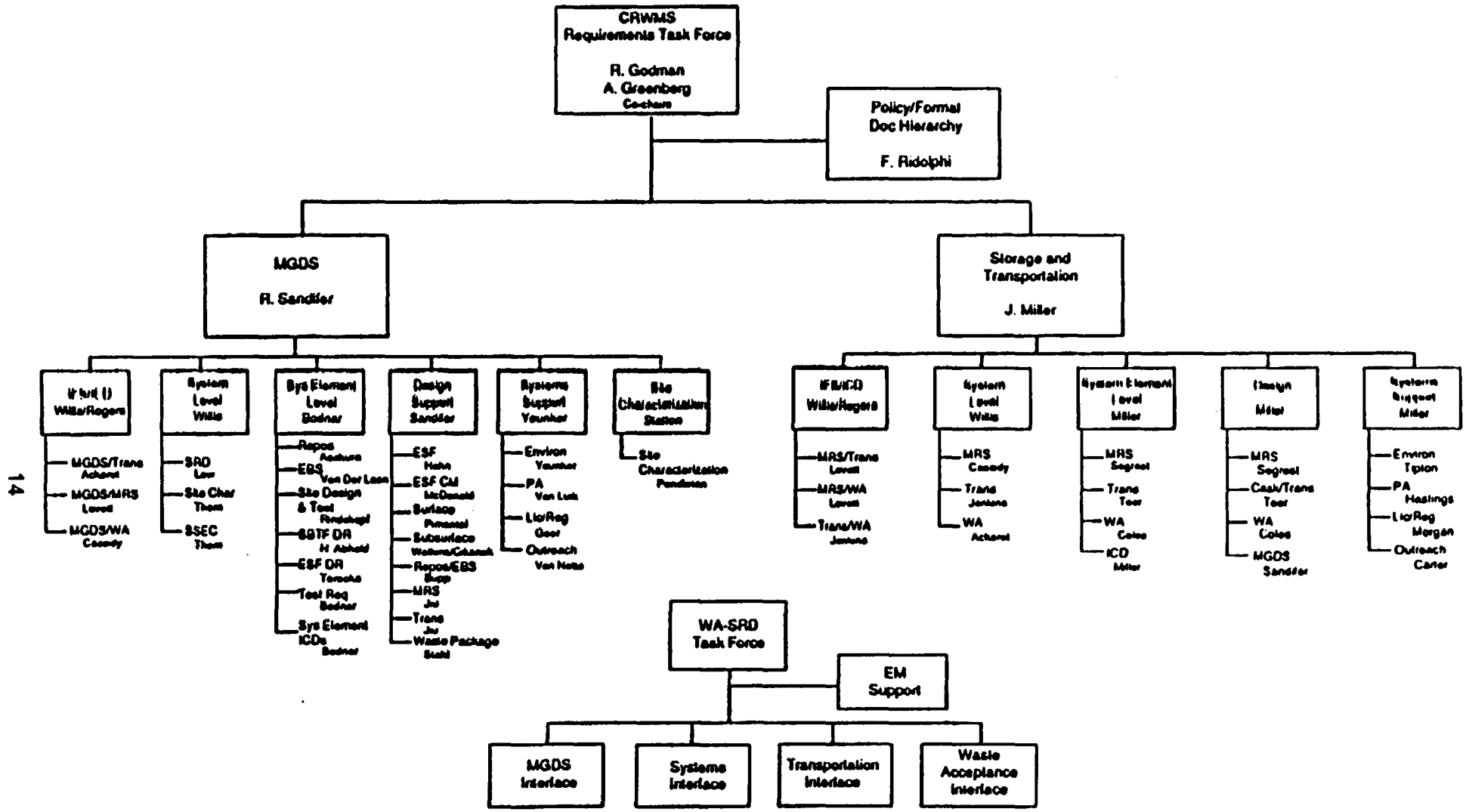


Figure 2-1 CRWMS and WA-SRD Requirements Task Force Organization

2.6 **Co-chairmen, Waste Acceptance System Requirements Task Force** are responsible for the management and development of the Waste Acceptance Requirements document. This document is to be based on the applicable regulations from the Physical System Requirements - Accept Waste document and derived performance requirements developed from other applicable documents.

2.7 **The Management and Operations (M&O)** organization is responsible for the preparation of this plan, for the development and implementation of the Requirements Documents, for conducting SRRs and SDRs, as required, and for conducting QAP 6.2 reviews for the requirements documents.

2.8 **The M&O Systems Integration Manager** is responsible for managing the effort to identify derived requirements and for evaluating the quality and completeness of the requirements research effort.

2.9 **The M&O System Integration Task Manager** is responsible for the preparation of the requirements document for submittal to the Chief, Systems Engineering Branch (SEB), coordination and evaluation of the inputs from the designated OCRWM and M&O technical experts, and the technical quality of the final requirements documents. The M&O Task Manager is responsible for identifying and interpreting physical and design requirements/constraints applicable to the CRWMS program or to one of the program elements. The Task Manager is responsible for coordinating necessary interfaces between the M&O and OCRWM to obtain information pertaining to the definition and interpretation of system requirements. The definition and interpretation of requirements shall be conducted in consonance with ongoing program efforts under Design, Regulatory and Licensing, Performance Assessment and System Analysis. Requirements which address major operational or licensing decisions will be stated only after an OCRWM review and decision has been conducted. The Task Manager is also responsible for coordinating review comments, ensuring approved review comments are included in requirements updates, for coordinating required design reviews, and for preparing change requests for submission to the OCRWM Systems Engineering Branch for review.

2.10 **The M&O staff and Requirements Document Task Team** are responsible for providing information as requested by the Task Manager, preparing appropriate quality records, transmitting those records to the SEB, preparing comment response forms, and incorporating comment resolution changes into the final Requirements Documents. It is the responsibility of the Task Manager to oversee the conduct of these activities.

2.11 **Waste Acceptance System Requirements Task Force** members are representatives from OCRWM, YMPO, the Office of Environmental Restoration and Waste Management (EM) and the M&O, who are knowledgeable in the area of Waste Acceptance and appropriate established interfaces. These personnel will develop and document the necessary regulatory and performance requirements, and are considered preparers of the Waste Acceptance System Requirements Document.

3. DESCRIPTION OF THE TECHNICAL DOCUMENTS

3.1 REQUIREMENTS DOCUMENTS

In accordance with Section 5.2 of QAAP 2.3, the SRDs and IFSs are considered to be quality affecting technical documents. Therefore, they will be prepared, reviewed, controlled, and documented in accordance with those reference documents in Section 1.3.

In addition to quality assurance preparation, review, and control procedures, each of the Requirements Documents shall be reviewed by the Office of Systems and Compliance. Upon completion of this review, and after incorporation of review comments, the Requirements Documents will undergo QAP 6.2 review. The documents will then be submitted to the OCRWM Program Change Control Board and, upon approval, will be placed under configuration control.

The Requirements Documents, once approved, document the technical requirements, including interpretations of requirements from source documents, and the conceptual design as the controlling documents in the CRWMS technical baseline. They include performance, and specialty engineering requirements, as well as a description of the configuration items (physical elements) that constitute the conceptual design. For the purposes of requirements development, technical requirements are the requirements for facilities to be built or modified and for items to be developed or procured for the program. These may include manufactured products, facilities, software, technical manuals, etc. Technical requirements may also describe the numbers and skills of people required to manage and operate the system.

Programmatic requirements describe processes and procedures that may occur at any phase of the program. The programmatic requirements will be addressed in plans and procedures, many of which will be developed during the design and construction phases and implemented during the operations phase. The various plans and procedures are to be identified in the Program Management System Manual (PMSM) and in the System Engineering Management Plan (SEMP).

3.2 ANNOTATED TABLE OF CONTENTS

The format for the Requirements Documents described herein have been adapted from MIL-STD-490A (Type A Specification) to conform to the requirements of the CRWMS Program. The general outline of the Requirements Documents is described below. Sections which do not apply to a specific requirements document may be modified or deleted.

3.2.1 Section 1 - Scope

A. **Identification.** Information is provided which properly identifies the document and its relation to the CRWMS.

B. **Document Purpose.** The purpose of the document is defined.

C. **System Overview.** The mission, background, concept, and top-level functions of the system or system element are defined.

D. **Document Organization and Description.** This section gives a brief overview of the requirements document, including a brief discussion of the document organization.

3.2.2 Section 2 - Applicable Documents

This section lists all documents that are included by reference.

3.2.3 Section 3 - Requirements

A. **System Definition.** A brief description of the system element to which this requirements document applies is provided. Major functions are identified as is the top-level architecture.

B. **Characteristics.** This section describes the system performance requirements, physical characteristics, and interfaces.

C. **Design and Construction.** Minimum design and construction criteria and standards are specified. DOE 6430.1A is referenced for applicable design criteria.

D. **Documentation.** Documentation requirements/standards are specified.

E. **Logistics.** Logistics considerations and requirements applicable to the operational system are specified.

F. **Personnel and Training.** Requirements are specified to identify the number and skills of personnel as well as special training required to meet operational and safety standards.

G. **Segment Requirements.** For each segment identified in the System Definition Section, the purpose, segment performance, design requirements, and interfaces are specified. As appropriate, the system-level requirements of the Characteristics, Design and Construction, Documentation, Logistics, and Personnel and Training sections are also specified, by reference, to each segment.

H. **Precedence.** The order of priority or precedence of requirements is given.

I. **Qualification/Quality Assurance.** General validation requirements are stated as are special tests, test methods, test constraints, and test equipment. Test responsibilities are defined.

3.2.4 Section 4 - Conformance Verification

This section defines how the requirements are to be satisfied/verified at the system level. In each requirements document, a Verification Matrix is provided that cross-references requirements to verification methods. Separate verification matrices, applicable to the design phase, should be contained in project-level Design Requirements documents.

3.2.5 Section 5 - Preparation for Operations/Delivery

Special requirements, if any, required in order to meet licensing or operational needs are specified in this section.

3.2.6 Section 6 - Notes

General information which is nonbinding on the physical system configuration is presented. This may include programmatic requirements that control development activities but are not a part of the design basis.

3.2.7 Appendices

Drawings, diagrams and oversize figures may be included in appendices for convenience and to reduce the complexity of the basic document. Other requirements, because of the nature of their complexity or degree of specialty, may also be included as appendices. Requirements contained in appendices are mandatory and may not be changed except through the document change control procedure.

In the case of the MGDS requirements, two additional appendices, the Site Characterization System Requirements and the Site Suitability Evaluation Criteria are included in the System Requirements document. Development of these appendices of the MGDS Requirements document will follow the guidelines stipulated herein for development of their requirements documents.

The Site Characterization System Requirement (SCSR) appendix will summarize requirements which must be met by the Site Characterization Program. It will serve as the basis for the development of the detailed test requirements at the project level and will provide program control to ensure issues are addressed.

The Site Suitability Evaluation Criteria (SSEC) appendix will summarize the requirements of which must be addressed by the MGDS project in developing its recommendations on the suitability of a site to be developed as a repository.

4. TECHNICAL APPROACH

4.1 MAJOR ASSIGNMENTS AND STEPS IN PREPARING THE REQUIREMENTS DOCUMENT

4.1.1 System Function Identification

System functions will initially be based on functions as identified in the Physical System Requirements documents. These functions will be reanalyzed and modifications or amendments will be proposed where appropriate.

4.1.2 Functional Flow Diagrams

Functional Flow Diagrams for the Requirements Documents will be developed from the functions identified in Section 4.1.1. These will graphically illustrate the functional process of the system, ensure all functions are addressed, and depict relationships among functions. The Functional Flow Diagrams will be incorporated in the Requirements Documents.

Once the relationships among functions have been identified using the functional flow diagrams, N^2 diagrams will be used to describe the nature of the interfaces. Intra-element interfaces will be documented in the element requirements document to which they pertain. Both functional and physical interfaces will be developed using this process. This process is to be further described in Interface Specifications to be developed.

Physical interfaces between CRWMS segments and systems external to CRWMS (e.g., local electrical, water or sewerage utilities) will be documented in the appropriate element Design Requirements documents at the project level. Management or programmatic-type interfaces will be documented in procedures, contracts, memoranda of understanding or other management documents. These programmatic interfaces are outside the scope of this TDPP.

4.1.3 Requirements Allocation Sheets

A Requirements Allocation Sheet (RAS), Figure 4-1, will be developed for each function identified in Section 4.1.1. Requirements pertaining to each function will be maintained on the RAS as a permanent record of requirements traceability. These requirements will be allocated to physical elements of the system and allocated to the appropriate section of the requirements document. The RAS will serve as a tool for consolidating requirements under the appropriate function and for maintaining traceability of functions and requirements. They will serve as a permanent QA record of a requirement's source, interpretation and allocation. The function description on the RAS will be reviewed by the engineering task leader and initialized in column 5. Approval of the description as stated in engineering terminology will be indicated by signature on the bottom of the form by the appropriate manager.

RAS are developed for the functions the system is to perform and incorporate the requirements on those functions. The functions, each defined on a separate RAS, define what is to be done-

REQUIREMENTS ALLOCATION SHEET (RAS)			Requirement Allocation	
Name and Number (1)	Rev (2)	Functional Description and Requirements (3)	Item (4)	Revw* (5)
		Description:		

* Signature in column 5 shows review of the restatement of the requirement into engineering terms.

Approved: _____ Date: _____

Figure 4-1. Requirements Allocation Sheets (RAS)

requirements indicate how well they are to be done. The RAS are then used to allocate the functions and requirements to physical items that perform the functions. The physical items and their allocated functional requirements appear in section 3.7 of the system requirements document. The RASs shall be submitted for System Engineering Branch (SEB) and QAP 6.2 reviews.

4.1.4 Design Constraint Sheets

The Design Constraint Sheets (DCSs) address requirements associated with specialty engineering and similar constraints which usually address the design, construction, etc. of the system architectural elements, rather than how they perform their functions. These include human factors, construction standards, safety, etc. and appear in sections 3.2 through 3.6 of the system requirements document. There are no basic differences between the RAS as discussed in section 4.1.3 and the DCS except in their use. In order to easily identify functions and their associated requirements and to maintain separation between these requirements and others which are primarily associated with specialty engineering, the DCS has been chosen as a means of maintaining this separation and clarification.

Functions are defined and requirements are allocated to system segments using the RAS as discussed in Section 4.1.3. Other requirements will be documented as "engineering constraints" and allocated to the appropriate section of the requirements document using Design Constraint Sheets (DCS), Figure 4-2. These design constraint requirements are typically those pertaining to human factors, safety, logistics, and other engineering specialties. Their development is based on standard engineering analytical approaches. In addition, the DCS will be used to document the requirements for each interface described in the Interface Specifications. A member of the system engineering staff will review each constraint and initial column 5. The appropriate manager from System Integration will approve each sheet. The DCSs shall be submitted for the SEB and QAP 6.2 reviews.

4.1.5 Issue Clarification and Derived Requirements Documentation Form

The Issue Clarification and Derived Requirements Documentation form, Figure 4-3, will be used to document technical decisions and derived requirements that have resulted from studies, analyses or peer reviews of issues from the Issues List (Section 4.1.6) or from reviews of the draft requirements document.

This form will also be used to document the engineering consensus resulting from analyses to interpret regulatory or legal requirements or otherwise to remove "To be Resolved" (TBR) or "To be Determined" (TBD) entries in the Requirements Documents. The Issue Clarification form will be signed by one of the system engineers from the staff and approved by the appropriate manager from Systems Integration.

DESIGN CONSTRAINT SHEET (DCS)			Constraint Applicability	
Requirement Number and Title (1)	Source Ref. (2)	Constraint or Design Criteria (3)	Item (4)	Review* (5)

* Signature in column 5 shows review of the restatement of the requirement into engineering terms.

Approved: _____ Date: _____

Figure 4-2. Design Constraint Sheet (DCS)

ISSUE CLARIFICATION AND DERIVED
REQUIREMENTS DOCUMENTATION FORM
(Please Print Clearly)

Page of

Date: _____ Serial Number: _____ QA: No ☐ Yes ☐

1. Document Title and Paragraph:

2. Issue/Requirement Short Title:

3. Statement of Issue:

4. Discussion: (Background (how was the issue raised?), Alternatives/disadvantages/risks considered; other decision/documents affected by this issue)

5. Conclusion: (See RAS/DCS/FFBD/Technical Document Input Control form attached) (annotate attachments with the serial number of this document)

6. Staff Engineers: _____ _____

_____ _____

7. Coordination:

_____ _____

_____ _____

_____ _____

Status Change (See back of form):

_____ _____ _____ _____

Submitted Date Approved Date

Figure 4-3. Issue Clarification and Derived Requirements Documentation Form

ISSUE CLARIFICATION AND DERIVED
REQUIREMENTS DOCUMENTATION FORM (Con't)

Page of

Serial No. _____

Item	Continuation

Figure 4-3. Issue Clarification and Derived Requirements Documentation Form (Cont'd)

ISSUE CLARIFICATION AND DERIVED
REQUIREMENTS DOCUMENTATION FORM (Con't)

Page of

Serial No. _____

NOTES:

1) The serial number of this form consists of:

(a) system designator

CR	CRWM System-Level
WA	Waste Acceptance
TRAN	Transportation
MRS	Monitored Retrievable Storage
MGDS	Mined Geological Disposal System
WA/TRAN	Interface Between WA and TRAN
TRAN/MRS	Interface between TRAN and MRS
TRAN/MGDS	Interface between TRAN and MGDS
MRS/MGDS	Interface between MRS and MGDS
WA/MRS	Interface between Waste Acceptance and MRS
WA/MGDS	Interface between Waste Acceptance and MGDS

(b) Six-digit (yymmdd) date representing two-digits each for year, month, and day.

(c) Two-digit number, reset to 01, each day for the first form initiated, 02 for the second, etc.

EXAMPLE: MGDS-920106-02 (This is the second MGDS form initiated on January 6, 1992)

2) Mark QA/Not QA depending upon whether the decision is quality affecting.

Figure 4-3. Issue Clarification and Derived Requirements Documentation Form (Cont'd)

4.1.6 Issues List

The Issues List will be developed and maintained as a working document throughout the development of the Requirements Document in order to document items requiring resolution or decision consensus.

The Issues List will be provided to the Systems Analysis Section of the M&O and, periodically to the OCRWM Systems Engineering Branch. A systems study plan will be developed for the resolution of primary issues. The issues list will be used as a management tool to maintain the status of items requiring resolution.

4.1.7 Technical Document Input Control

In accordance with NQA-1, inputs used in the preparation of technical documents and in changes to inputs shall be documented, reviewed and maintained as part of the QA record. The Technical Document Input Control Form, Figure 4-4, shall be used to assist in maintaining a list of inputs used in developing and changing the requirements document.

The potential input (new or change) shall be documented by filling out the Technical Document Input Control Form. This form shall identify and describe the potential input and the appropriate reviews and approvals. The form shall include at least the following:

A. A description of the inputs or change to inputs and the estimated impact of the change.

B. A list of the requirements documents that are affected by this input.

C. A list of the QA controls that were used in developing the input, and the QA controls that are required for the technical documents.

D. Indication of whether the QA controls used for the input are adequate or if any actions are required to be able to accept the input.

E. Whether the input will be included or excluded (provide rationale) and whether an immediate change to the technical document is needed.

4.1.8 Verification Matrix

The data on the RAS and the Design Constraint Sheets will be incorporated into the format of Section 3 of this plan. A Verification Matrix will be prepared for each requirements document except the CRWMS Requirements that lists each requirement separately. The verification method (e.g., analysis, inspection, test, or demonstration) will be determined for each requirement and entered in the matrix. In addition, any special test requirements will be documented in Section 3 of the requirements document and reflected on the Verification Matrix, if appropriate.

Civilian Radioactive Waste Management System

Management and Operating Contractor

TECHNICAL DOCUMENT INPUT CONTROL

Page ___ of ___
TDIC Rev. No. ___

New Input ___ Change ___ Deletion ___

1. Title of Input: _____

2. Description of Input (include estimated impact and rationale): _____

3. Technical documents affected by this input: _____

4. List Quality Assurance controls required to generate the potential input: _____

5. List Quality Assurance controls required for the affected document: _____

6. Are QA controls used for the input adequate for the affected document? Yes ___ No ___
If No, provide necessary action to qualify input. _____

7. Is the input to be included in the affected document? Yes ___ No ___
If No, provide rationale for exclusion: _____

8. If there is a change to the document: Revise now ___ Hold for next revision ___

Originator's Signature _____ Date _____
Organization M&O System Integration

Section Manager's Approval _____ Date _____
Organization M&O System Integration

Figure 4-4. Technical Document Input Control Form

4.1.9 Drafts of the Requirements Document

Preliminary drafts of each Requirements Document may be produced for periodic review as required. Later versions of such preliminary drafts will be submitted to SEPID for review and comment.

Following the SEPID review, an updated draft will be distributed. The M&O shall be responsible for conducting the QAP 6.2 review and, after comment resolution, the requirements document will be reviewed again for PCCB action. Following PCCB review, the final requirements document will be published incorporating all resolved comments.

The SRR and SDR are reviews identified in DOE 4700.1. They are intended as management reviews of technical activities. As appropriate, they will be conducted in addition to the reviews described above.

4.1.10 Description of Process

The entire process of developing the Requirements Documents will be conducted in a close working relationship with the M&O team performing the system element designs. For development of the Waste Acceptance SRD, close coordination between RW and EM will be maintained to ensure consistency with lower-level compliance and qualification documents.

4.2 CRITERIA FOR REQUIREMENTS DOCUMENT ACCEPTABILITY

4.2.1 System Design Review

A System Design Review (SDR) will be held for the MGDS, MRS and Transportation SRDs as described in paragraph 1.4.H and the OCRWM SEMP.

4.2.2 System Engineering Branch Review

The Systems Engineering Branch will review the draft requirements documents for functional breakdown adequacy and program policy compliance, prior to the QAP 6.2 review. The Systems Engineering Branch will use the criteria below to guide its evaluation of the requirements document.

A. All identified functions, interfaces, and requirements are appropriate

B. The definition of each function, interface, and requirement is clear and excludes duplication

C. The Requirements Document is consistent with this Technical Document Preparation Plan

D. Overall content is consistent with program policy

E. Flowdown and interpretation of functions and requirements from the regulatory requirements is documented.

4.2.3 QAP 6.2 Technical Review

Subsequent to completion of the System Engineering Branch review requirements documents will be reviewed and comments documented in accordance with QAP 6.2. Each requirements document will be accepted by the Associate Director, OSC. It will then be submitted to the Project Change Control Board (PCCB) for final approval.

A QAP 6.2 technical review package will accompany each document submitted for review. The following review criteria will be adapted or amended as necessary and shall be included in each review package.

A. **All Reviewers**

1. Review in accordance with QAP 6.2
2. Review document(s) for technical adequacy to meet top-level CRWMS technical baseline requirements
3. Review for completeness and need for additional requirements
4. Review for correct interpretation of requirements
5. Verify that assumptions are explicit and reasonable
6. Verify that a means is stated for adjudicating conflicting requirements
7. Review for organization and format (editorial comments are not mandatory)

B. **System Engineering Area of Expertise**

1. Review for consistency with this TDPP
2. Verify that functions have been properly identified and allocated in the function hierarchy
3. Ensure requirements (functional, technical or interface) are properly identified and allocated to appropriate document sections.
4. Review requirements for accuracy, traceability and flow down

5. Ensure inputs and input sources are current, correct and usable

C. **Element Interfaces Area of Expertise**

1. Ensure system and element interfaces are properly identified and allocated to appropriate Interface Specification for definition.

2. Ensure that physical and functional top-level interfaces are identified, are accurate and meet system-level requirements for the CRWMS technical baseline.

D. **Regulatory Licensing and Compliance Area of Expertise**

1. Review for compliance with prior commitments

2. Review for compliance with regulations

3. Review Conformance Verification Matrices for correctness and completeness.

E. **Design, Technology, and Nuclear Engineering Areas of Expertise**

1. Ensure that system and element functions are properly identified and allocated

2. Ensure that system requirements (functional, technical, interface) have been properly identified, interpreted and allocated to proper section of the document.

3. Ensure that physical system segments and subsystems are adequate for addressing CRWMS technical baseline requirements.

4. Ensure that source document(s) requirements have been properly identified, interpreted and allocated.

5. Ensure that top-level interfaces have been identified, are accurate and have been allocated to appropriate interface specification for definition.

6. Review Conformance Verification Matrices for technical accuracy and completeness.

4.2.4 Document Change Proposal

Upon acceptance of the Requirements Documents by the Associate Director, OSC, the Requirements Document will undergo a management review against all program impacts by the PCCB in accordance with Reference O. If required, a Document Change Proposal will be prepared by the Associate Director, OSC, to update the technical baseline documents.

4.2.5 Training for Users

All document preparers and reviewers shall be furnished a copy of this TDPP and it shall be included on I&T matrices for all document developers and reviewers conducting reviews under QAP 6.2.

4.3 QUALITY ASSURANCE

The preparation and review of the Requirements Documents are subject to the OCRWM QA program as defined in the OCRWM QARD and QAPD. The quality assurance controls that will be applied will be those specified in the OCRWM QAPD. In summary, the analysis and document preparation and/or revision will be in accordance with:

A. QAAPs 2.1, 2.2, 2.3, and 3.3 to assist in the preparation of the requirements document

B. QAAP 7.1 for procurement of services, if applicable

C. QAAP 6.1 for document control

D. QAAP 17.1 for records management

E. QAPs 3.5 and 6.2 for document preparation and review

4.3.1 Records

Records resulting from the implementation of this management plan are to be maintained in accordance with the requirements specified in QAAP 17.1. As a minimum the following records shall be considered QA records:

A. The Technical Document Preparation Plan and any revisions thereto

B. The draft Requirements Document submitted for QAP 6.2 review, and all documentation associated with the QAP 6.2 review

C. The final Requirements Document used as basis for Document Change Proposal

D. Document Change Proposal

E. Technical Document Input Control forms in accordance with NQA.1, QAP 3.5 and this TDPP (see Section 4.1.7).

F. Education and Experience Verification Forms, per QAAP 2.2, and Indoctrination and Training matrices, in accordance with QAAP 2.1, for all Task Team members

G. Draft Requirements Document after QAP 6.2 review with incorporation of all resolved comments

H. Draft Requirements Document submitted for PCCB review and all associated documentation

I. Final Requirements Document after PCCB review with incorporation of all resolved comments

J. Requirements Allocation Sheets (RAS) and Design Constraint Sheets (DCS) used to develop the Requirements Documents (see Section 4.1.3 and 4.1.4)

K. Issue Clarification and Derived Requirements Documentation Form (see Section 4.1.5)

4.3.2 Revisions to the Preparation Plan

Any changes to this preparation plan found to be necessary during the conduct of the conceptual design will be documented through revision, including appropriate review and approval of this plan, in accordance with QAP 3.5.

Schedules for production of the requirements documents and for various reviews, if revised, will be promulgated as revisions to this Technical Document Preparation Plan.

4.4 REQUIREMENTS INPUTS AND DOCUMENT PREPARATION

The CRWMS, MRS Facility, MGDS and Transportation System Requirements Documents and each Interface Specification will be prepared by the Requirements Document Task Team that consists of the Task Manager and selected M&O staff members. All members of the team will be qualified technical personnel with documented knowledge of items A-AE of Section 1.3 and all technical documents described in Section 4.4.2. Education and experience shall be verified in accordance with QAAP 2.2, and QA indoctrination and training shall be documented in accordance with QAAP 2.1. Education and Experience Verification and Indoctrination and Training forms shall be included in the QA record.

The Waste Acceptance System Requirements Document will be prepared by the Waste Acceptance Requirements Task Force. All members of this Task Force will be qualified technical personnel with documented knowledge of items D, E, K, L, T, Z, AF and AG of Section 1.3 and items A, B, E, I and L in the document list described in Section 4.4.2. Education and experience shall be verified in accordance with QAAP 2.2, and QA indoctrination and training shall be documented in accordance with QAAP 2.1. Education and Experience Verification and Indoctrination and Training forms shall be included in the QA record.

4.4.1 Basis for Requirements Specified as Part of the Functional Analysis

Requirements will be based on:

A. Current Federal Laws pertaining to the management of high-level radioactive waste material

B. Federal regulations derived from laws pertaining to high-level radioactive waste management

C. Federal laws and regulations that are applicable to the operation of nuclear facilities and systems needed to manage high-level waste

D. Federal laws and regulations pertaining to protection of the environment and of public and worker health and safety

E. Selected DOE Orders and OCRWM approved policies and decisions (i.e., Mission Plan, etc.)

F. State of Nevada and other state and local laws and regulations as appropriate

G. Physical System Requirements, references 1.3-T, 1.3-U, 1.3-V, 1.3-W, 1.3-Y, and 1.3-Z

H. Site Characterization Plan Baseline, reference 1.3-X

I. Other standards and criteria as appropriate

Relevant NRC regulatory guides, technical staff positions, NUREGs and other NRC publications will be reviewed to help interpret requirements during the development of the requirements documents. This does not infer, however, that other requirements will not be identified by reading the source documents or through discussions with personnel outside the M&O Task Team developing requirements documents. Specifically for the Waste Acceptance SRD, consideration shall be given to existing waste production facility designs. The use of such requirements, however, will require concurrence of a Requirements Document Task Team engineer and approval by the Task Manager.

In addition to interpretation of statutory, regulatory, and other requirements as described above, the Task Teams will develop derived and performance requirements to meet the mission and support the constructability of the system. These will be based on engineering and other analyses, inputs from peer reviews, calculations, etc. Those processes will be documented and concurred in by more than one engineer from the Requirements Document Task Teams and approved by M&O management. This documentation, together with supporting data, will serve as the source documentation for the requirement.

4.4.2 Document Familiarization

Specifically, the M&O Requirements Document Task Team must be thoroughly familiar with applicable primary source documents for the system requirements. These include as a minimum, references in Section 3 and the following documents:

A. *Nuclear Waste Policy Act of 1982* (NWPA)

B. *Nuclear Waste Policy Act Amendments of 1987* (NWPAA)

C. *OCRWM Quality Assurance Requirements Document*

D. 10 CFR 960, *General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories*

E. 10 CFR 961, *Standard Contract for Disposal of Spent Nuclear Fuel and or High-Level Radioactive Waste*

F. *Occupational Safety and Health Act* (OSHA), 29 USC 651

G. 10 CFR 20, *Standards for Protection Against Radiation*

H. 40 CFR 191, *Environmental Radiation Protection Standards for Management and Disposal of Spent Fuel, High-Level and Transuranic Radioactive Wastes*

I. 10 CFR 71, *Packaging and Transportation of Radioactive Material*

J. 10 CFR 72, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste*

K. 10 CFR 73, *Physical Protection of Plants and Material*

L. 10 CFR 60, *Disposal of High-Level Radioactive Wastes in Geologic Repositories*

M. DOE/RW-0005, *Mission Plan for the Civilian Radioactive Waste Management Program (CRWM)*, OCRWM, DOE, June 1985, Volume I, Part I

N. *OCRWM Mission Plan Amendments*

The Waste Acceptance Requirements Task Force must be thoroughly familiar with the documents identified in Section 4.4.

4.4.3 Preliminary Draft of Requirements Documents

Requirements Documents may be discussed with selected individuals for comments and technical input. Interactions with OCRWM branches, project offices, or other program participants will facilitate development of the technical approach, identify and resolve potential issues, and avoid potential conflicts. Such interactions, although not formally scheduled or required in this management plan, will be undertaken at the discretion of the Task Manager, on an as needed basis, during document development. Preliminary drafts of the requirements documents may be developed to support those interactions.

4.4.4 Source Documents

Source documents (documents from which requirements have been derived or which support requirement definition) will be documented, approved, and controlled using the criteria in Section 4.4.1 of this plan. This will include documenting each source document on a Technical Document Input Control Form (see Section 4.1.7). The M&O Task Manager will ensure that copies of the referenced source documents are maintained and that these copies are the most current versions.

Those requirements that are derived from laws, regulations, DOE Orders, and policy decisions will not be subject to qualification through use of quality assurance controls. However, to ensure that configuration control is maintained, these inputs will also be documented on the Technical Document Input Control Forms.

Where a primary source document, e.g. DOE 6430.1A, contains other sources, reference to the primary document as a source shall be taken to infer inclusion of all sources contained within the primary document unless exception is taken and such exception is noted and approved in the source input control form.

Requirements that are included in the requirements documents as "to be resolved" (TBR) or "to be determined" (TBD) will be qualified in accordance with appropriate QA procedures. Each such requirement shall be qualified by engineering analyses, document research, peer review, or other appropriate means. The results of each qualification will be appropriately documented in accordance with QA procedures.

4.4.5 Interfaces

Inter-element interfaces (e.g. Waste Acceptance-Transportation; MRS-Transportation, MGDS-Transportation; MGDS-MRS; Waste Acceptance-MRS and Waste Acceptance-MGDS) will be identified through functional analysis as described in Sections 4.1.1. and 4.1.2. Additionally, interface identification may be facilitated by an interface group composed of technical experts from the interfacing elements.

For each inter-element interface, an Interface Specification (IFS) will be developed. Each IFS will be referenced in both system element requirements documents to which they apply; however, they will be written as stand alone documents.

5. MILESTONES FOR THE REQUIREMENTS DOCUMENTS

Schedules for development and review of requirements documents which have been identified in this plan are presented in Figure 5-1. Revisions to these dates will be processed in accordance with Section 4.3.2 procedures.

DELIVERABLES	COMPLETION DATE
CRWMS Requirements	
- RW-30 Review Draft	5/15/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 weeks after receipt of PCCB comments
Waste Acceptance Requirements	
- RW-30 Review Draft	8/17/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	2 weeks after receipt of QAP 6.2 comments
- Final Document	1 week after receipt of PCCB comments
Waste Acceptance-Transportation Interface Specification	
- RW-30 Review Draft	2/9/93
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 week after receipt of PCCB comments
Waste Acceptance-MRS Interface Specification	
- RW-30 Review Draft	5/15/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 week after receipt of PCCB comments
Waste Acceptance-MGDS Interface Specification	
- RW-30 Review Draft	9/25/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	2 weeks after receipt of QAP 6.2 comments
- Final Document	3 week after receipt of PCCB comments
Transportation System Requirements	
- RW-30 Review Draft	12/9/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 week after receipt of PCCB comments
MGDS-Transportation Interface Specification	
- RW-30 Review Draft	9/25/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 week after receipt of PCCB comments

Figure 5-1. Requirements Documents Development and Review Schedule

DELIVERABLES	COMPLETION DATE
MRS-Transportation Interface Specification	
- RW-30 Review Draft	5/15/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 week after receipt of PCCB comments
MRS System Requirements	
- RW-30 Review Draft	5/15/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	3 weeks after receipt of QAP 6.2 comments
- Final Document	4 week after receipt of PCCB comments
MGDS-MRS Interface Specification	
- RW-30 Review Draft	7/1/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	2 weeks after receipt of QAP 6.2 comments
- Final Document	3 week after receipt of PCCB comments
MGDS System Requirements	
- RW-30 Review Draft	7/1/92
- QAP 6.2 Review Draft	2 weeks after receipt of RW-30 comments
- PCCB Review Draft	2 weeks after receipt of QAP 6.2 comments
- Final Document	3 week after receipt of PCCB comments

Figure 5-1. Requirements Documents Development and Review Schedule (continued)

Technical Document Preparation Plan (TDPP)

For The

Preparation of MGDS Design Requirements Documents

Revision 1

June 15, 1993

Approved: W B Simecka

W. B. Simecka
Director, Engineering &
Development Division
Yucca Mountain
Site Characterization
Project Office

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1. OBJECTIVES AND SCOPE

1.1 OBJECTIVES

This technical document preparation plan (TDPP) provides guidance for the development and review of the Mined Geologic Disposal System (MGDS) Design Requirements documents (DRDs) in accordance with OCRWM QAPs 3.5 and 6.2. The Design Requirements documents will capture the applicable requirements from the MGDS Requirements document (MGDS RD). In addition, derived requirements will be developed as a product of the functional analysis and decomposition process. These requirements will be appropriately allocated within each element of the MGDS.

1.2 SCOPE

The overall organization of the OCRWM technical requirements documents is depicted in Figure 1-1. System-Level Requirements documents (SRDs) are subordinate to the Civilian Radioactive Waste Management System (CRWMS) Requirements document (CRD), and the project-level DRDs are subordinate to their respective SRD. The MGDS RD is the applicable SRD for the development of the DRDs that are the subject of this TDPP. The MGDS RD provides a general overview of the system elements and defines the functions and configuration items to a lower level of detail than the CRWMS Requirements document. It states the technical and mission requirements of the MGDS element, allocates system specific requirements to functional areas, documents design constraints, and defines interfaces between and among functional areas. The MGDS RD also addresses site characterization and site suitability evaluation criteria. The MGDS RD iInterface sections define the functional and physical interfaces between the major system elements. These sections assign requirements to the interfaces.

The project-level DRDs state the requirements for the design or engineering development of configuration items or products during the development phase. DRDs are normally developed during the preliminary design phase and serve as the basis for definitive design. Each DRD must be in sufficient detail to describe effectively the performance characteristics that each configuration item is to achieve. As the design of a configuration item evolves into a definitive design for production or construction, the requirements also evolve and become more definitive in order to retain a complete statement of performance requirements. The five MGDS DRDs identify design requirements for the:

1. Repository (the Repository Design Requirements document);
2. Engineered Barrier System (the Engineered Barrier Design Requirements document);
3. Site Design and Test Requirements (Site Design and Test Requirements document);
4. Surface Based Test Facilities (Surface Based Test Facilities Requirements document); and
5. Exploratory Studies Facility (Exploratory Studies Facility Requirements document).

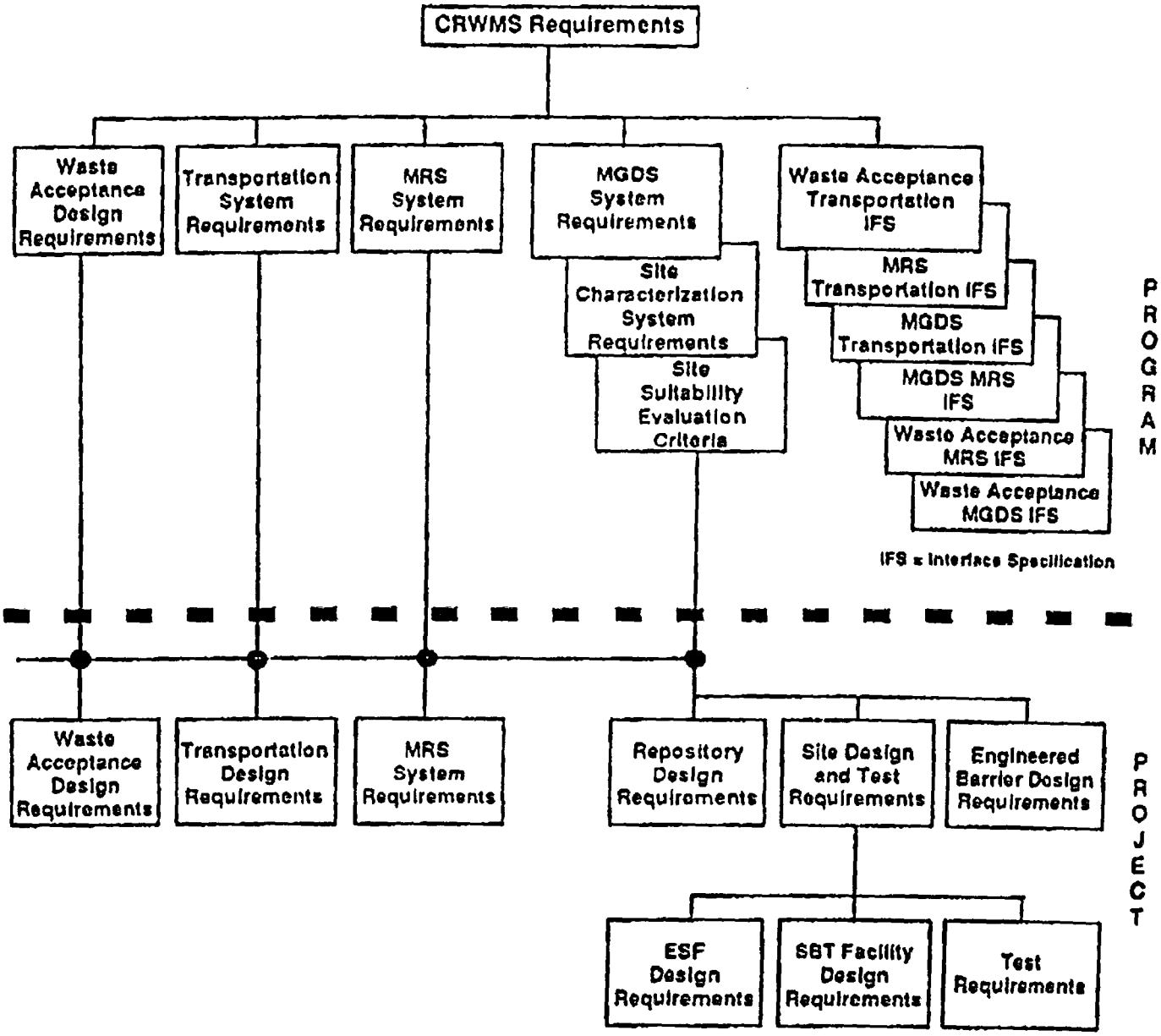

Figure 1-1. CRWMS Technical Document Hierarchy

These documents are organized in the document hierarchy to insure a logical allocation of requirements from the systems-level requirements documents down to the project-level documents. The sponsoring DOE organization for the project level DRDs is the Yucca Mountain Site Characterization Project Office (YMPO). The approving DOE organization is the Project Office Change Control Board (CCB).

1.3 DEFINITIONS

A. **Derived Requirement.** Derived requirement is a generic term for requirements which are derived from higher level requirements as requirements are given more detail and specificity. Derived requirements are frequently developed from analyses of the effects of mission or performance requirements on system design.

B. **Design Requirements Documents.** These project-level documents specify the requirements for the design or engineering development of products (configuration items) during the development period. Each design requirements document shall be in sufficient detail to describe effectively the performance characteristics that the configuration item, subsystem or component is to achieve when the developed item evolves into a detailed design for construction or production. In the case of DRDs that identify test requirements (such as the SD&TRD), sufficient detail shall be provided to describe effectively the performance objectives of the required activity such that the study plans can be developed to initiate the required activities.

C. **Functional Allocation.** Each function and subfunction is assigned a set of technical requirements or physical capabilities of the system. Derived requirements (those from analyses or other studies not directly traceable to another source) should be stated in sufficient detail for allocation to facilities, hardware, software, personnel, and procedures. When necessary, special skills or peculiar requirements are identified. Allocated requirements should be traceable through the analysis by which they were derived to the system requirement they are designed to fulfill. A set of block diagrams or functional flow diagrams are used to "flow down" the functions and subfunctions until closure is reached at the hardware or procedure level.

D. **Functional Analysis.** Functional analysis, at the system level, consists of two interrelated activities described below. A third activity, time requirements analysis or timeline analysis is an activity which may be performed as part of Functional Analysis, if required, at the project level. The functional analysis activities performed at the system and project level are as follows:

1. **Function Identification.** Analysis of system objectives to identify functions and subfunctions that should be performed to satisfy the system performance and design parameters.

2. **Functional Requirements Identification.** Development of technical requirements for each function identified. These requirements define the input and output functions in sufficient detail for direct use as criteria for equipment design and operation, personnel skill development, computer programming, environmental, safety and health considerations, logistics support, etc.

3. **Timeline Analysis.** Analysis performed to determine the time requirements of functions or functional sequences in which time is critical to mission success, safety, utilizing resources, minimizing downtime, and/or increasing availability. Only those sequences in which time is a critical factor require timeline analysis.

E. **Performance Requirements.** Performance requirements generally provide an extension of the requirements for functions by expressing an acceptable level or range of performance for a function. They describe the extent to which a mission or function must be executed, generally measured in terms of quantity, quality, coverage, timeliness or readiness.

F. **Segment.** A constituent of a system element (e.g., the EBS is one segment of the MGDS).

G. **System Element.** One of the major elements of the CRWMS (e.g., Waste Acceptance, Transportation, MRS, MGDS). This differs from a "project" that may be initiated by DOE to manage and control development of one or more System Elements (e.g., the Yucca Mountain Project or the MRS Project).

H. **Systems Engineering.** Systems engineering encompasses management of the engineering and technical effort required to transform the project objectives into an operational system. It includes the engineering required to define the system performance parameters and the configuration to best satisfy the project objectives. It also includes the planning and control of technical tasks, integration of the engineering specialties, and the management of a totally integrated design effort to meet cost, schedule, and technical objectives of the systems engineering process.

I. **Systems Engineering Process.** The systems engineering process is an iterative one encompassing changes at any point in the process. Possible impacts of change to the system should be analyzed during the project. These impacts should be examined for validity, consistency, desirability, and attainability with respect to current technology, physical resources, human performance capabilities, life-cycle costs, and other constraints. The output of this analysis should either verify the existing requirements or lead to the development of new requirements that are more appropriate for the mission.

J. **System Integration (or Engineering Integration).** The integration of engineering specialties and the management of a totally integrated effort of design engineering, specialty engineering, and production (or construction) engineering to ensure their influence on design.

K. **Traceability.** The capability to track requirements from a higher-level document or other source to all elements of the system that, collectively or individually, perform the function (e.g., an element of the system to all functions that it performs; or a specific requirement to a specific source analysis or constraint which originated the requirements). Traceability also includes the capability to trace from an element of the system back to the source.

1.4 BACKGROUND

The Nuclear Waste Policy Act of 1982 (NWPA), as amended, assigned to the Department of Energy (DOE) the responsibility for managing the disposal of spent nuclear fuel (SNF) and high-level nuclear waste (HLW) and established the OCRWM for that purpose. The mission of the CRWMS is to permanently isolate SNF and HLW in a geologic repository in a timely manner that protects the health and safety of the public and maintains the quality of the environment. In order to accomplish this mission, DOE is developing a waste management system that will accept, transport, store, and dispose of SNF and HLW. The management and control of this system is provided by the OCRWM Program.

For planning, systems analysis, and conceptual design purposes, the CRWMS has been identified as having four major functions which are Accept Waste, Transport Waste, Store Waste, and Dispose of Waste. The MGDS facility will accomplish the Dispose of Waste function by permanently emplacing waste in an isolated geologic medium in such a manner that the waste may be retrieved, if necessary, in accordance with 10CFR60.111.

The MGDS RD has allocated functions to the repository, engineered barrier, and site segments of the MGDS. The MGDS DRDs will further decompose these functions and allocate requirements appropriately.

2. RESPONSIBILITIES

YMPO is the sponsoring DOE organization for the project-level and the approving organization is the CCB. The M&O contractor is responsible for preparing the DRDs and coordinating the QAP 6.2 technical reviews.

The Project Manager of YMPO has overall responsibility for this TDPP and for the MGDS DRDs.

The Division Director, Engineering and Development Division is responsible for approval of this TDPP and its revisions.

The Chief, Project Control Branch, is responsible for reviewing change requests to the DRDs submitted by the M&O for approval by the CCB.

Other OCRWM Offices and Divisions will be responsible for designating appropriate technical experts to participate in the review and resolution of comments on the resulting DRDs. These reviewers may be from DOE, M&O, or other participant or support organizations. Reviewers must be independent of those who prepare the documents.

M&O is responsible for preparing this plan, developing, and implementing the requirements documents, and conducting QAP 6.2 reviews for the requirements documents.

The M&O MGDS Requirements Manager is responsible for managing the effort to identify derived requirements and for evaluating the quality and completeness of the requirements research effort. The Requirements Manager is also responsible for preparing the requirements documents for submittal to the Chief, Project Control Branch, coordinating and evaluating the inputs from the designated OCRWM and M&O technical experts, and for ensuring the technical

quality of the final requirements documents. The M&O MGDS Requirements Staff is responsible for coordinating necessary interfaces between the M&O and OCRWM to obtain information pertaining to the definition and interpretation of design requirements. The definition and interpretation of requirements shall be conducted in consonance with ongoing program efforts under Design, Regulatory and Licensing, Performance Assessment and System Analysis. Requirements which address major operational or licensing decisions will be stated only after an OCRWM review and decision has been conducted. The Requirements Manager is also responsible for coordinating review comments, ensuring approved review comments are included in requirements updates, for coordinating required design reviews, and for preparing change requests for submission to the YMPO Project Control Branch for review.

The M&O MGDS Requirements Staff are responsible for developing the DRDs, preparing appropriate quality records, transmitting those records to the Project Control Branch, preparing comment response forms, and incorporating comment resolution changes into the final DRDs. It is the responsibility of the M&O MGDS Requirements Manager to oversee the conduct of these activities.

3. DESCRIPTION OF THE TECHNICAL DOCUMENTS

3.1 DESIGN REQUIREMENTS DOCUMENTS

The DRDs will provide the requirements and basic constraints imposed on the development of an architectural and engineering design for the particular segment described.

Programmatic requirements describe processes and procedures that may occur at any phase of the program. The programmatic requirements will be addressed in plans and procedures, many of which will be developed during the design and construction phases and implemented during the operations phase. The various plans and procedures are to be identified in the Program Management System Manual (PMSM) and in the System Engineering Management Plan (SEMP). These programmatic requirements are beyond the scope of the DRDs.

3.2 TABLE OF CONTENTS

The general outline of the DRDs is described below. Sections may be modified or deleted as necessary to satisfy the specific needs of a document.

3.2.1 Section 1 - Scope

The purpose of the document is defined and information is provided which properly identifies the document and its relation to the CRWMS. The mission, background, concept, and top-level functions of the segment are defined. A brief overview of the requirements document, including a brief discussion of the document organization is also given.

3.2.2 Section 2 - Applicable Documents

This section lists all documents that are included by reference.

3.2.3 Section 3 - Requirements

The essential requirements and descriptions that apply to performance, design, reliability, personnel subsystems, etc. of the configuration item, material or process covered by the specification shall be stated in this section. These requirements and descriptions shall define as applicable, the character or quality of the materials, formula, design, construction, performance, reliability, transportability, and product characteristics, chemical, electrical, and physical requirements, dimensions, weight, color, nameplates, product marking, workmanship, etc. This section is intended to indicate, as definitively as practicable, the minimum requirements that a configuration item, material or process must meet to be acceptable. The Requirements section shall be so written that compliance with all requirements will assure the suitability of the configuration item, material or process for its intended purpose, and non-compliance with any requirement will indicate unsuitability for the intended purpose. Only those requirements shall be specified that are necessary and measurable.

3.2.4 Section 4 - Conformance Verification

This section defines how the requirements are to be satisfied/verified. In each requirements document, a Verification Matrix is provided that cross-references requirements to verification methods.

3.2.5 Section 5 - Preparation for Operations/Delivery

Special requirements, if any, required in order to meet licensing or operational needs are specified in this section.

3.2.6 Section 6 - Notes

General information which is non-binding on the physical system configuration is presented. This may include programmatic requirements that control development activities but are not a part of the design basis. This section will contain a glossary, list of acronyms, identify appropriate design guidance, and provide various traceability matrices as appropriate. At a minimum, a traceability matrix showing requirement flow down from the parent document (the document from which the higher level requirements are flowed) will be provided.

3.2.7 Appendices

Drawings, diagrams and oversize figures may be included in appendices for convenience and to reduce the complexity of the basic document. Other requirements, because of the nature of their complexity or degree of specialty, may also be included as appendices. Requirements contained in appendices are mandatory and may not be changed except through the document change control procedure. These requirements will also be presented in the traceability matrix in Section 6. The traceability matrix will contain 3 columns (as a minimum). The first Column will identify source requirements, the second column will contain the corresponding section of the parent document and the third column will specify the corresponding DRD section.

Each DRD will provide an appendix which contains a complete listing of all requirements in the parent document correlated to the appropriate sections of the DRD. This appendix provides the explanation of the rationale for why requirements from the Parent were not captured in the DRD.

3.3 TRAINING REQUIREMENTS

No special training will be required for the users of the DRDs.

4. TECHNICAL APPROACH

4.1 MAJOR ASSIGNMENTS AND STEPS IN PREPARING THE DESIGN REQUIREMENTS DOCUMENT

4.1.1 Functional Analysis

The functions allocated to each MGDS segment by the MGDS RD will be decomposed to lower levels necessary to provide the requirements and constraints to the designer. Further decomposition of functions may be required as the MGDS concept evolves or as modifications are made to the system-level requirements documents.

4.1.2 Functional Flow Diagrams

Functional Flow Diagrams for the DRDs will be developed from the functions identified in Section 4.1.1. These will graphically illustrate the functional process of the system, ensure all functions are addressed, and depict relationships among functions. A brief overview of the functions will be provided in the DRDs. The Functional Flow Diagrams serve only as a tool for the development of the Requirements Allocation Sheets and will be maintained by the responsible engineer (document preparer).

Physical interfaces between MGDS segment and systems external to CRWMS (e.g. local electrical, water or sewerage utilities) will be documented in the appropriate DRDs at the project level.

4.1.3 Requirements Allocation Sheets

A Requirements Allocation Sheet (RAS), Figure 4-1, will be developed for each function identified in Section 4.1.1. Requirements pertaining to each function will be maintained on the RAS as a permanent record of requirements traceability. These requirements will be allocated to physical elements of the system and allocated to the appropriate section of the requirements document. The RAS will serve as a tool for consolidating requirements under the appropriate function and for maintaining traceability of functions and requirements. They will serve as a permanent QA record of a requirement's source, interpretation and allocation. The function description on the RAS will be prepared by the responsible engineer (document preparer).

RASs are developed for the functions the system (in the case of the DRDs the segment) is to perform and incorporate the requirements onf those functions. The functions, each defined on a separate RAS, define what is to be done while the requirements indicate how they are to be done. The RASs are then used to allocate the functions (and requirements) to physical items that perform the functions. Derived requirements will be documented on the RASs. The physical items and their allocated functional requirements appear in section 3.7 of the design requirements document. The RASs shall be submitted for inclusion into the QA package prior to implementation of the DRD.

4.1.4 Design Constraints

Design Constraints typically address requirements associated with regulatory, specialty engineering, or similar constraints which usually address the design, construction, etc. of the system architectural elements, rather than how they perform their functions. These also include human factors, construction standards, safety, etc. and appear in sections 3.2 through 3.6 of the design requirements document. There are no fundamental differences between requirements and constraints. Therefore, the RAS will also be used to document constraints. The data on the RASs will be incorporated into Section 3 of the DRDs.

4.1.5 Verification Matrix

A Verification Matrix will be prepared for each DRD that lists each requirement separately. The verification method (e.g., analysis, inspection, test, or demonstration) will be determined for each requirement and entered in the matrix. In addition, any special test requirements will be documented in Section 3 of the requirements document and reflected on the Verification Matrix, if appropriate.

4.1.6 Description of Process

The process of reviewing the MGDS DRDs and incorporating them into the new technical baseline is described in Figure 4-2.

4.2 CRITERIA FOR DESIGN REQUIREMENTS DOCUMENT ACCEPTABILITY

4.2.1 Systems Branch Review

The Systems Branch will review the draft DRDs for functional decomposition adequacy and program policy compliance, prior to the QAP 6.2 review. The Systems Branch will use the criteria below to guide its evaluation of the requirements document.

A. All identified functions, interfaces, and requirements are appropriate.

B. The definition of each function, interface, and requirement is clear and excludes duplication.

C. The DRD is consistent with this TDPP.

D. Overall content is consistent with project policy.

E. Allocation and interpretation of functions and requirements identified in the parent document are is documented.

F. Other program or project documents which will be affected by the MGDS DRDs should be identified to the extent practicable.

The Systems Branch Review (informal) will include other representatives from RW-20, the M&O, and other organizations as needed to facilitate the review.

4.2.2 QAP 6.2 Technical Review

Subsequent to completion of the Systems Branch review, requirements documents will be reviewed and comments documented in accordance with QAP 6.2. After resolution of the comments, each requirements document will be accepted by the Project Manager, YMPO. The requirements documents will then be submitted to the CCB for final approval.

A QAP 6.2 technical review package will accompany each document submitted for review. This review package will include:

A. A copy of this TDPP;

B. A copy of the parent document;

C. Traceability matrices to selected documents;

D. The document for review.

Reviewers representing the areas of expertise indicated in Figure 4-3 must be present on the appropriate QAP 6.2 review team to ensure an adequate review is performed.

REQUIREMENTS ALLOCATION SHEET

Page ___ of ___ (2)

Document Title: (1)

Function Name and Number (3)		Item Identification (H/W, S/W, & Facilities)	
Rev. (4)	Functional Performance and Design Requirements (5)	Nomenclature (CI Name) (6)	CI or Detail Spec. No (7)

Prepared By:_____ Date:_____ (8)

Approved:_____ Date:_____ (9)

MGDS Requirements Manager

Figure 4-1. Requirements Allocation Sheets (RAS)

INSTRUCTIONS FOR PREPARATION OF REQUIREMENTS ALLOCATION SHEET

The following information is required on the Requirements Allocation Sheet (RAS) in the spaces indicated on the sample form:

1. Provide the title of the requirements document.
2. Indicate the page numbering for this function. Each function begins on page 1 of x and has x RASs to identify all requirements allocated to that function.
3. Provide the function name and number as identified during the functional analysis.
4. Provide the revision for the requirement. A blank in this space indicates Revision 0; a revised requirement will be denoted with an appropriate revision number (starting with 1 and numbering sequentially).
5. Provide for each function:
   a. the function
   b. the physical description (optional), and
   c. each requirement (numbered) allocated to that function.
6. Provide the Configuration Item (CI), facility, or equipment name to which the requirement is allocated.
7. Identify the section number in the requirements document where this requirement is located
8. Provide signature of the requirements engineer who prepared the RAS and the date.
9. Provide the signature of the responsible manager and the date.

Note that all RASs are also reviewed as part of the QAP 6.2 technical review of the requirements document. The signatures on this form (items 8 and 9) indicate the author and responsible manager for the QA record.

Figure 4-1. Requirements Allocation Sheets (RAS) (Cont'd)

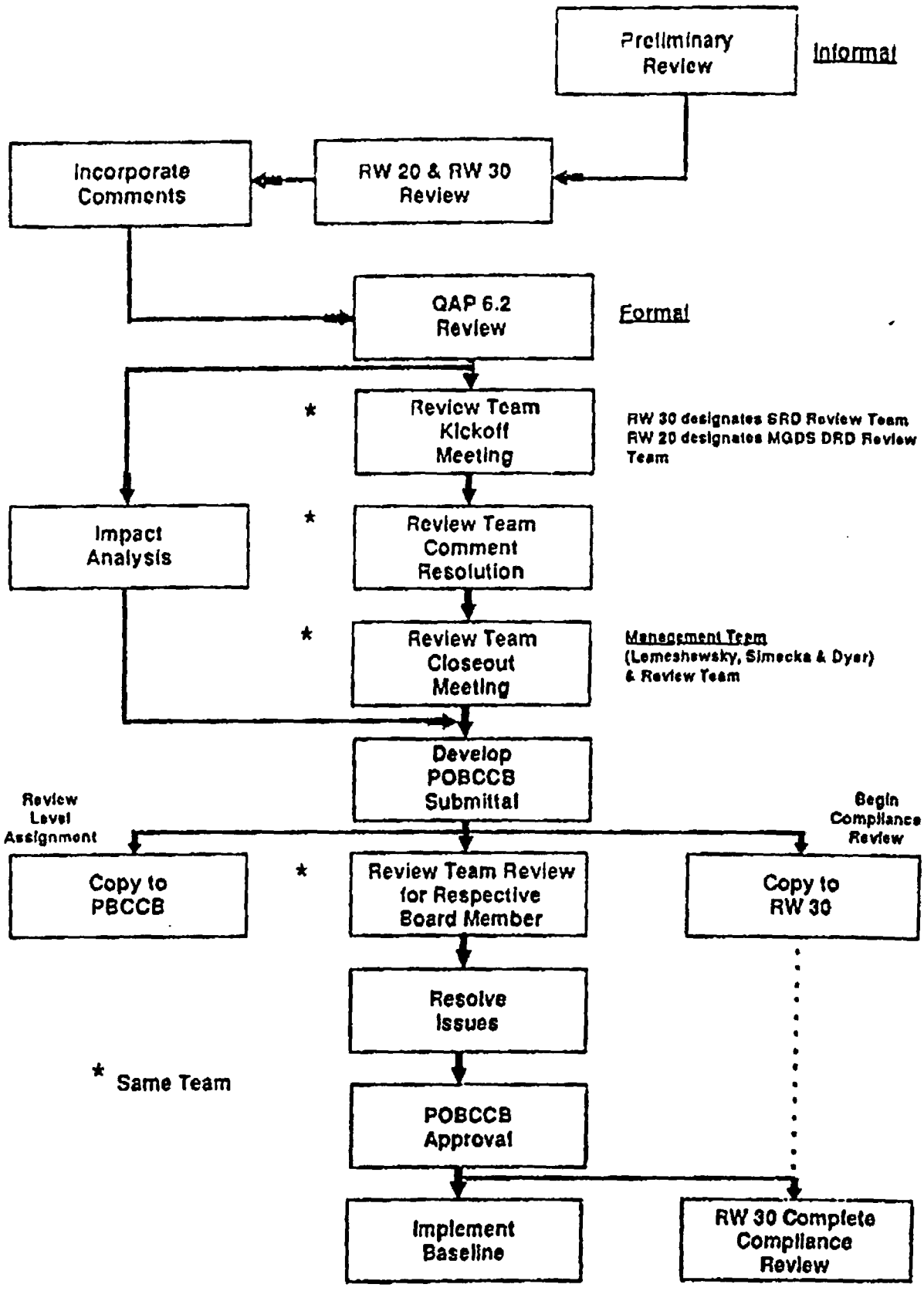

Figure 4-2. Requirements Documents DOE Review/Concurrence Process

AREA OF EXPERTISE	DOCUMENT				
	RDR	EBDR	SD&TR	ESFDR	SBTFRD
Systems Engineering	X	X	X	X	X
Surface Design	X			X	X
Sub-surface Design	X	X		X	
Waste Package Design	X	X			
Site Characterization			X	X	X
QA	X	X	X	X	X
ESF Design			X	X	
Environmental	X		X	X	X
PA	X	X	X	X	X
Regulatory and Licensing	X	X	X	X	X

RDR = Repository Design Requirements
EBDR = Engineered Barrier Design Requirements
SD&TR = Site Design and Test Requirements
ESFDR = Exploratory Studies Facility Design Requirements
SBTFRD = Surface-Based Test Facilities Design Requirements

Figure 4-3. Required Areas of Expertise for Reviewers

The following review criteria will be adapted or amended as necessary and shall be included in each review package.

A. **All Reviewers**

1. Review in accordance with QAP 6.2.

2. Are any assumptions used in the development of the technical document stated explicitly? Are they reasonable?

3. Is document content consistent with established OCRWM objectives?

4. Was technical input correctly incorporated into the final document?

5. If the technical document is for design purposes, are the following requirements evident: basic function of items, performance, regulatory, technical, security, and safety?

6. Are the responsibilities for interface requirements delineated?

7. If there are any constraints on required interfaces, are they described adequately?

8. Review for completeness and need for additional requirements.

9. Review for correct interpretation of requirements.

10. Review document(s) for technical adequacy to meet MGDS project level CRWMS technical baseline requirements.

11. Ensure that all allocated requirements from the next higher-level document have been flowed down. MGDS requirements must flow down to EBDR, RDR, and SD&TRD. SD&TRD must flow down to ESFDR and SBTFRD.

12. Ensure that the content of the document is complete enough to allow work to continue (i.e., no TBDs, TBRs, or TBSs need to be immediately resolved).

13. Ensure that appropriate interfaces have been properly identified.

B. **System Engineering Area of Expertise**

1. Is the document prepared in accordance with this TDPP?

2. Is there adequate traceability of information used as input to the document?

3. Are the applicable requirements of the source documents incorporated into the document?

4. In the case of a design document, is the design approach compatible with OCRWM objectives and constraints and with prescribed systems engineering requirements?

5. If referenced standards contain conflicting requirements, is the requirement that governs designated?

6. Verify that functions have been properly identified and allocated in the function hierarchy.

7. Ensure requirements (functional, technical or interface) are properly identified and allocated to appropriate document sections.

8. Review requirements for accuracy, traceability and flow down.

9. Ensure inputs and input sources are current, correct and usable.

C. MGDS Surface Design

1. Are adequate, complete, and correct technical requirements identified including drawings and specifications; codes, standards, and regulations; technical acceptance criteria; and traceability requirements, where appropriate?

2. Ensure that functions are properly identified and allocated.

3. Ensure that design requirements (functional, technical, interface) have been properly identified, interpreted and allocated to the proper section of the document.

4. Ensure that source document(s) requirements have been properly identified, interpreted and allocated.

5. Review Conformance Verification Matrices for correctness and completeness.

D. MGDS Sub-Surface Design

1. Are adequate, complete, and correct technical requirements identified including drawings and specifications; codes, standards, and regulations; technical acceptance criteria; and traceability requirements, where appropriate?

2. Ensure that functions are properly identified and allocated.

3. Ensure that design requirements (functional, technical, interface) have been properly identified, interpreted and allocated to the proper section of the document.

4. Ensure that source document(s) requirements have been properly identified, interpreted and allocated.

5. Review Conformance Verification Matrices for correctness and completeness.

E. Waste Package

1. Are adequate, complete, and correct technical requirements identified including drawings and specifications; codes, standards, and regulations; technical acceptance criteria; and traceability requirements, where appropriate?

2. Ensure that functions are properly identified and allocated.

3. Ensure that design requirements (functional, technical, interface) have been properly identified, interpreted and allocated to the proper section of the document.

4. Ensure that source document(s) requirements have been properly identified, interpreted and allocated.

5. Review Conformance Verification Matrices for correctness and completeness.

F. Site Characterization

1. Are adequate, complete, and correct technical requirements identified including drawings and specifications; codes, standards, and regulations; technical acceptance criteria; and traceability requirements, where appropriate?

2. Ensure that functions are properly identified and allocated.

3. Ensure that design requirements (functional, technical, interface) have been properly identified, interpreted and allocated to the proper section of the document.

4. Ensure that source document(s) requirements have been properly identified, interpreted and allocated.

5. Review Conformance Verification Matrices for correctness and completeness.

G. QA

1. Are terms that are defined in the QARD used in a context consistent with the QARD definitions?

2. Are all QA Records to be generated during the implementation of the document and the procedure for handling those QA records identified?

3. Is there adequate traceability of information used as input to the document?

4. For unqualified inputs, are steps for qualification of the input specified and are they to be tracked?

5. Are the applicable requirements of the source documents incorporated into the document?

6. Are adequate, complete, and correct technical requirements identified including drawings and specifications; codes, standards, and regulations; technical acceptance criteria; and traceability requirements, where appropriate?

7. Is the document prepared in accordance with the TDPP?

8. Are inputs and input sources current, correct, and useable under the requirements for qualified data?

9. Ensure inputs and input sources are current, correct and usable.

10. Ensure the document was prepared with appropriate QA requirements.

H. ESF Design

1. Are adequate, complete, and correct technical requirements identified including drawings and specifications; codes, standards, and regulations; technical acceptance criteria; and traceability requirements, where appropriate?

2. Ensure that functions are properly identified and allocated.

3. Ensure that design requirements (functional, technical, interface) have been properly identified, interpreted and allocated to the proper section of the document.

4. Ensure that source document(s) requirements have been properly identified, interpreted and allocated.

5. Review Confonmance Verification Matrices for correctness and completeness.

I. Regulatory and Licensing

1. Are the applicable requirements of the source documents incorporated into the document?

2. Is the document content consistent with applicable regulatory requirements?

3. Does the document content affect existing regulatory or other external commitments and is it consistent with such commitments?

4. If the document makes any commitment or addresses a topic of regulatory interest, is it consistent with OCRWM policy?

5. Is there any contradiction between DOE Orders and regulatory requirements or commitments, and if so, what will be the method of resolution?

6. Review Conformance Verification Matrices for correctness and completeness.

4.2.3 Document Change Proposal

Upon acceptance of the DRDs by the Project Manager, YMPO, the DRDs will undergo a management review against all program impacts by the CCB. If required, a Document Change Proposal will be prepared by the Project Manager, YMPO, to update the technical baseline documents.

4.3 QUALITY ASSURANCE

The preparation, review, and baselining of the DRDs are subject to the OCRWM QA program as defined in the OCRWM QARD DOE/RW/0333P. The quality assurance controls that will be applied will be those specified in the OCRWM QARD. In summary, the analysis and document preparation and/or revision will be in accordance with:

A. QMP- 02-01 for qualification and training

B. AP 1.5Q for document control

C. AP 1.18Q for records management

D. QAPs 3.5 and 6.2 for document preparation and review

E. AP 3.3Q for change control

4.3.1 Records

Records resulting from the implementation of this management plan are to be maintained in accordance with the requirements specified in AP 1.18Q. As a minimum the following records shall be considered QA records:

A. The TDPP and any revisions;

B. All drafts of the DRDs submitted for QAP 6.2 review, and all documentation associated with the QAP 6.2 review;

C. The revised DRD after QAP 6.2 review with incorporation of all resolved comments and all associated documentation to be submitted for CCB review;

D. Document Change Proposal;

E. Education and Experience Verification Forms and Indoctrination & Training matrices, in accordance with QMP-02-01, for all document preparers and reviewers (these are maintained in accordance with normal application of the QA Program and will not be created or duplicated as a part of the DRD development process nor will they be included in the records package);

F. Final DRD after CCB review with incorporation of all resolved comments;

G. Requirements Allocation Sheets (RAS) used to develop the DRD;

4.3.2 Revisions to the Preparation Plan

Any changes to this preparation plan found to be necessary during the conduct of the conceptual design will be documented through revision, including appropriate review and approval of this plan, in accordance with QAP 3.5.

Variations in schedules for production or review of the DRDs will not require a revision to this TDPP.

4.4 REQUIREMENTS INPUTS AND DOCUMENT PREPARATION

The DRDs will be prepared by the Requirements Section of MGDS Systems Engineering. Selected M&O staff members from the MGDS requirements task force will provide input and guidance as necessary.

4.4.1 Source Documents

The following is a list of potential source documents to be consulted during the preparation of the DRDs.

A. Current Federal Laws pertaining to the management of high-level radioactive waste material

B. Federal regulations derived from laws pertaining to high-level radioactive waste management

C. Federal laws and regulations that are applicable to the operation of nuclear facilities and systems needed to manage high-level waste

D. Federal laws and regulations pertaining to protection of the environment and of public and worker health and safety

E. Selected DOE Orders and OCRWM approved policies and decisions (e.g., Mission Plan, etc.)

F. State of Nevada and other state and local laws and regulations as appropriate

G. MGDS RD

H. Other DOE orders, standards and criteria documents as appropriate

Relevant NRC regulatory guides, staff technical positions, NUREGs and other NRC publications will be reviewed to help interpret requirements during the development of the requirements documents.

In addition to interpreting statutory, regulatory, and other requirements as described above, derived and performance requirements will be developed to meet the mission and support the constructability of the system. These will be based on engineering and other analyses, inputs from peer reviews, calculations, etc. This documentation, together with supporting data, will serve as the source documentation for the requirement.

4.4.2 Source Input Control

Source documents (documents from which requirements have been allocated or derived) will be documented, approved, and controlled, as appropriate. The source of each requirement shall be documented on the appropriate RAS. The document preparer shall ensure that inputs were developed under quality assurance program controls consistent with those needed for the technical document.

Those requirements that are derived from laws, regulations, DOE Orders, and policy decisions will not be subject to qualification through use of quality assurance controls. Requirements which are flowed down from the parent document are qualified through the QAP 6.2 review of the parent document except as indicated within that document.

Requirements developed from "unqualified" input sources will be annotated with "To Be Reviewed" (TBR) or "To Be Verified" (TBV) to denote those input sources which must be qualified. Requirements that are included in the requirements documents as TBR or TBD will be qualified in accordance with appropriate QA procedures before removing the flag. Each such requirement shall be qualified by engineering analyses, document research, peer review, or other appropriate means. The results of each qualification will be appropriately documented in accordance with QA procedures. The source of such input shall be documented on a revision to the appropriate RAS after qualification.

5. MILESTONES FOR THE DESIGN REQUIREMENTS DOCUMENTS

The major milestones for the DRDs include submitting the documents for the formal QAP 6.2 review and obtaining approval from the CCB. The QAP 6.2 review began in October 1992. CCB approval is targeted for July 1993. Changes to these dates will not require a revision to this TDPP.

The initial goals of this TDPP will be achieved when each of the five DRDs have been approved and implemented. These approved documents will then represent the starting point from which the documents will evolve as required to support the continuing design activities.

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WASHINGTON, D.C.

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CORRECTIVE ACTION REQUEST

[1] Controlling Document	[2] Related Report No.
Quality Management Procedure (QMP) 06-04, Rev. 4 dated 10/28/91	HQ-SR-92-06
[3] Responsible Organization: YMPO EDD, Systems Branch	[4] Discussed With: Dennis C. Royer, Acting Systems Branch Chief

[5] Requirement:

QMP-06-04, Step 14, 1st Note requires: "When a quality related document is prepared by the YMPO under the YMPO QA Program, DOE reviewers are responsible for performing sufficient verification to assure accuracy and adequacy of the document (e.g., format, flowdown, traceability)."

[6] Adverse Condition:

The QMP-06-04 document review process, as implemented, did not adequately ensure that the top level WMSR Volume I and IV requirements consistently flowed down into the Project Level technical baseline documents.

A. The following document reviews were evaluated and considered inadequate:

A.1 One QA review and five management reviews performed against the Yucca Mountain Mined Geologic Disposal System Requirements (YM MGDS SR), YMP/CC-0010, Rev. 0, document. No technical reviews were performed. The review criteria was not expanded to include flowdown verification.

[9] Does a significant condition adverse to quality exist? Yes__ No X If Yes, Circle One: A B C	[10] Does a stop work condition exist? Yes__ No X ; If Yes - Attach copy of SWO If Yes, Circle One: A B C D	[11] Response Due Date: ~~7/31/92~~ 8/14/92

[12] Required Actions: ☒ Remedial ☒ Extent of Deficiency ☒ Preclude Recurrence ☒ Root Cause Determination

[13] Recommended Actions:

A. Expand the review criteria, as appropriate, to include the "verification of requirements flowdown" when technical reviews are performed.
B. Include the requirements for which flowdown could not be demonstrated in the next scheduled revision to the appropriate Project Level documents.
C. Locate the required training documentation. Determine any reviews adversely impacted.

[7] Initiator: Thomas E. Rodgers Thomas E. Rodgers Date 9/15/92	[14] Issuance Approved by: QADD R.W. Craig Date 7/17/92
[15] Response Accepted QAR Dennis Brown for TERodgers Date 11/2/92	[16] Response Accepted QADD R.W. Craig Date 11/3/92
[17] Amended Response Accepted QAR Thomas E. Rodgers Date 3/5/93	[18] Amended Response Accepted QADD Date
[19] Corrective Actions Verified QAR Date	[20] Closure Approved by: QADD Date

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A.2 One QA review and three management reviews performed against the Exploratory Shaft Facility Design Requirements (ESFDR), Rev. 1. No technical reviews were performed. The review criteria was not expanded to include flowdown verification.

A.3 One QA review, eight management reviews and three technical reviews performed against Section VI - Surface-Based Testing Facilities Requirements Document (SBTFRD) included in the Technical Requirements for the Yucca Mountain Site Characterization Project Surface Based Testing, YMP/CM-0007, Rev. 6, document. Although technical reviews were performed, the technical review criteria failed to address flowdown.

B. Flowdown of the following requirements could not be demonstrated (100% sample):

B.1 Yucca Mountain Mined Geologic Disposal System Requirements (YM MGDS SR), YMP/CC-0010, Rev. 0

The following requirements from the Waste Management System Requirements (WMSR), Volume IV, document, could not be found in the Yucca Mountain Mined Geologic Disposal System Requirements (YM MGDS SR), YMP/CC-0010, Rev. 0, document:

2.2.1(3.4)	33 CFR 323
2.2.1(3.12)	42 USC 9601 (SARA)
2.2.1(5)	DOE 5400.5
2.2.1(5.2)	DOE 3790.1A DOE 5483.1A DOE 5480.7 DOE 5480.9 DOE 5480.10
2.2.1.4.1.3(2.2)	30 CFR 31.9(a) 30 CFR 36.45(b)

B.2 Exploratory Studies Facility Design Requirements (ESFDR), YMP/CC-0013, 7/29/91

The following requirements from Yucca Mountain Mined Geologic Disposal System Requirements (YM MGDS SR), YMP/CC-0010, Rev. 0, could not be found in the Exploratory Studies Facility Design Requirements (ESFDR), YMP/CC-0013, 7/29/91, document:

B.	40 CFR 1500-1508 DOE 5440.1C 7 CFR 658 DOE 5400.1
B.6	Nevada Runoff/Erosion Regulations
B.7	NRS 444.440-.620
B.9	7 USC 136 40 CFR 162

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B.13	DOE 5400.1
B.14	16 USC 1241 et. seq.
B.15	16 USC 668-668D 16 USC 1331-1340
C.	29 CFR XVII 30 CFR 57 DOE 5480.11 DOE/RW-0119
G.	DOE 5700.6B
3.B	10 CFR 60.15(a)

The following requirements from WMSR, Volume IV, could not be located in the ESFDR:

2.2.1(3.4)	33 CFR 323
2.2.1(5.2)	DOE 3790.1A DOE 5483.1A DOE 5480.7 DOE 5480.9 DOE 5480.10
2.2.1.4.1.3(2.2)	30 CFR 31.9(a) 30 CFR 36.45(b)

B.3 Section III - Mined Geologic Disposal System Requirements (YM MGDS SR) included in Technical Requirements for the Yucca Mountain Site Characterization Project Surface Based Testing, YMP/CM-0007, Rev. 6

The following requirements from the Waste Management System Requirements (WMSR), Volume IV, document, could not be found in Section III - Mined Geologic Disposal System Requirements (YM MGDS SR) included in Technical Requirements for the Yucca Mountain Site Characterization Project Surface Based Testing, YMP/CM-0007, Rev. 6, document:

2.2.1(3.4)	33 CFR 323
2.2.1(3.8)	7 USC 136 et. seq. 40 CFR 162
2.2.1(3.12)	42 USC 9601 (SARA)
2.2.1(5)	DOE 5400.5
2.2.1(5.2)	DOE 3790.1A DOE 5483.1A DOE 5480.7 DOE 5480.9 DOE 5480.10

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2.2.1(7)	DOE 6430.1A
2.2.1(7.1)	DOE 6430.1A

B.4 Section VI - Surface-Based Testing Facilities Requirements Document (SBTFRD) included in Technical Requirements for the Yucca Mountain Site Characterization Project Surface Based Testing, YMP/CM-0007, Rev. 6

The following requirements from Section III - Mined Geologic Disposal System Requirements (YM MGDS SR) included in Technical Requirements for the Yucca Mountain Site Characterization Project Surface Based Testing, YMP/CM-0007, Rev. 6, document could not be found in the Surface-Based Testing Facilities Requirements Document (SBTFRD):

P.C. 2.2.1(4)	DOE/RW-0214
P.C. 2.2.1(4)	DOE/RW-0215
B.	40 CFR 1500-1508 DOE 5440.1C DOE 5400.1
B.6	Nevada Runoff/Erosion Regulations
B.11	DOE 5484.1 DOE 5480.1B
B.12	DOE 5400.1
B.13	16 USC 1241 et. seq.
B.14	16 USC 668-668D 16 USC 1331-1340
C.	29 CFR XVII (other than 29 CFR 1910, 1926) DOE/RW-0119
G.	DOE 5700.6B

The following requirements from WMSR, Volume IV, could not be located in the SBTFRD:

2.2.1(5.1)	DOE 3790.1A DOE 5483.1A DOE 5480.7 DOE 5480.9 DOE 5480.10

C. The following reviewer training could not be verified (sample size of 4):

C.1 Randolph L. Schreiner of Ratheon Services Nevada (RSN) conducted a technical review of the Surface Based Testing Facility Requirements Document (SBTFRD), Revision 6. Objective evidence documenting training to QMP-06-04 could not be located.

Department of Energy
Yucca Mountain Site Characterization
Project Office
P. O. Box 98608
Las Vegas, NV 89193-8608

WBS 1.2.1.2
QA

AUG 1 3 1993

Robert W. Clark, Director, Headquarters Quality Assurance Division, HQ (RW-3.1) FORS

CORRECTIVE ACTION REQUEST (CAR) HQ-92-012

The subject CAR documents deficiencies identified during the Office of Civilian Radioactive Waste Management (OCRWM) Surveillance HQ-SR-92-06 (regarding the flowdown of Waste Management System Requirements in the project level technical baseline documents).

All required action has been completed by the Yucca Mountain Site Characterization Project Office with the approval of our five design requirements documents. The action to officially implement the technical baseline documents is a function of OCRWM Headquarters. This action is currently being addressed by BCP-00-93-0002, "Revision to the Interim Approach for the Technical Baseline (Approved DCP-56)."

If further information is needed, contact J. C. de la Garza at (702) 794-1931.

William B. Simecka, Director
Engineering & Development Division

EDD:JCD-5601

cc:
W. A. Lemeshewsky, HQ (RW-321) FORS
T. W. Johnson, HQ (RW-3.1) FORS
Wayne Booth, Weston, Washington, DC
M. J. Meyer, CER. Arlington, VA
C. L. Nye, CER, Arlington, VA
T. E. Rogers, CER, Arlington, VA
J. E. Zimmerman, M&O/TRW, Las Vegas, NV
T. C. Geer, M&O/Duke, Las Vegas, NV
R. L. Schreiner, RSN, Las Vegas, NV
R. L. Bullock, RSN, Las Vegas, NV

ORIGINAL
to Jim / Kim

Department of Energy
Yucca Mountain Site Characterization
Project Office
P. O. Box 98608
Las Vegas, NV 89193-8608

WBS 1.2.1.2
QA:

TJ
3/9/9

MAR 0 3 1993

Robert W. Clark, Director, Headquarters Quality Assurance Division,
HQ (RW-3.1) FORS

CORRECTIVE ACTION REQUEST (CAR) HQ-92-12 AMENDED RESPONSE

During your verification process on subject CAR, some informal questions were raised concerning the U.S. Department of Energy Order 5480.7. This letter plus the enclosure consists of an amended response in which those concerns should be clarified.

It is expected the final corrective action will be completed by April 30, 1993. Thomas Geer will be responsible for the corrective actions.

Questions should be directed to either Bernard J. Verna at (702) 794-7410 or Thomas C. Geer at (702) 794-7968.

Dennis C. Royer for
William B. Simecka, Director
Engineering & Development Division

EDD:DCR-2759

Enclosure:
Ltr, 2/18/93, Schutt to Royer
w/encls

cc w/encl:
W. A. Lemeshewsky, HQ (RW-321) FORS
T. W. Johnson, HQ (RW-3.1) FORS
Wayne Booth, Weston, Washington, DC
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R. L. Bullock, RSN, Las Vegas, NV

TRW Environmental
Safety Systems Inc.

101 Convention Center Drive, Suite 540
Las Vegas, NV 89109
702.794.1800

WBS: 1.2.1.2
QA: N/A

Contract #: DE-AC01-91RW00134
LV.SI.GMT.2/93-464

February 18, 1993

Mr. Dennis C. Royer
Engineering and Development Division
U.S. Department of Energy
Yucca Mountain Site Characterization Project Office
P.O. Box 98608
Las Vegas, NV 89193-8606

Dear Mr. Royer:

Subject: Updated Review of Each Requirement Listed in CAR HQ-92-012, Adverse Condition B.1 - B.4

Reference: 1) Letter dated November 30, 1992, "Review of Each Requirement Listed In CAR HQ-92-012, Adverse Condition B.1 - B.4", W.D. Schutt to C.P. Gertz

2) Letter dated October 16, 1992, "Amended Response to Corrective Action Report (CAR) HQ-92-012"

3) Memorandum dated November 4, 1992, "Evaluation of Response to Corrective Action Request (CAR) HQ-92-012"

This letter is an update of the Reference 1 letter which addressed the Remedial Action, for Adverse Condition B of CAR HQ-92-012 (documented in Reference 2). Reference 3 acknowledged the acceptance of the amended response document in Reference 2. The task was to individually review and categorize each of the requirements listed as "could not be found" in the CAR, Adverse Conditions B.1 - B.4. This has been completed and is presented in the attached four tables.

The results of the investigation for each requirement are summarized in the third column of each table. The following is an explanation of the numbering system being used to categorize the disposition of each requirement addressed in the CAR.

ENCLOSURE

1. Policy requirements with no design applicability were deleted.

2. Statutes listed in the higher level documents were properly allocated as public laws and included in the documents.

3. Requirements detailed by sub-paragraphs or sub-sections in one document traced to the whole document.

* Requirement was found to be captured in the document.

BLANK Requirement not captured. Corrective action indicated in "Explanation" column.

Categories 1 through 3 are the same as specified in Reference 2. The last column provides a short explanation of the disposition of each requirement (i.e., the location of the requirement or a rationale as to why the requirement was not included is provided).

This update of Reference 1 revises the responses to the traceability of DOE Order 5480.7 (fire protection) in Tables 1, 3, and 4. DOE Order 5480.7 is applicable to the ESF and the SBTF. The MGDS SR for ESF (YMP/CC-0010) and the SR for the SBTF as well as the SBTFR document (YMP/CC-0006) did not include DOE Order 5480.7 and should have.

This update incorporates this position for the ESF by indicating that YMP/CC-0010 has been superseded by YMP/CC-0020, which does capture DOE Order 5480.7. The audited ESFDR (YMP/CC-0013) does include DOE Order 5480.7, as evidenced by the paragraph referenced in Table 2. The current baseline ESFDR (YMP/CM-0019) has superseded YMP/CC-0013 and also requires DOE Order 5480.7. The ESFDR being developed for the new hierarchy will also require fire protection as specified in DOE Order 5480.7.

The SBTF SR and the SBTF design requirements do not currently include DOE Order 5480.7 and rather than change a document which is scheduled to be superseded in April 1993, we will commit to including DOE Order 5480.7 in the new documents (Site Design & Test Requirements and Surface Based Test Facilities). There is not a current need to update the SBTF requirements document prior to these new hierarchy documents being put into place.

Note: The MGDS-SR (YMP/CC-0010) was developed to only address the system requirements needs of the ESF and not the SBTF. The SBTFR document (YMP/CC-0007) has its own unique MGDS-SR. This SR is included within the SBTFR document.

If you have any questions, please contact Gary Teraoka at (702) 794-7416.

Sincerely,

W. Donovan Schutt, Manager
MGDS Systems Engineering
Management and Operating Contractor

Enclosures

1) Table 1, Disposition of Requirements Not Found in the MGDS SR (YMP/CC-0010, Rev. 0)
2) Table 2, Disposition of Requirements Not Found in the ESFDR
3) Table 3, Disposition of Requirements Not Found in the MGDS SR (YMP/CC-0007, Rev. 6)
4) Table 4, Disposition of Requirements Not Found in the SBTFRD

cc:
H.M. Abhold, M&O/TRW, Las Vegas, NV
T.C. Geer, M&O/Duke, Las Vegas, NV
P.G. Jones, M&O/TRW, Las Vegas, NV
R. M. Sandifer, M&O/Duke, Las Vegas, NV
W.B. Simecka, YMP, Las Vegas, NV
G.M. Teraoka, M&O/TRW, Las Vegas, NV
B. J. Verna, YMP, Las Vegas, NV
W.F. Van Der Laan, M&O/TRW, Las Vegas, NV

GMT
GMT/WDS:dif

Table 1. Disposition of Requirements Not Found in the MGDS SR (YMP/CC-0010, Rev. 0)

B.1 WMSR, VOLUME IV REQUIREMENTS NOT FOUND IN MGDS SR (YMP/CC-0010, Rev. 0)

WMSR STATEMENT	REQUIREMENT	CAT.	EXPLANATION
2.2.1(3.4)	33 CFR 323	1	Not applicable to ESF. Applies to discharges into lakes and rivers.
2.2.1(3.12)	42 USC 9601	1	Not applicable to ESF. Not a Superfund site.
2.2.1(5)	DOE 5400.5	1	Not applicable to ESF. No SNF or HLW will be emplaced in the ESF.
2.2.1(5.2)	DOE 3790.1A	1	Not applicable to ESF. Federal Employee Occupational Safety and Health Program, no design requirements.
	DOE 5483.1A	1	Not applicable to ESF. Occupational Safety and Health Program for DOE Employees at Government-Owned Contractor Facilities, no design requirements.
	DOE 5480.7		Applicable to ESF. Fire Protection is contained in the revised MGDS SR (YMP/CM-0020).
	DOE 5480.9	1	Not applicable to ESF. Construction Safety and Health Program, no design requirements.
	DOE 5480.10	1	Not applicable to ESF. Contractor Industrial Hygiene Program, no design requirements.
2.2.1.4.1.3(2.2)	30 CFR 31.9(a)	1	Not applicable to ESF shaft concept.
	30 CFR 36.45(b)	1	Not applicable to ESF shaft concept.

Table 2. Disposition of Requirements Not Found in the ESFDR

B.2 MGDS SR (YMP/CC-0010) REQUIREMENTS NOT FOUND IN ESFDR (YMP/CC-0013)

MGDS STATEMENT	REQUIREMENT	CAT.	EXPLANATION
B.	DOE 5400.1	2	All applicable environmental requirements addressed in DOE 5400.1 are included in Appendix J.
	DOE 5440.1C	2	This order is implemented by 40 CFR 1500-1508.
	40 CFR 1500 - 1508	2	The portions which addresses environmental impact statement, does not apply to the ESFDR. All environmental protection requirements, applicable to the ESFDR, are captured in Appendix J. This is documented in the "Environmental Regulatory Compliance Plan for Site Characterization".
	7 CFR 658	1	Not applicable to ESFDR. The site is not considered "prime farmland".
B.6	NV Runoff/Erosion Reg.	2	Appendix J, Section 5.2 stipulates NRS 445.131-.399.
B.7	NRS 444.440-.620	2	Enforced by NAC 444.570-.748 in Appendix J, Section 6.1.
B.9	7 USC 136	2	Appendix J references P.L.2-140 and P.L.95-396 for FIFRA, which updates 7 USC 136.
	40 CFR 162	1	Not applicable to ESFDR. This regulation is for registering pesticide products with the state.
B.13	DOE 5400.1	2	All applicable environmental requirements addressed in DOE 5400.1 are included in Appendix J.
B.14	16 USC 1241 et. seq.	1	Not applicable to ESFDR. There are no national trails on the ESF site.
B.15	16 USC 668-668D	1	Not applicable to ESFDR. There are no bald eagles and not enough golden eagles to trigger this law.
	16 USC 1331 - 1340	1	Not applicable to ESFDR. There are not enough wild horses and burros to trigger this law.
C.	29 CFR XVII	3	1.2.6.0 C K in the ESFDR addresses the applicable portions of 29 CFR, which are parts 1910 and 1926.
	30 CFR 57	*	Addressed in requirement 1.2.6.0 C K and in Appendix J.
	DOE 5480.11	*	Addressed in requirement 1.2.6.0 C K and in Appendix J, Section 10.0.
	DOE/RW-0119	*	Addressed in requirement 1.2.6.0 C K.
G.	DOE 5700.6B	1	Not applicable to ESFDR. This order contains no design requirements.
3.B	10 CFR 60.15(a)	1	The MGDS SR sites both subparagraphs (a) and (b). Only (b) has applications in the ESFDR.

WMSR, VOLUME IV REQUIREMENTS NOT FOUND IN ESFDR (YMP/CC-0013)

WMSR STATEMENT	REQUIREMENT	CAT.	EXPLANATION
2.2.1(3.4)	33 CFR 323	*	Addressed in Appendix J, Section 5.0.
2.2.1(5.2)	DOE 3790.1A	1	Not Applicable to ESFDR. Contains procedures, not design requirements.
	DOE 5483.1A	*	Addressed in Appendix E.
	DOE 5480.7	*	Addressed in Section 1.2.6.3 and Appendix E.
	DOE 5480.9	*	Addressed in Appendix E
	DOE 5480.10	*	Addressed in Appendix E.
2.2.1.4.1.3(2.2)	30 CFR 31.9(a)	*	Addressed by 30 CFR Chapter I in requirement 1.2.6.0 C G and in Appendix E.

Table 3. Disposition of Requirements Not Found in the MGDS SR (YMP/CM-0007, Rev. 6)

B.3 WMSR, VOLUME IV REQUIREMENTS NOT FOUND IN THE MGDS SR CONTAINED IN THE SBTFRD (YMP/CM-0007, Rev. 6)

WMSR STATEMENT	REQUIREMENT	CAT.	EXPLANATION
2.2.1(3.4)	33 CFR 323	1	Not applicable to SBTF. Applies to discharges into lakes and rivers.
2.2.1(3.8)	7 USC 136 et. seq.	1	Not applicable to SBTF. FIFRA is an operational requirement, not a design requirement.
	40 CFR 162	1	Not applicable to SBTF. Implements FIFRA, not needed.
2.2.1(3.12)	42 USC 9601	1	Not applicable to SBTF. Not a Superfund site.
2.2.1(5)	DOE 5400.5	1	Not applicable to SBTF. No SNF or HLW will be emplaced in the SBTF.
2.2.1(5.2)	DOE 3790.1A	1	Not applicable to SBTF. Federal Employee Occupational Safety and Health Program, no design requirements.
	DOE 5483.1A	1	Not applicable to SBTF. Occupational Safety and Health Program for DOE Employees at Government-Owned Contractor Facilities, no design requirements.
	DOE 5480.7		Applicable to SBTF. Fire Protection will be included in the new SBTF DRD.
	DOE 5480.9	1	Not applicable to SBTF. Construction Safety and Health Program, no design requirements.
	DOE 5480.10	1	Not applicable to SBTF. Contractor Industrial Hygiene Program, no design requirements.
2.2.1(7)	DOE 6430.1A	•	Incorporated directly into SBTFRD section 3.0 PC 1a.
2.2.1(7.1)	DOE 6430.1A	•	Incorporated directly into SBTFRD section 3.0 PC 1a.

Table 4. Disposition of Requirements Not Found in the SBTFRD

B.4 MGDS SR (SECTION III, YMP/CM-007) REQUIREMENTS NOT FOUND IN SBTFRD (SECTION VI, YMP/CM-007)

MGDS STATEMENT	REQUIREMENTS	CAT	EXPLANATION
P.C. 2.2.1(4)	DOE/RW-0214	1	P.C. 2.2.1(4) is in the WMSR, not the MGDS SR; no design requirements
P.C. 2.2.1(4)	DOE/RW-0215	1	P.C. 2.2.1(4) is in the WMSR, not the MGDS SR; no design requirements
B.	40 CFR 1500-1508	2	The portions which address environmental impact statements do not apply to the SBTFRD; All environmental protection applicable to the SBTFRD are captured in Appendix D
	DOE 5440.1C	2	This order is implemented by 40 CFR 1500-1508
	DOE 5400.1	2	All applicable requirements in 5400.1 are included in Appendix D
B.6	Nevada Runoff/Erosion		Appendix D mentions NRS 445.131-.399
B.11	DOE 5484.1	1	This order contains no design requirements
	DOE 5480.1B	1	This order sets policy, contains no design requirements
B.12	DOE 5400.1	2	All applicable requirements in 5400.1 are included in Appendix D
B.13	16 USC 1241 et seq	1	Not applicable to SBTFRD. No national trails on site.
B.14	16 USC 668-668D	1	Not applicable to SBTFRD. No bald and not enough golden eagles.
	16 USC 1331-1340	1	Not applicable to SBTFRD. Not enough wild horses and burros.
C.	29 CFR XVII not 1910,1926	3	Parts 1910 and 1926 are the parts that apply to design
	DOE/RW-0119	1	This Plan contains no technical design requirements
G.	DOE 5700.6B	1	Contains no design requirements

WMSR, VOLUME IV REQUIREMENTS NOT FOUND IN SBTFRD

WMSR STATEMENT	REQUIREMENT	CAT	EXPLANATION
2.2.1(5.1)	DOE 3790.1A	1	Federal Employee Occupation Safety and Health Program -- no design requirements
	DOE 5483.1A	1	Occupational Safety and Health program for DOE Contractor Employees at Government Owned Contractor Operated Facilities -- no design requirements
	DOE 5480.7		Applicable - will be included in new hierarchy
	DOE 5480.9	1	Construction safety & health program -- no design requirements
	DOE 5480.10	1	Contractor Industrial Hygiene Policy -- no design requirements

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QA

CORRECTIVE ACTION REQUEST (Continuation Page)

1. CORRECTIVE ACTION RESPONSE FOR CAR HQ-92-012

A. REMEDIAL ACTION

Adverse Condition A: The technical and management reviews considered inadequate as addressed in CAR Adverse conditions A.1 - A.3 were revisited to evaluate if additional reviews were necessary. It was determined that the previous QMP 06-04 technical and management reviews provided satisfactory reviews, except for the deficient flowdown verification checks as noted in this surveillance.

Adverse Condition B: Each of the requirements listed in the CAR Adverse Conditions B.1 - B.4 sections as "could not be found" were individually reviewed and categorized as follows:

1. Policy requirements with no design applicability were deleted. The rationale for eliminating those non-applicable requirements was not included in the text or records package. In addition, the deletion of non-applicable requirements was not consistent between documents.

2. Statutes listed in the higher level documents, which did not appear verbatim in lower level documents were properly allocated as public laws and included in the documents; however, no explanation was provided in the text of either document.

3. Requirements detailed by sub-paragraphs or sub-sections in one document traced to the whole document in another.

A listing of the additions/deletions for each document has been developed for incorporation in the next revision.

The associated rationale regarding each requirement's disposition will be documented.

Adverse Condition C: Applicable training documentation for R. Schreiner for QMP 06-04 (all Revs/ICN's) was retrieved from his personal training records and will be forwarded to the training center. The training has been current since implementation of QMP 06-04.

B. INVESTIGATIVE ACTIONS

Adverse Condition A: The Yucca Mountain Site Characterization Project Office (YMPO) Quality Management Procedure (QMP) 06-04 is no longer being utilized for reviews. Headquarters Quality Assurance Procedure (QAP) 6.2, Document Reviews is now being utilized for all program document reviews. The investigation determined that detailed review criteria for flowdown verification is also not included in QAP 6.2 and technical reviews should have been used for all of the subject reviews.

ENCLOSURE 2

CORRECTIVE ACTION REQUEST (Continuation Page)

Adverse Condition B: As discussed in the remedial Actions, all listed "could not be found" requirements were traced and/or accounted for. The documentation in the reviews and in the requirements documents or record packages did not adequately provide the rationale for requirements applicability and traceability.

Adverse Condition C: An internal departmental search for Mr. Schreiner's training documentation was conducted. His personal self-study training records for QMP 06-04 did indicate current training in QMP 06-04. Mr. Schreiner had failed to forward his records to the training center upon completion of self-study.

C. ROOT CAUSE DETERMINATION

Adverse Condition A: The flowdown verification requirement in QMP 06-04 to be utilized when performing technical document reviews was in the text as a note and had not been included in the review criteria. Management reviews were erroneously assigned for some of the technical document reviews and would not have utilized the flowdown verification if included above.

Adverse Condition B: Lack of requirements for documenting flowdown and/or associated rationale in technical requirements document preparation format, record package, or instructions.

Adverse Condition C: Isolated personnel error, individual involved failed to forward QMP 06-04 self-study training documentation to the training center. Other training documentation for Mr. Schreiner had been properly forwarded to the training center.

D. CORRECTIVE ACTION TO PRECLUDE RECURRENCE

Adverse Conditions A and B: QMP 06-04 has been superseded by QAP 6.2, Document Reviews and QAP 3.5, Document Preparation. All the documents mentioned in Adverse Condition B will be superseded by documents (in the new hierarchy) that are now in preparation. QAP 3.5 is used to guide the preparation of technical documents which are subject to QARD controls. This procedure is used to develop the Technical Document Preparation Plan (TDPP) for technical analysis documents as well as requirements documents. The existing procedures for document preparation and review (QAP 3.5 and QAP 6.2) do not draw a distinction between different types of technical documents. Since unique considerations must be made for requirements documents relative to analysis documents (e.g., requirement traceability and flowdown), care must be exercised in selecting appropriate review criteria from the recommended set in QAP 6.2 and requiring additional specific review criteria that are necessary for a proper review. CAR HQ-92-012 recognized that the review criteria for the subject review "was not expanded to include flowdown verification."

CORRECTIVE ACTION REQUEST (Continuation Page)

The TDPP for the design requirements documents for the new document hierarchy (copy enclosed) was written so that specific review criteria appropriate to requirements documents were specified in addition to the appropriate criteria recommended by QAP 6.2 These additional criteria require all reviewers to "ensure that all allocated requirements from the next higher-level document have been flowed down." Establishing these detailed reviewed criteria in the TDPP ensures that the objective of QAP 6.2 to produce effective document reviews is achieved. Since this TDPP is intended to be applicable to the preparation of revisions to the requirements documents once they are approved, no further corrective actions are deemed necessary to preclude the recurrence of this problem. In addition, the document preparers for each of the design requirements documents in the new hierarchy have been adequately trained in QAPs 3.5 and 6.2, and the YMP ensures that reviewers are adequately trained to QAP 6.2 and the TDPP. It is expected that the training and the implementation of the procedures, as written, will prevent the adverse conditions from recurring.

Adverse Condition C: The individual involved will be apprised of his error by his supervisor of the need to ensure all training records are promptly forwarded to the YMP training center.

2. ACTION AND COMPLETION DATES

1.A. ADVERSE CONDITION C: Submit R. Schreiner QMP 06-04 self-study training records to the YMPO training center.

Action: R. Schreiner, RSN

Action to be completed by: 09/01/92

1.A. ADVERSE CONDITION B: Document associated disposition rationale.

Action: T. Geer

Action to be completed by: 12/01/92

1.D. Adverse Conditions A and B: Prepare TDPP for MGDS DRDs and ensure training of preparers.

Action: T. Geer

Completed by: 10/01/92

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CORRECTIVE ACTION REQUEST (Continuation Page)

1.D. Adverse Condition C: Apprise R. Schreiner of need to ensure training records are forwarded to training center promptly upon completion of self-study training.

Action: Richard L. Bullock, RSN/YMPO Supervisor

Completed by: 09/01/92

3. RESPONSE APPROVED: Edgar Watkins DATE: 10/16/92
Responsible Manager

ORIGINAL

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[8] CAR NO. HQ-93-19
DATE: 2/17/93
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QA

CORRECTIVE ACTION REQUEST

[1] Controlling Document:
M&O QAP-2-2, *Verification of Personnel Qualifications*, Rev. 1

[2] Related Report No.
HQ-93-03/YMP-93-07

[3] Responsible Organization
M&O (Vienna and Nevada)

[4] Discussed With
E. Chulick/R. White/L. Faust (NV)

[5] Requirement:

Paragraph 5.2.1 requires the verification and documentation of education and experience of individuals performing quality affecting work.

[6] Adverse Condition:

Six of 28 personnel records reviewed did not contain adequate verification of education. (Cole, Hunt, Bice, Carruth, McCormick, and L. Smith)

During Audit YMP-93-07, 4 of 26 CRWMS M&O-Nevada personnel training records reviewed did not contain adequate verification of education. All four instances involved lack of verification of high school education.

[9] Does a significant condition adverse to quality exist? Yes X No_
If Yes, Circle One: A (B) C

[10] Does a stop work condition exist?
Yes_ No X ; If Yes - Attach copy of SWO
If Yes, Circle One: A B C D

[11] Response Due Date:
March 31, 1993

[12] Required Actions: ☒ Remedial ☒ Extent of Deficiency ☒ Preclude Recurrence ☒ Root Cause Determination

[13] Recommended Actions:

Establish methodology for verification of education for personnel performing quality affecting work.

[7] Initiator: P. Chomentowski Date 2/5/93	[14] Issuance Approved by: QADD Carl E Gleber Date 3/18/93
[15] Response Accepted QAR Date	[16] Response Accepted QADD Date
[17] Amended Response Accepted QAR J Beeler Date 5/26/93	[18] Amended Response Accepted QADD R.W. Clark Date 6/3/93
[19] Corrective Actions Verified QAR Date	[20] Closure Approved by: QADD Date

REV. 08/91

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WASHINGTON, D.C.

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DATE 4-16-93
SHEET 1 OF 1

CORRECTIVE ACTION REQUEST
(continuation sheet)

CAR# HQ-93-19

CORRECTIVE ACTION RESPONSE

A. EXTENT OF DEFICIENCY:

As a result of this deficiency M&O QA has started a surveillance of all training files for personnel performing work subject to the requirements of the OCRWM QARD. Preliminary results of this surveillance indicate that there are many cases where the objective evidence documenting the verification of the highest level of education required for a position is not to the standard used during the Vienna and Las Vegas audits. Verifications were done however most files simply have a signature that the individual has the education required by the position description and the only objective evidence in the training file is a copy of the college diploma. This is insufficient objective evidence.

B. ROOT CAUSE:

The root cause is that QAP-2-2 required verification of education yet the procedure was silent as to what constituted objective evidence. The form of the procedure was signed by the person performing the verification and because the form stated 'Objective Evidence is Attached' a copy of the diploma was often attached. In many cases personnel files were in fact checked to verify that the college was contacted or a college/university supplied transcript was on file however the training file did not reflect this verification other than a signature. Because the procedure was silent on the method used to verify education, verification was not consistently performed and documented.

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SHEET 2 OF 3

CORRECTIVE ACTION REQUEST
(continuation sheet)

C. REMEDIAL ACTION:

The surveillance of all M&O training files for personnel performing work subject to the requirements of the QARD shall be completed by April 30, 1993. The surveillance is verifying the following:

(1) Training files contain academic institiution supplied letters or transcripts which document the granting of the required diplomas.

Notes: (a) Copies of diplomas or documentation of visual reviews of the original diplomas are not acceptable as objective evidence.

(b) Letters or transcripts must be obviously supplied by the academic institution and not provided by the employee (i.e. academic institution letterheads, seal embossed transcripts are provided from the institution as requested);

- or -

(2) Training files contain documented evidence (i.e. letter, memo or notation on qualification form) that personnel files have been reviewed and they contain item (1) above;

- or -

(3) Training files contain documented telephone confirmations which include academic institution, person contacted, date of contact and confirmation of the required education;

- or -

(4) Training files contain written justification of the basis of qualification where verification of education noted in (1) through (3) above cannot be accomplished due to the fact the institution is no longer in existence, records are lost or have been destroyed by fire, etc.

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SHEET 3 OF 3

CORRECTIVE ACTION REQUEST
(Continuation sheet)

The verification of high school diplomas for positions that do not require college degrees will not be required as it is felt that there is no value added in doing this and that only post high school diplomas need to be verified.

This surveillance shall be performed in Vienna and Las Vegas. (Note: Charlotte files are maintained in Vienna.) From this surveillance new forms documenting the need for re-verification of education shall be provided to the responsible M&O managers for documentation of verification of education or coordination with M&O or Teammate HR Managers. If any individuals are found not to have the required verifiable education and their qualification cannot be justified then a separate CAR shall be generated for each case and appropriate corrective actions shall be handled under the individual CAR. All re-verifications shall be completed by July 1, 1993 to allow for sufficient time for return of the forms from M&O Teammate HR Managers.

D. CORRECTIVE ACTION TO PREVENT RECURRENCE:

QAP-2-2, Verification of Personnel Qualifications, shall be revised to detail the methodology and documentation needed for the verification of education as outlined in C above. The procedure shall also be revised to only require verification of post high school diplomas. The revision to this procedure shall concide with corrective actions for M&O CAR-92-032 on a similar problem with the documentation of verification of experience. The procedure shall be revised by May 14, 1993 with an effective date of June 18, 1993. Any new hires brought on from now until the effective date of the revised procedure shall have their education verified and documented as described above and the objective evidence shall be filed in the training files.

ASSIGNED TO: M&O Training Manager/ M&O QA Manager
DATE PROJECTED FOR CLOSURE: July 1, 1993

RESPONSE APPROVAL _____ DATE 4-16-93
M&O QA MANAGER

REV. 10/90

OCRWM SURVEILLANCE HQ-SR-93-07

PERSONNEL CONTACTED DURING THE SURVEILLANCE

NAME	ORG.	TITLE	PRE	CONTACT	POST

OCRWM SURVEILLANCE HQ-SR-93-07

TEAM MEMBER RESPONSIBILITIES

1. ATTEND THE PRE- AND POST- SURVEILLANCE MEETINGS
2. START ACTIVITIES EACH DAY AT 0815
3. ATTEND THE DAILY CAUCUS AT 1615 EACH DAY
4. DRAFT CARS, RECOMMENDATIONS, AND ITEMS CORRECTED DURING. GIVE TO THE STL AT THE CAUCUS EACH DAY.
5. ATTEND ANY MANAGEMENT MEETINGS AS NECESSARY TO EXPLAIN ANY CARS IDENTIFIED, CONCERNS, OR RECOMMENDATIONS.
6. COMPLETE CHECKLIST AS THE SURVEILLANCE PROGRESSES:
   - A. LEGIBLE
   - B. BLACK OR BLUE INK
   - C. SAT OR UNSAT - EXPLAIN ANY NA'S
   - D. IDENTIFY WHO CONTACTED AND TITLE.
   - E. IDENTIFY OBJECTIVE EVIDENCE REVIEWED (UNIQUE)
7. PREPARE THE NARRATIVE DRAFT FOR THE SURVEILLANCE REPORT SO THAT BY THE END OF THE SURVEILLANCE A DRAFT OF THE NARRATIVE IS COMPLETE.
8. PROVIDE INPUT TO THE EFFECTIVENESS STATEMENT FOR EACH AREA REVIEWED
9. SUMMARY OF TEAM MEMBER INPUTS REQUIRED:
   - A. DRAFT CARS, RECOMMENDATIONS, AND CORRECTED DEFICIENCIES.
   - B. LIST OF WHO CONTACTED WITH TITLES.
   - C. OBJECTIVE EVIDENCE REVIEWED.
   - D. NARRATIVE OF WHAT YOU DID.
   - E. COMPLETED CHECKLISTS.

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

[8] CAR NO. _____
DATE: _____
PAGE: _____ OF _____
QA

CORRECTIVE ACTION REQUEST

[1] Controlling Document	[2] Related Report No.
[3] Responsible Organization	[4] Discussed With

[5] Requirement:

[6] Adverse Condition:

[9] Does a significant condition adverse to quality exist? Yes___ No___ If Yes, Circle One: A B C	[10] Does a stop work condition exist? Yes___ No___; If Yes - Attach copy of SWO If Yes, Circle One: A B C D	[11] Response Due Date:

[12] Required Actions: ☐ Remedial ☐ Extent of Deficiency ☐ Preclude Recurrence ☐ Root Cause Determination

[13] Recommended Actions:

[7] Initiator Date	[14] Issuance Approved by: QADD Date
[15] Response Accepted QAR Date	[16] Response Accepted QADD Date
[17] Amended Response Accepted QAR Date	[18] Amended Response Accepted QADD Date
[19] Corrective Actions Verified QAR Date	[20] Closure Approved by: QADD Date

REV. 08/91

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RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

CAR NO. _____
DATE: _____
PAGE: _____ OF _____
QA

CORRECTIVE ACTION REQUEST (Continuation Page)

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RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

PAGE_____ OF_____
AUDIT/SURVEILLANCE
NO._____

QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED	[ ] EXTERNAL	[ ] AUDIT	
DATES OF EVALUATION	[ ] INTERNAL	[ ] SURVEILLANCE	PREPARED BY _____ DATE _____
CONTROLLING DOCUMENT (Title, Number, Revision)			ACTIVITY EVALUATED

ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	* RESULTS

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

REV. 09/91

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RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

PAGE _____ OF _____
AUDIT/SURVEILLANCE
NO. _____

QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS

TASK	ASSIGN	% COMP	CONCERNS, RECOMMEND., FIXED, HELP NEEDED
1. REVIEW THE BCP 002 ANALYSIS PERFORMED	ARUL NEIL OR DENNIS		
2. PERFORM FLOWDOWN OF REQUIREMENTS	TERRY TRIEU ROB		
3. REVIEW PROGRAMMATIC ASPECTS OF THE PREPARATION, REVIEW, COMMENT RESOLUTION, AND ISSUANCE OF THE ABOVE DOCUMENTS.	JIM DENNIS ARUL		
4. PERFORM CROSS-WALK BETWEEN DOCUMENTS BEING REPLACED AND THE NEW DOCUMENTS THAT HAVE BEEN PREPARED.	NEIL OR JIM, AND TRIEU, OR ARUL		
5. VERIFY IMPLEMENTATION - CAR CORRECTIVE ACTION	JIM DENNIS		
6. VERIFY INCORPORATION OF RE"MTS INTO DESIGN PACKAGES 1A AND 1B & 2A	TERRY ARUL ROB		

TASK	ASSIGN	% COMP	CONCERNS, RECOMMEND., FIXED, HELP NEEDED
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Response to State of Nevada Comments on Study Plan 8.3.1.4.2
(Studies to Provide Soil and Rock Properties of Potential
Locations of Surface and Subsurface Access Facilities)

Response to Comment 1

Previous investigations and experience in the area of Yucca Mountain aided in formulating the Study Plan to accommodate conditions in the Yucca Mountain area. The study plan has the flexibility to explore unanticipated conditions. The inclusion of Standard Penetration testing in the study plan is an example of this flexibility. This test probably will not be used but was included as a contingency.

The tests discussed in the Study Plan are industry standard and are designed to acquire the geotechnical data necessary for design. Many of the tests are normally run as part of any geotechnical exploration program and will be run as part of this study.

Response to Comment 2

Interfaces with other site characterization study plans are explained in Section 4.2. Study Plans 8.3.1.17.2.1 and 8.3.1.17.4.2 are listed along with other study plans that interface with this study. Data from geologic mapping, fracture dating, core sampling, and test pits and trenching activities are already being shared by several studies.

Response to Comment 3

The study plan is very specific as to the relative locations and types of soil and rock property testing for the structures. The planned tests are based on industry standards with the number of tests quite conservative (i.e., many tests). Actual individual structure sites are not finalized until early reconnaissance and exploration data are available. Specific sites (e.g., coordinate locations) are not now available, nor would they be appropriate for inclusion in the study plan. Flexibility is needed in order to adjust to final configurations of Exploratory Studies Facility (ESF) surface support facilities. Information gathering would be negatively impacted if specific locations were prescribed in the study plan.

Alternate ramp alignments and sites are investigated as a separate study.

Response to Comment 4

A statistical sampling method would be a valid way to determine foundation conditions. In this case, the testing is designed to investigate each specific structure. Specific exploration or test locations defined in study plans are implemented in two administrative procedures (AP), AP 5.21Q, "Field Work Activation," and AP 5.32Q, "Test Planning and Implementation Requirements."

ENCLOSURE 2

Response to Comment 5

Activities under the current version of the study plan are not directed to gather data needed to construct a repository. Rather, it is directed to gather all data needed for construction of surface support facilities and the ESF itself. Data acquired under this study plan will be collected under approved quality assurance programs and can be used for repository design. The ESF structures that are candidates for integration into a repository include the portal cuts and ramps. Investigations for potentially permanent repository structures require tests not necessary for other ESF structures. Contingent testing (e.g., study plan pages 27 and 40) is discussed and would be evaluated for any structures potentially part of a repository design. An example is the acquisition of dynamic data for the portal cut.

Response to Comment 6

Information used in siting is to be acquired as part of this study plan. The information is to be used in separate siting studies for the ESF performed by the architect/engineering participant. The word "siting" in many instances refers to individual structures and not a general siting study. The reference conceptual site was used extensively in the study plan because the site apparently has the characteristics needed. Any site in the vicinity of Yucca Mountain capable of meeting ESF needs would require essentially the same investigations as the reference conceptual site.

Large-scale, non-borehole geophysical methods used to date at the site are considered unreliable. The use of geophysical methods as part of this study is very limited in scale and scope. Shear and compressional wave velocity acquisition are the only non-borehole geophysical methods to be used. These are confined to the portal locations and do not involve complex geologic conditions or interpretations.

Natural and induced stress fields are being evaluated by other studies and are not part of this study plan.

Response to Comment 7

Unsatisfactory results from previous large-scale geophysical exploration and investigations dictate the approach used, i.e., core drilling and surface geologic mapping, as the appropriate approach for ramp exploration.

Standard penetration and cone penetrometer tests are included in the study plan in the event that fine-grained materials are encountered. Parameters will be estimated from in-place density and relative density tests, and gradations. These are standard tests and no new methods are expected to be necessary for ESF exploration.

The use of remolded samples for testing is a method for obtaining mechanical properties of soils that cannot be sampled without disturbing the material. This is not the best method of obtaining data but is a method that can be used if the source of the data is kept in mind. As described in the study plan, the soils at Yucca Mountain are too coarse-grained to obtain undisturbed samples and that in-place densities, relative densities, and gradations will be used for low-load foundation design. Exploration has revealed that some of the soil is

caliche-cemented and undisturbed samples have been obtained.

Certain proposed ESF structures have low foundation loads. Offices, change houses, and shops are examples of these low-load structures. No large ESF structures that would impose high-loading conditions are anticipated to be built at the site. Engineering practice demonstrates that empirical estimates combined with conservative design loads is an appropriate design approach.

Response to Comment 8

The U.S. Bureau of Reclamation (USBR) procedures are comparable to ASTM procedures. Many ASTM procedures are based on USBR procedures and vice versa. The main difference is that USBR procedures are more detailed and designed to standardize and facilitate the actual running of the tests. ASTM standards are standards for running the tests, and generally do not include step-by-step procedures. The numerous reviewers of the study plan believed that allowing the Principle Investigator to use comparable USBR procedures was reasonable.

The laboratory property test activity will measure static and dynamic deformation and strength characteristics of soil or rock samples. The types of tests are broken down into "required" and "contingent" depending on the type of structure and whether the structure is potentially to be integrated into a repository. Sophisticated and expensive tests are not warranted for the typical ESF facilities (see response to comment 5). The type of facilities are essentially the same for an ESF based on the Site Characterization Plan/Conceptual Design Report or on Option 30 of the ESF Alternatives Study. The major differences are the location and ramp access rather than shaft access. Geotechnically the sites and design data needs are similar.

Tests that rely on disturbed sample testing or classification will not consider the contribution of the caliche to the material strength. The significant strength contribution by the caliche cementation will not be considered, therefore laboratory strength values will be lower than reality, thus strength values will be conservative. Designers using the laboratory strengths will be aware of this conservatism.

Response to Comment 9

Field tests are designed to acquire physical, mechanical, and dynamic properties of the soil and rock. In-place dynamic properties can be obtained from geophysical testing. The testing to obtain compressional and shear wave velocities for dynamic modulus determination is the primary purpose of the testing. An attempt may also be made to derive geologic data but may not prove possible based on work by Gibson et al. This attempt is not a necessary part of the study, but a possibility. The velocity determinations will be possible.

The decision as to type of analysis, such as pseudo-static, is the decision of the facility designers. This study is to prove the parameters necessary for the study. In this case, dynamic data are being provided for analysis of the portal and cutslope above the portal.

Thermal logging is not planned for this investigation. Coring and standard geophysical logging will provide the needed data. The drill holes will be available for other investigations soon after drilling is completed and other investigations can utilize the drill holes for whatever tests required. The core will be available as soon as geotechnical testing is completed.

The core from drilling will be available after geotechnical testing for any testing desired by other investigators. Geotechnical testing will break core but generally will not result in a significant loss of materials for other tests. Any tests involving minerals recovered in cores can be performed.

Response to Comment 10

The number and types of tests required to be performed for meeting the schedule can be performed in the time limitations. The U.S. Bureau of Reclamation has experience in performing large-scale testing programs under tight time constraints and the program as outlined can be accomplished as scheduled.