1.0 PURPOSE

The purpose of this QAP is to establish the methods and responsibilities for verifying the adequacy of engineering designs/documents and calculations.

2.0 REFERENCES

2.1 NWRS Project Quality Assurance Manual

2.2 QAP-6.2 - Control of Design Documents

2.3 QAP-3.4 - Computer Code/Software Quality Assurance

2.4 QAP-17.1 - Quality Assurance Records

3.0 DEFINITIONS

3.1 Design Verification

Documented traceable measures applied by individuals or groups other than those who performed the original design work to verify the adequacy, completeness, and technical compliance of a design, by one or more of the following methods:

1. Design/Document Review
2. Peer Review
3. Alternate Calculations
4. Performance Qualification Tests

3.2 Design/Document Review

A documented traceable in-depth review consisting of examination, comment, evaluation, and resolution which ensures that any given design clearly, accurately, and completely describes the technical requirements of the item in sufficient detail.

3.3 Peer Review

A documented traceable review performed by personnel who have technical expertise equivalent to those who performed the original work. Peer reviews are in-depth, critical reviews and evaluations of documents, material, or data that require interpretation or judgement to verify or validate the results or conclusions reached or when the conclusions,

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material, or data contained in a report go beyond the existing state of the art.

3.4 Alternate Calculations

Documented traceable calculations or analyses that are made using alternate methods to verify correctness of the original calculations or analyses.

3.5 Performance Qualification Tests

Qualification tests will be included in this procedure at a later date. Design verification by qualification tests is not applicable during the conceptual design, in that no hardware or systems are being designed for specific repository application.

3.6 Technical Expertise/Technical Competency

Technical expertise/technical competency of the Verifier shall be determined by the engineering manager based on related background, education, and experience for the assigned task.

4.0 PROCEDURE

4.1 Responsibilities

4.1.1 The Engineering Manager is responsible for ensuring that the verification methods used provide adequate levels of verification, in accordance with good engineering practice and the requirements of this procedure.

4.1.2 The Originating Engineer is responsible for producing accurate and fully verifiable results for the task assigned, and for resolving the Verifiers' comments or discrepancies.

4.1.3 The Verifier (design review board chairman/member, alternate individual, or peer) is responsible for performing and documenting an independent verification in accordance with this procedure.

4.1.4 The Quality Assurance Manager is responsible for verifying that all design verification activities are accomplished in accordance with this procedure and the referenced procedures.

4.2 Design/Document Review

4.2.1 The originating engineer initiates the design/document review after all interdisciplinary review activities have been completed by preparing the request section of the design/document review (DDR) form (Attachment 6.1) and submitting it to the engineering manager.

#12 4.2.2 The engineering manager assigns the DDR review number and determines the need for an internal or external design/document review and checks the appropriate block in the review meeting schedule section of the DDR form.

Note: External reviews are conducted by the applicable client or by an approved engineering agency whose name is shown on the M-K 10 CFR 50 Appendix B Approved Vendors List.

4.2.3 Designs/documents for external review are transmitted together with the associated reference documents in accordance with Reference 2.2.

4.2.4 The engineering manager shall select the individual(s) to perform internal design/document reviews. The individual(s) shall be technically competent in the subject field and shall not have participated in the original design work, calculation(s), analyses, or other technical material to be reviewed.

#13 The Engineering Manager shall, for each review to be conducted, designate one individual as the review board chairman who shall be responsible for coordination of the design/document review efforts.

4.2.5 The minimum review board membership shall consist of the chairman and a Quality Assurance Representative.

4.2.6 The engineering manager documents by name the review board membership on the DDR form and distributes copies of the DDR to the individuals. The original DDR and the appropriate number of copies of the applicable design/documents and associated reference documents to be reviewed are sent to the review board chairman.

4.2.7 The review board chairman coordinates with the review board members to establish an initial meeting. During the initial meeting the review board chairman shall provide each member with a review package and establish the date, time, and location of the formal meeting which is documented on the DDR form.

4.2.8 During the initial meeting, the design review board shall develop the appropriate design/document review criteria. The criteria shall be used to conduct the review and shall be documented on the Review Comment Record (RCR) Attachment 6.2. The review criteria shall reflect the general review criteria in Attachment 6.3 for design/document reviews and Attachment 6.4 for peer and conceptual design study reviews.

4.2.9 The review board members shall review the design/document with emphasis on their respective area of expertise and record their comments on the RCR form.

4.2.10 The following are provided as guidelines for review board members:

1. Generic questions such as drawing/specification format, overall project quality engineering comments, and issues of general design concept should be handled as one issue and not duplicated by board members.

2. All reviewers are encouraged to initiate communication with the review chairman, the originating engineer or other applicable personnel to obtain responses to questions prior to formal documentation of Review Comment Records (RCR's). This should assist in minimizing the number of formal comments transmitted for resolution.

3. Where appropriate on larger design packages, separate meetings should be convened for the specifications and for the design drawings and their supporting calculations to limit discussions to pertinent documents.

4. Review Comment Records should be submitted to the design/document review chairman three (3) working days prior to the scheduled formal review meeting.

4.2.11 Review board comments shall reflect specific program/project requirements of the disciplinary function of the reviewer and shall not address subjective opinions or pose questions. Comments shall provide justification for implementing the change including reference to the source of the requirement and/or substantiating alternate calculations (documented per paragraph 4.3).

4.2.12 The review board chairman coordinates RCR comments and reviews them with the board members individually or collectively to

eliminate duplication of comments or provide clarification if necessary.

4.2.13 The review board chairman conducts a formal review board meeting with the originating engineer and all review board members present. Comments are presented for discussion, clarification or resolution, as applicable. All clarifications or resolutions are documented on the RCR.

4.2.14 The originating engineer documents his/her position on all comments by one of the following alternatives:

1. Accept
2. Reject
3. Open

A clarification statement may follow any one of the positions selected. However, an "Open" or "Reject" position must include written justification and include the anticipated method of resolution or identification of action to be taken.

4.2.15 The review board chairman, upon completion of the formal meeting, assembles all RCR's, support data, and the original DDR together as the design/document review report package and forwards the report to the engineering manager.

4.2.16 The engineering manager reviews the report and forwards it to the originating engineer for disposition.

4.2.17 The originating engineer reviews all open and reject positions, then conducts and documents additional research and computations necessary to provide final disposition of open or reject positions to either accept or reject.

#19 4.2.18 Comments which, in the judgement of the originating engineer, are nonrelevant or out-of-scope of the design, may be dispositioned "Reject" with written justification provided for the rejection. The reviewer, however, has the option to rebut the disposition. Where disagreement remains concerning the validity of the comment, it shall be resolved by the engineering manager.

4.2.19 The review board chairman conducts a concluding review board meeting to substantiate the agreement of disposition of all comments by the review board chairman, the review board members and the originating engineer. Agreement shall be indicated by signature of the review board chairman and the originating engineer in the agreement block of the RCR.

4.2.20 The originating engineer shall incorporate the agreed-to comments, or other dispositions agreed to, into the original design/document and notify the review board chairman to coordinate verification.

4.2.21 The review board chairman shall verify that the agreed-to comments, or other dispositions agreed to, have been incorporated and shall document the verification by signature and date in the verification block of the RCR.

4.2.22 When all verification activities are complete the design/document shall be submitted to the engineering manager for approval.

4.3 Alternate Calculations

4.3.1 Calculations, whether used to substantiate a design/document or conducted as a basis to be used in subsequent designs, shall be verified by an alternate method of calculation. Alternate calculations shall be performed by a technically competent individual in the subject field. The individual shall not have participated in the specific work effort or distinct calculation(s) to be verified.

NOTE: Calculations for which no alternate method exists shall be so identified on the calculation verification record, and the rationale together with the items to be reviewed in 4.3.6 below shall be documented.

4.3.2 Alternate calculations shall be recorded on the Calculation Verification Record (CVR) Attachment 6.5.

4.3.3 The verifying individual shall obtain the CVR number(s) from the document control coordinator prior to beginning verification.

4.3.4 Alternate calculations conducted by the design/document review board shall be recorded on the CVR, be attached to the applicable RCR page and be listed as an attachment on the applicable RCR page by CVR number.

4.3.5 Alternate calculations that are conducted only to verify an original calculation which is to be used in subsequent designs, shall be recorded on the CVR, the CVR number shall be recorded on the calculation cover sheet, and the CVR shall be attached to the original calculation as a permanent part of the calculation.

4.3.6 The verifying individual shall review the originator's input, methodology, and results.

4.3.7 Alternate calculations shall be identified as to the purpose and nature of the calculation and shall provide a clear comparison between the alternate results and those of the calculation verified.

4.3.8 The verifying individual, upon completion of the alternate calculations, signs and dates the original calculation cover sheet in the "verified by" block, if no comments or discrepancies are documented, and returns the calculation sheets and CVR's to the originator.

4.3.9 Comments and discrepancies such as, but not limited to, numerical or procedural errors, shall be clearly identified and shall be referenced by alpha/numerical designator to the CVR. Rationale for comments and discrepancies shall be documented on the CVR and shall include the correct value(s) or steps.

4.3.10 Disagreement between the originator and verifier which cannot be resolved shall be referred to the engineering manager.

4.3.11 The originating engineer shall incorporate comments and correct discrepancies, as applicable, into the original calculation and notify the verifying individual to coordinate final verification.

4.3.12 The verifying individual shall verify that comments have been incorporated and discrepancies corrected, as applicable, and shall document the verification by signature and date on the original calculation cover sheet in the "verified by" block.

4.3.13 When all verification activities are complete, the calculation(s) shall be submitted to the engineering manager for approval.

4.4 Computer Codes

4.4.1 Verification and validation of computer codes shall be conducted in accordance with Reference 2.3.

4.5 Peer Review

4.5.1 Peer reviews shall be conducted and documented in accordance with Paragraph 4.2.1 through 4.2.22 by personnel as described in Paragraph 3.3.

4.6 Conceptual Design Study Review

4.6.1 Conceptual design study reviews shall be conducted and documented in accordance with Paragraph 4.2.1 through 4.2.22.

5.0 RECORDS

5.1 All quality assurance records generated as a result of implementation of this QAP shall be maintained and controlled in accordance with the requirements of Reference 2.4.

6.0 ATTACHMENTS

6.1 Design/Document Review Form

6.2 Review Comment Record Form

6.3 General Review Criteria for Design/Document Reviews

6.4 General Review Criteria for Peer and Conceptual Design Study Reviews

6.5 Calculation Verification Record Form

MORRISON-KNUDSEN CO., INC.
MINING GROUP
Fluor Contract 639704-9-K014
M-K Work Order 1638

U.S. DEPARTMENT OF ENERGY
Nuclear Waste Repository in Salt
Contract DE-AC02-83WM46656

DESIGN/DOCUMENT REVIEW

THIS SECTION COMPLETED BY REQUESTING ENGINEER				Assigned By Engr. Mgr.
Project / WBS No.:			Date:	Review No.:
Subject (Purpose of Review):				Information Distribution (Name)
Requested Review Date:	☐ Design Review ☐ Document Review	☐ M-K Originated ☐ External Originated	Quality Assurance Level	
Requestor:	Title:	Department/Group:	Phone:	
DESIGN DOCUMENT NUMBER(S)			REFERENCE DOCUMENT(S)	

THIS SECTION COMPLETED BY ENGINEERING MANAGER

REVIEW MEETING SCHEDULE

Date of Review:	Time:	Location: Building Room	☐ Internal Review ☐ External Review

REVIEW BOARD MEMBERSHIP

Name	Meeting Attendance Signature	Organization/Group	Title	Phone
Chairman				
Cognizant Engineer				
Independent Reviewer				
		Quality Assurance		

The information provided above has been reviewed and approved by the Engineering Manager. Signature:

MORRISON-KNUDSEN CO., INC.
MINING GROUP
Fluor Contract 639704-9-K014
M-K Work Order 1638

U.S. DEPARTMENT OF ENERGY
Nuclear Waste Repository in Salt
Contract DE-AC02-83WM46656

REVIEW COMMENT RECORD (RCR) CONTINUATION

Reviewer | Review No | Page of

Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	Hold Point	Disposition (Provide justification if NOT accepted.)	Attachment No	Status

MORRISON-KNUDSEN CO., INC.
MINING GROUP
Fluor Contract 639704-9-K014
M-K Work Order 1638

U.S. DEPARTMENT OF ENERGY
Nuclear Waste Repository in Salt
Contract DE-AC02-83WM46656

REVIEW COMMENT RECORD (RCR)

1. Date | 2. Review No
3. Attach No | 4. Page 1 of ___

5. Document Number(s)/Title(s):	6. Project WBS Number:	7. Review Board:	8. Organization/Group	9. Phone

10. Agreement with indicated comment disposition(s):		11. VERIFICATION/CLOSE OUT	
Date:	Review Board Chairman:	Date:	Review Board Chairman:
Date:	Originating Engineer:		

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (Provide justification if NOT accepted)	16 Status

GENERAL REVIEW CRITERIA FOR DESIGN/DOCUMENT REVIEWS

1. Has the originator followed defined procedures?
2. Are the title, purpose, and function of the design/document adequately described?
3. Is the method clearly stated?
4. Are assumptions identified? Are open items identified for subsequent verification where necessary?
5. Are design bases and references current, and were they correctly selected and incorporated?
6. Are applicable codes, standards, and regulatory requirements identified and properly used?
7. Can the analytical steps involved be verified without recourse to the originator?
8. Is each sheet identifiable to its location in the calculation, drawing, or other document?
9. Are all markings legible, and identifiable as to purpose or function?
10. Is each sheet traceable to originator, date, and job or equivalent control number?
11. Do calculations and analyses clearly reference any final computer runs used?
12. Do final computer runs include an input listing and output?
13. Are computer results reasonable based on inputs and methodology?
14. Are final computer runs traceable back to the calculation?
15. Are final computer runs identifiable by a unique number or code?
16. Are calculation results consistent with inputs, technical procedures, and design criteria?
17. Are results reasonable?
18. Are revisions clearly documented?

GENERAL REVIEW CRITERIA FOR PEER AND CONCEPTUAL DESIGN STUDY REVIEWS

1. Is the objective of the design, analyses, or test defined?
2. For conceptual design studies, are the objectives as defined consistent and complete in their interpretations of the statement of work requirements?
3. Are inputs and their sources identified and defined?
4. Are the results of literature searches or other applicable background data documented?
5. Are assumptions identified and rationale for the assumptions documented?
6. Are the methods used reasonable, and have they been clearly defined?
7. Are computer programs identified where they are used?
8. Were computer programs properly used?
   - o Program capabilities adequate for the defined task
   - o Modeling
   - o Sensitivity studies
   - o Output values consistent with inputs
9. Are the overall results obtained reasonable based on objectives, inputs, assumptions, and methods used?

CALCULATION VERIFICATION RECORD

MORRISON KNUDSEN

JOB TITLE NUCLEAR WASTE REPOSITORY IN SALT WORK ORDER 1638

CALCULATION BEING VERIFIED _____

_____ SHEET NO. _____ OF _____

VERIFIER _____ DATE _____ CVR NO. _____

REFERENCE: U.S. Department of Energy
Nuclear Waste Repository in Salt
Contract DE-AC02-83WM46656
Fluor Contract 839704-9-K014

6.0 ENGINEERING (Continued)

6.3 USE OF ANALYTICAL AND COMPUTER CODES

6.3.1 Scope

a. The purpose of this section is to establish guidelines for the use and control of the analytical and computer codes which are to be used during the Salt Project conceptual and title designs.

b. This section also describes the procedures for executing codes using programmable calculators, microcomputers and mainframe computers during the conceptual and title designs.

6.3.2 Responsibilities

a. The M-K Project Engineers shall be responsible for preparing and maintaining a list of analytical and computer programs to be used during the conceptual and title designs in their areas of responsibility.

b. The Fluor Technical Manager shall have overall responsibility for maintaining the list of analytical and computer codes to be used during the conceptual and title designs as part of the Design Data Base documentation.

c. Proprietary codes shall not be used until prior arrangements have been made to protect the proprietary information.

6.3.3 List of Analytical and Computer Design Codes

a. A list of analytical and computer design codes shall be summarized on a schedule which shall contain the following information:
   - o Code name
   - o Author

6.3 USE OF ANALYTICAL AND COMPUTER CODES (Contined)

- o Ownership
- o Design areas of application
- o QA certification
- o Baselining status
- o Proprietary nature

b. The design codes not presently existing, but which may be required, existing codes requiring modifications and subsequent recertification to meet design of QA requirements, and existing acceptable codes requiring QA certification shall be listed separately. This list shall identify time required for development and/or certification of each program.

c. The lists of analytical and computer design codes shall be maintained current during the conceptual and title design.

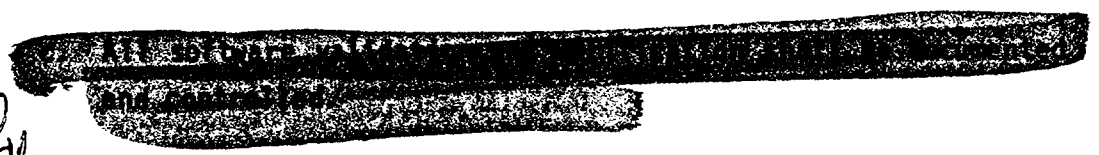
[redacted]

M-K standard practice and generally accepted, sound engineering practices and procedures shall also be verified.

[redacted]

6.3 USE OF ANALYTICAL AND COMPUTER CODES (Continued)

b. The M-K Project Engineers shall be responsible for software validation verification of programs to be used during the conceptual and title designs in their area of responsibility.



#16 Cont'd

d. Calculations that verify and validate computer programs shall be stored in the Fluor PIC as part of the QA records, as well as in the M-K Document Control files.

6.3.5 Baselining

a. All analytical and computer design codes to be used during the conceptual and title designs shall be baselined prior to their use.

b. Baselining shall consist of the following:
   - o Documentation per Subsection 6.3.6
   - o Making analytical and design codes operational
   - o Validation and Verification per Subsection 6.3.4

c. Baselined manuals, documents, analytical and computer codes shall be placed under formal document and configuration control per Section 6.12.

d. The M-K Project Engineers shall be responsible for baselining the analytical and computer codes to be used during the conceptual and title designs in their areas of responsibility.

6.3 USE OF ANALYTICAL AND COMPUTER CODES (Continued)

6.3.6 Documentation of Codes

a. Documentation of the analytical and computer codes shall consist of describing the code through a series of specific standard steps in an application. The following is a generic format for documenting a code:

- o Abstract: This shall be a short description of the code's purpose, capabilities, options, and results.
- o Methodology: A clear and concise explanation shall be given describing the procedures utilized by the code during problem execution such as applicable equations, iterative sequences or other schemes. Any assumptions, limitations and cautions shall be highlighted. All terms, symbols, and nomenclature shall be noted and defined. Diagrams, if applicable, shall also be provided to aid the user in understanding the code's methodology.
- o User Instructions: A narrative description of the input required for the code to proceed with the calculations shall be provided. An explanation shall be given to the user as to what he can expect from the resulting output and in what format it will be presented. Detailed "step-by-step" instructions showing the user show to input required data and the final, detailed output format shall be given.
- o Sample Programs: The sample programs shall be provided which serve as the basis against which to check the proper operability of the code.

b. The analytical and computer codes which are to be used in support of the Salt Project licensing application shall be documented to meet the requirements of NRC NUREG - 0856 "Final

6.3 USE OF ANALYTICAL AND COMPUTER CODES (Continued)

Technical Position on Documentation of Computer Codes for High Level Waste Management" dated June 1983.

c. The M-K Project Engineers shall be responsible for preparing and maintaining documentation of the analytical and computer codes to be used during the conceptual and title designs in their areas of responsibility.

6.3.7 Procedures for Using Analytical and Computer Codes

These procedures are applicable only to the use of baselined analytical and computer codes to be executed on handheld calculators, microcomputers, or mainframe computers.

a. Handheld Calculators:
   - o The user shall carefully read and understand the documentation of the code.
   - o The user shall input the program per user's instructions.
   - o The sample problem shall be run on the calculator and the output shall be compared with the documented output. If they compare exactly, the user is assured that the code and the calculator are operating properly. The sample problem printed output shall be attached to the verification form.
   - o The user shall input the problem(s) to be solved and shall attach the printed tape to calculation sheets.
   - o The entire package, verification tapes and forms, as well as the actual printed tape for the particular problem(s) shall constitute a part of the engineering calculations.
   - o If a calculator is incapable of producing a printed output, the user shall maintain notes of input and output

6.3 USE OF ANALYTICAL AND COMPUTER CODES (Continued)

verification, and notes of actual problem input and output as part of the engineering calculations.

b. Microcomputers: (later)

c. Mainframe Computers: (later)

6.0 ENGINEERING (Continued)

6.4 CALCULATIONS

Calculations used for design or selection of components/systems shall be legible, complete, and in sufficient detail for technical verification and review by both internal and independent groups.

6.4.1 Content

#17

[redacted] and shall clearly identify the output and any recognized impact or consequences. [redacted]

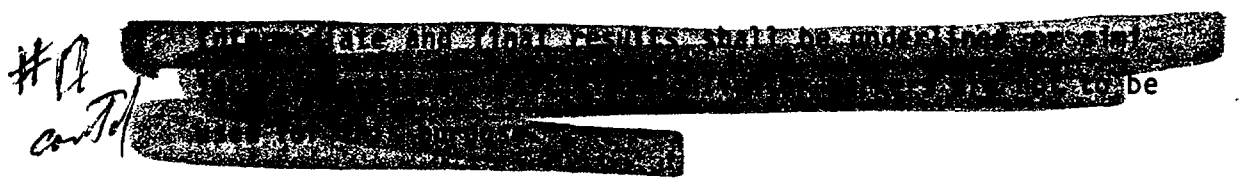
b. Input data shall be clearly identified including appropriate sources and criteria. Project related documents such as drawings, design criteria, and other calculations shall include official titles and identifiers used on the Project records for cross reference. (Refer to Section 8.1, Project Document Control.)

[redacted]

e. Assumptions made as part of the input conditions or as intermediate steps in the calculations shall be clearly labeled as

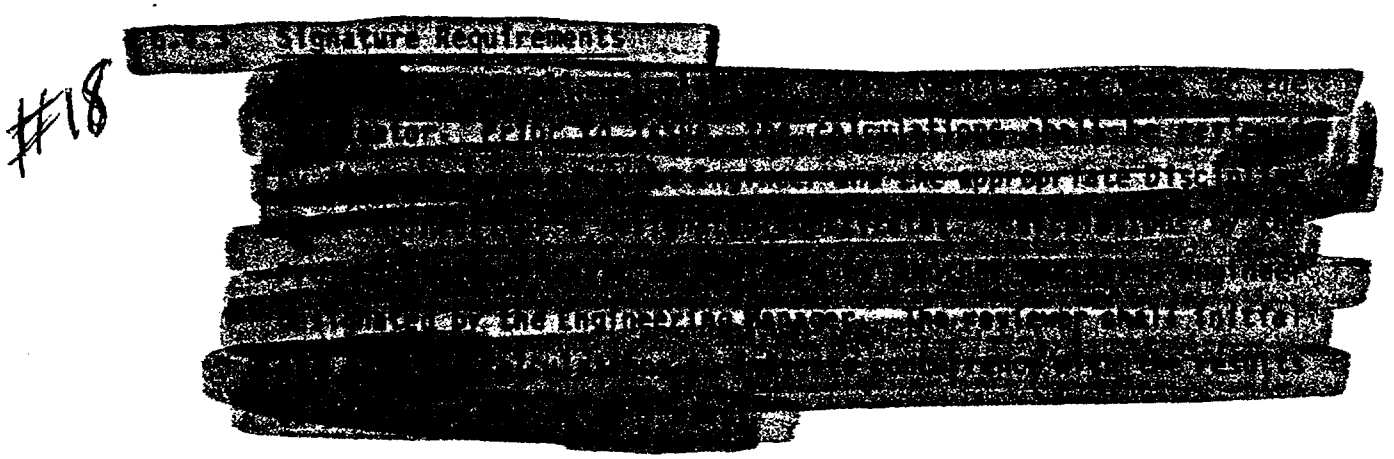
6.4 CALCULATIONS (Continued)

such. A brief statement on the rationale for the assumption should also be included.



6.4.2 Computer and Calculator Programs

Computer or related calculator programs used in calculations shall be identified by title. Programs shall meet the requirements of Section 6.3 of the Project Procedure Manual.



6.4.4 Distribution

a. Calculations shall be considered as Project Records. Document Control shall microfiche and log all issued calculations and retain one copy.

b. Originals of calculations or microfilm fiches shall be retained by the originating discipline as required.

c. A copy of calculations used in the development of specific documents shall be issued upon request to the Department of

6.4 CALCULATIONS (Continued)

Energy separate from the report or deliverable which includes the calculations. Distribution shall be in accordance with charts in Section 9.0.

d. Drawings, sketches, or other documents supporting calculations shall be microfilmed and a copy shall be maintained by Document Control. Distribution shall be the same as for associated calculations.

6.4.5 Revisions

Calculations shall be revised whenever a change in the input data, asusmptions, or methodology is determined to affect the calculations. Changes to the calculations shall be noted by a revision number. Distribution of revised calculations shall be identical to the original document.

6.0 ENGINEERING (Continued)

6.5 DRAWINGS

6.5.1 Drawing Forms

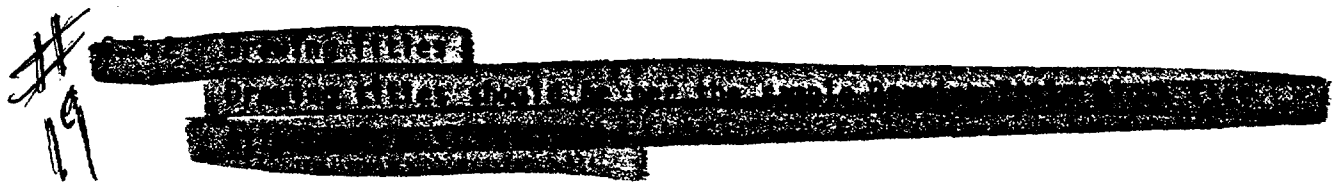
a. All drawings shall be prepared in pencil with lead suitable for use on mylar. Drawing forms shall be standard mylar sheets except as noted below.

b. Small project forms such as data sheets, may be on either vellum or mylar.

c. To be consistent with other small paper sizes used for this project, the small drawing forms will be sizes "A" (8-1/2" x 11") and "B" (11" x 17").

d. Larger drawings shall be made on forms that conform to drawing sheet sizes "D" and "F" as designated in ANSI Y14.1-1980 and developed for this project.

e. In general, the "F" size (28" x 40") is preferred for all drawings. The use of the "D" size (22" x 34") is restricted to special types of drawings such as plan and profile drawings.

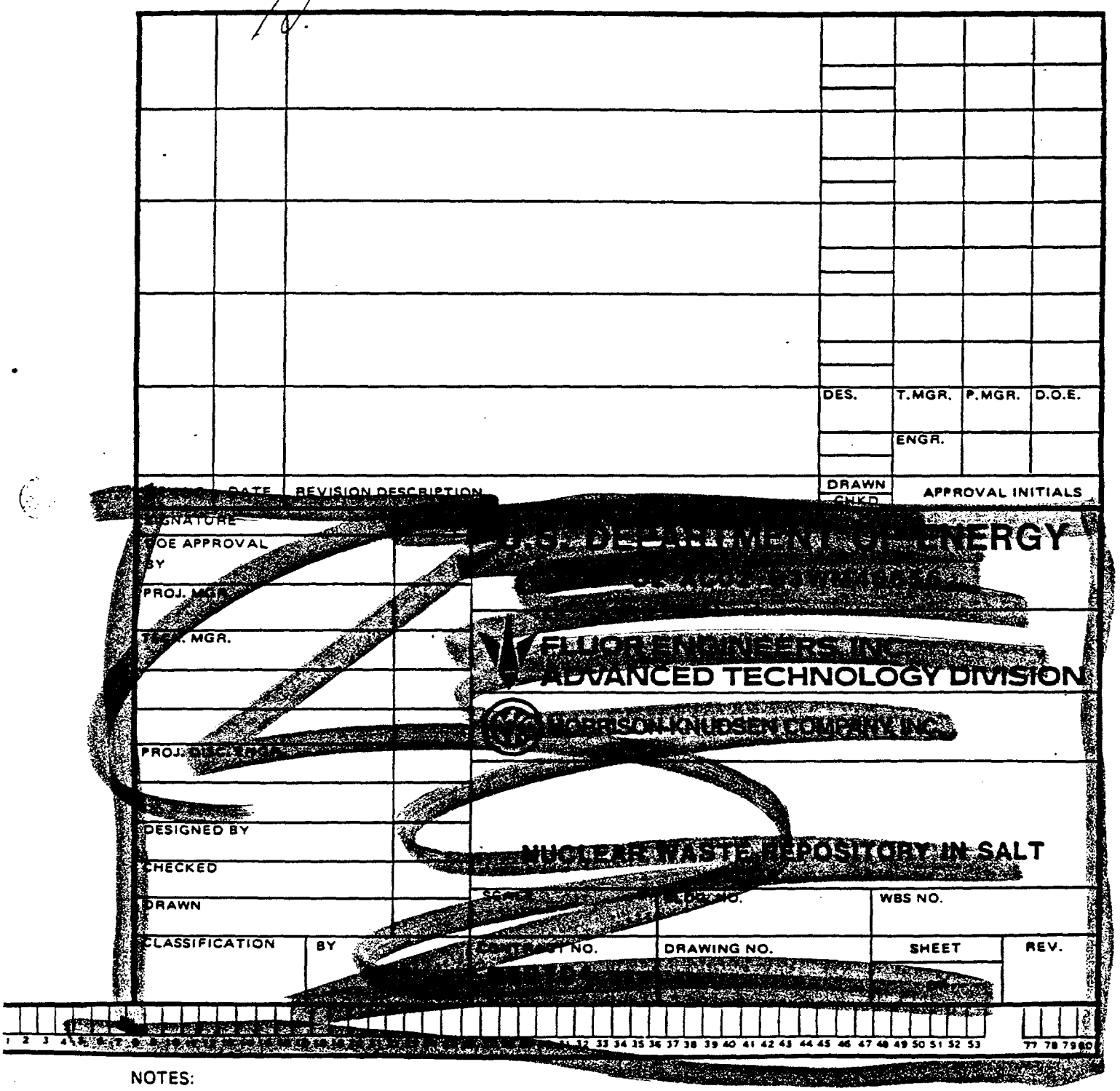


6.5.3 Multiple Sheets

Systems that require Flow Diagrams to be drawn on more than one sheet shall be arranged in such a manner that prints may be joined or assembled into a single continuous presentation.

#19

TITLE BLOCK – MORRISON-KNUDSEN DRAWINGS



NOTES:

(1) REVISION BLOCK SHOWN IN ALTERNATE LOCATION FOR CONVENIENCE. PREFERRED LOCATION WOULD BE TO LEFT OF TITLE BLOCK.

6.5 DRAWINGS (Continued)

6.5.4 Duplicate Reproducibles

Duplicate reproducibles of final drawings shall be on mylar. Brownline sepias or other types or reproducibles will not be used for construction or record drawings.

6.5.5 Voided Drawings

Drawings that have received external distribution and are subsequently voided shall be handled as described below. Changing a drawing number is cause for voiding the drawing.

a. When the requirement for a drawing no longer exists:

#20

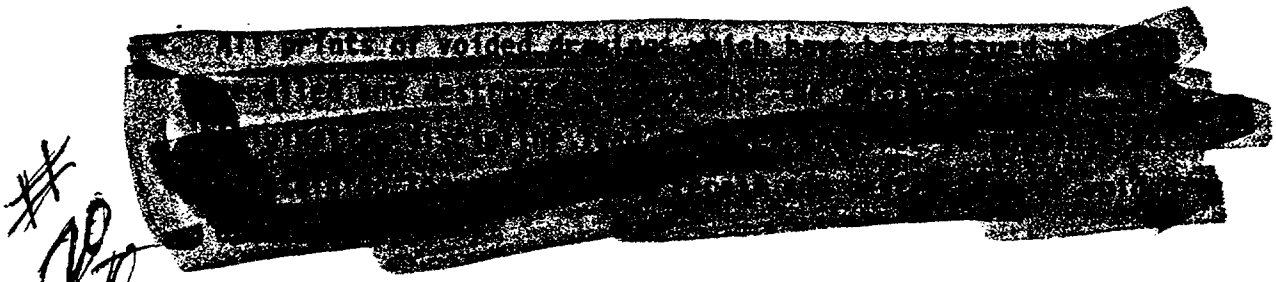
[redacted]

b. When a drawing number has changed:

A duplicate transparency must be obtained to handle the voided drawing requirement. Print the word VOIDED across this transparency; advance the revision number by one with a revision note stating "Drawing Number has been changed to _____." Reissue this transparency.

The original mylar transparency will revert to Revision 1 and the drawing number will be changed. All prior revision descriptions will be removed from the drawing. Issue this transparency.

6.5 DRAWINGS (Continued)



d. All voided drawing originals shall be retained by the originating project discipline engineer until the completion of the contract (839704). The originals may then be destroyed or retained in accordance with the following paragraph (6.5.5e).

e. Copies of all voided drawings, including an attached listing of them, shall be periodically transmitted to Fluor requesting DOE approval to either destroy or retain originals for future disposition. Appropriate action shall be taken upon receipt of Fluor's response.

6.5.6 Microfilming or Drawing Reduction

All drawings shall have provisions for microfilming or print reduction. Careful attention shall be paid to the following details to ensure acceptable drawings from which good microfilms or reduced size prints can be obtained:

a. The original drawings or material shall be dark lined with dark characters on a light background.

b. Shading of portions of drawings to make then stand out will not be used.

c. Drawings that, by nature, are highly congested (e.g., underground piping) shall be drawn to a scale of not less than 1" = 10'-0" to provide satisfactory reproductions.

6.5 DRAWINGS (Continued)

d. Preprinted "decals" of standard notes may be used. The printing on the decal shall be in caps, with 1/8" minimum height letters or figures, with 1/8" spacing between lines of text; 3/32" or one-half character height, whichever is greater.

e. Freehand lettering on all drawings shall have a minimum height of 1/8", with spacing between lines of lettering to be not less than one-half the character height. Lettering shall be round and open; so as not to "run" together with normal microfilming techniques. Lettering on each drawing should match in style. Upper case lettering is preferred.

f. The copy may differ in size from the original; therefore, if the scale(s) used is not one of those preprinted in the drawing form border, then a graphic scale or scales at least 5" long shall be drawn at a suitable location on the original drawing.

g. The drawings shall be of a density as uniform as possible. Light rework over extensive erasures will not reproduce satisfactorily. Rework shall match the density of the original drawing.

6.0 ENGINEERING (Continued)

6.8 ENGINEERING STUDIES AND REPORTS

6.8.1 Engineering Study Reports

a. Engineering Study Reports shall be prepared for all formal studies authorized by the DOE. These reports shall be the formal means for presenting the results of such studies.

b. The responsibility for the conduct of the study and the preparation and issue of the Engineering Study Report shall be assigned by the Fluor Project Manager or Technical Manager. The responsible M-K Project Engineers will be selected by the Engineering Manager, Mine Design.

c. A Study Outline shall be prepared by the individual responsible for the study and approved by the Engineering Manager, Mine Design and the Fluor Project Manager or the Technical Manager and submitted for DOE approval by Fluor prior to starting work on the study. The Study Outline shall identify scope, objectives, technical approach and requirements to begin and complete the study.

A sample Study Outline format is given as Attachment 5-3.

d. After the study has been defined and milestones identified, the individual responsible shall prepare a schedule for completion of the study. This schedule shall show appropriate milestones and any other information pertinent to the schedule such as:

- o Required dates for all draft write ups and artwork
- o Logistics for preparation and assembly
- o Estimated date for submittal to Fluor
- o Estimated date for submittal to DOE for comment

6.8 ENGINEERING STUDIES AND REPORTS (Continued)

- o Estimated date for return of comments by DOE
- o Estimated final issue date.

e. Study report drafts shall undergo independent technical review or peer review before issue to Fluor/DOE.

f. Completed Study Reports shall be issued to Fluor for review and comment via transmittal form. The transmittal form shall indicate the requested response date for any comments by Fluor or DOE.

g. After Fluor or DOE comments are received, they shall be incorporated and the report shall be transmitted to Fluor to be issued for approval. Approval shall be documented by receipt of a copy of a signed Record of Document Approval.

h. The Engineering Study Report shall be prepared following the procedure outlined in Figure 6.8-1.

i. A universal Study Style Guide shall be prepared by Fluor. This guide will define formal specifications for items such as title pages, type style and size, headings and titles, paragraphs, and page numbering.

#21

[redacted] includes the revision number. [redacted]

6.8 ENGINEERING STUDIES AND REPORTS (Continued)

6.8.2 Study Report Format

i Table of Contents

ii Glossary/Definitions/Acronyms

iii Figures/Sketches/Tables List

1.0 EXECUTIVE SUMMARY

2.0 INTRODUCTION

- 2.1 Objective
- 2.2 Scope
- 2.3 Study "x" Description
  - 2.3.1 General
  - 2.3.2 Boundaries/Interfaces
  - 2.3.3 Other Studies Affected
  - 2.3.4 Other Areas/Systems Affected
  - 2.3.5 Issues Without Precedent

3.0 ISSUES (STUDY "x")

- 3.1 General Description
- 3.2 Specific Issues
  - 3.2.1 Issue 1
  - 3.2.2 Issue Number

4.0 STUDY ISSUE NO. 1

- 4.1 General
- 4.2 Approach
- 4.3 Results
- 4.4 Conclusions
- 4.5 Impact (cost, schedule, etc.)

6.8 ENGINEERING STUDIES AND REPORTS (Continued)

5.0 STUDY ISSUE NO. "x"
- 5.1 General
- 5.2 Approach
- 5.3 Results
- 5.4 Conclusions
- 5.5 Impact (cost, schedule, etc.)

6.0 EVALUATION
- 6.1 Criteria
- 6.2 Measurement
- 6.3 Sensitivity Analysis

7.0 RECOMMENDATIONS
- 7.1 General
- 7.2 Study Related
  - 7.2.1 Issue 1
  - 7.2.2 Issue N
- 7.3 Other Recommendations
  - 7.3.1 Other Studies (Related)
  - 7.3.2 Other Areas (Not Study Related)
  - 7.3.3 Other Systems (Not Study Related)

8.0 REFERENCE MATERIAL (STUDY RELATED ONLY)
- 8.1 Techanical Documents
- 8.2 Drawings
- 8.3 Standards
- 8.4 Correspondence
- 8.5 M-K Documents/Standards
- 8.6 Other

6.8 ENGINEERING STUDIES AND REPORTS (Continued)

[redacted]

Much of conceptual design effort will involve identification and evaluation of alternatives for various aspects of the repository design. It is important that the rationale for selection from among each set of alternatives is clearly documented in any resulting study or report. The following guidelines shall be used for documentation of evaluations:

[redacted]

c. A method or basis for evaluation of each criteria shall be prepared. This statement shall include a description of how each alternative will be evaluated against the specific criteria.

d. Criteria shall be assigned a relative value with respect to how important meeting the criteria is in achieving the objective of the study.

e. Each alternative shall be evaluated against each criteria using the guidelines established in "C" above. Where possible, rationale for measurement shall be clearly stated.

6.8 ENGINEERING STUDIES AND REPORTS (Continued)

f. Each alternative shall also be evaluated on an overall basis considering how well it satisfies all criteria.

g. Final recommendations shall be prepared including a sensitivity analysis discussing probable impacts in the event of inconclusive data and/or evaluations.

6.8 ENGINEERING STUDIES AND REPORTS (Continued)

FIGURE 6.8.1

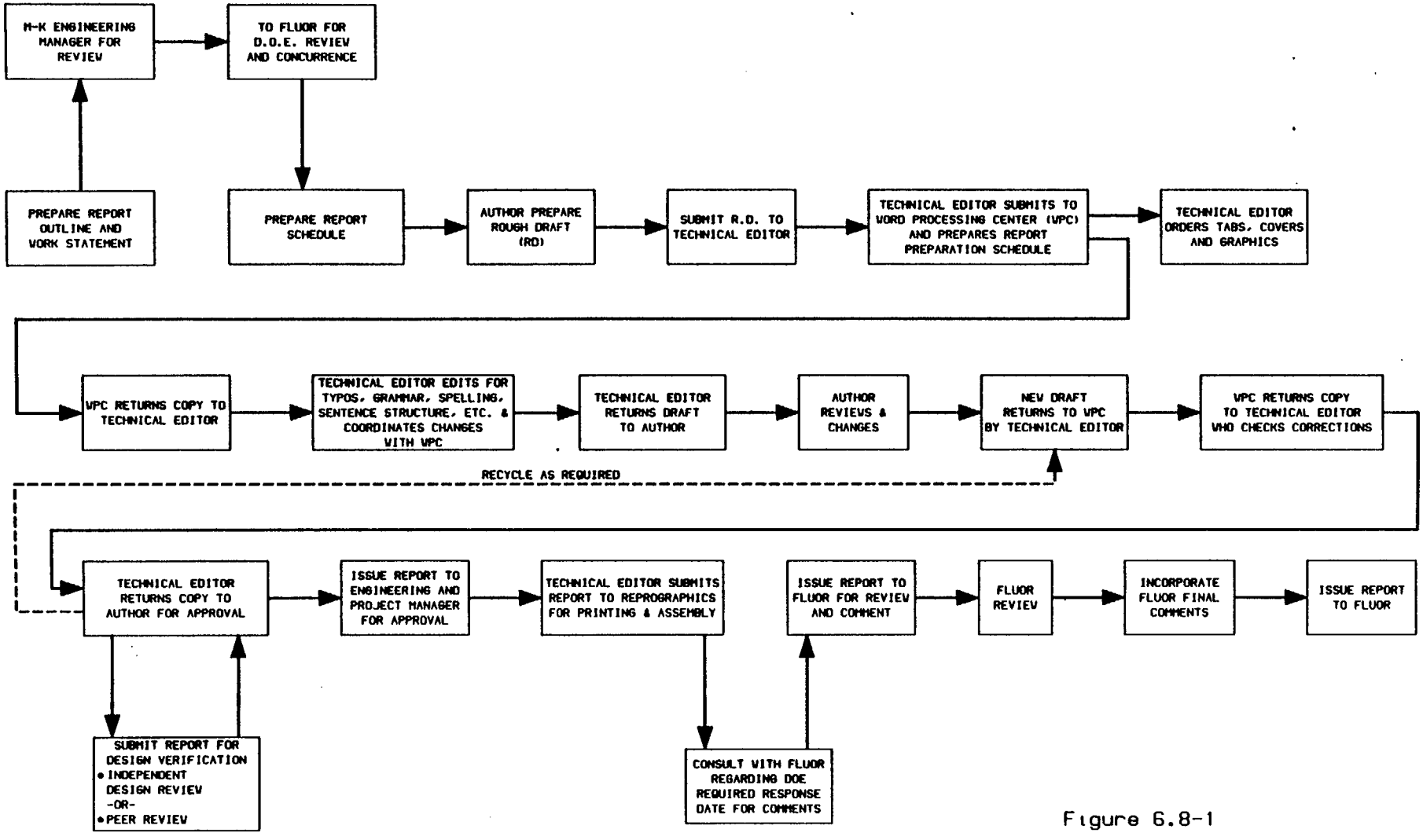


Figure 6.8-1

REPORT PREPARATION PROCEDURE
NUCLEAR WASTE REPOSITORY IN SALT

6.0 ENGINEERING (Continued)

6.11 DRAWING AND DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, AND REVISIONS

This section covers the procedures to be used for the handling of all drawings, documents, and design reports to be developed for the Salt Project. It should be worked in conjunction with Sections 6.1, 6.5, 6.6, 6.7, and 6.8 which provide additional requirements for specific drawings and documents.

6.11.1 Drawing, Document and Design Report Preparation (See 6.7 for Flow Diagrams)

a. Project Engineer (or discipline lead engineer) assigns drawing/document preparation to qualified originator.

b. Inputs into conceptual design activities such as, but not limited to, design bases, performance requirements, codes, standards, site selection, characterizationand analysis criteria, and computer software used in performing these activities, shall be identified and documented by the originator. Such inputs shall be reviewed, verified, validated, and approved prior to use in these activities and prior to becoming Project Records.

c. Originator prepares document in accordance with project design criteria, basis for design, related industry, and M-K standards and practices and the applicable sections of this manual.

d. Project Engineer (or discipline lead engineer) obtains "check print" or draft document and assigns checker.

e. Checker reviews and checks drawing/document in accordance with departmental procedures. Notes on "check print" any necessary corrections. Verifies conformance with all interface drawings

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

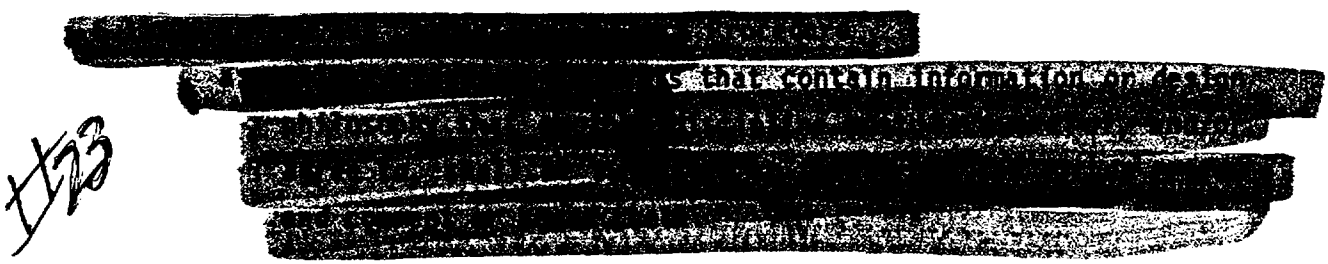
and documents and verified dimensional accuracy and completeness of the drawing.

f. Project Engineer (or discipline lead engineer) reviews check print corrections, comments and notations and assigns qualified individual (originator, if available) to correct drawing/document.

g. Originator (or qualified replacement) corrects drawing/document as noted.

h. Project Engineer (or discipline lead engineer) reviews drawing/document. Checking cycle shall be repeated as required, as determined by Project Engineer (or discipline lead engineer), depending on the quantity and degree of difficulty of corrections.

i. Project Engineer (or discipline lead engineer) assigns revision number in accordance with subsection 6.2.4 and releases the drawing/document for squad check.



b. The Index for Squad Checking (Attachment 6-4) is used to define which groups will either review and comment on a particular item, squad check it, or receive a copy for reference.

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

c. The following definitions shall apply for the Index for Squad Checking:

- o R = Reference
  Indicates the group is receiving the drawing or document for reference only.

- o R/C = Review and Comment
  Indicates the group is receiving the drawing or document for review and comment before the drawing or document is placed in check.

- o SQ = Squad Check
  Indicates the group receiving the document or drawing will detail check those portions that affect their group. Squad checking takes place after the drawing or document has been formally checked by the originating group.

d. Using the Index for Squad Checking as a guide, the originating discipline lead engineer (supervisor) shall attach a Squad Check Sign-Off Form (Attachment 6-5) to the drawing/document(s) to be squad checked (or reviewed) indicating thereon the review required and the completion priority. These shall then be forwarded to the Document Control Coordinator.

e. The Document Control Coordinator shall make copies of the document for Document Control and each of the disciplines indicated on the Squad Check Sign-Off Sheet.

f. The Document Control Coordinator shall then prepare and attach a memo (see Attachment 6-6, for sample) to the sign-off form

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

and drawing/document copy and distribute to each of the reviewing disciplines and to Document Control for filing. Document originals shall be returned to the originating discipline lead engineer (supervisor).

A copy of the document with attached Squad Check Sign-Off Form shall then be placed in the Squad Check area for mark-up.

g. Project engineers and discipline lead engineers shall notify the appropriate personnel in their disciplines to review applicable data. All Task Force personnel performing drawing/document squad checks are responsible for immediately notifying the originating engineer (or supervisor) of any noted violations of, or unapproved deviations from design criteria; these notations shall be specific. Any changes to the squad check copy shall be marked directly on the squad check copy and must be clearly initialed by the person originating the change. Disciplines shall complete this review within five working days for routine checks and two working days for expedited checks. Expedited squad checks require the approval of the Engineering Manager, Mine Design, or the Quality Control Manager, Mine Design.

h. The Document Control Coordinator shall provide a daily listing by discipline of all data not reviewed after five working days for routine checks and after two working days for expedited checks to the Engineering Manager, Mine Design, and those disciplines concerned. These squad checks shall then be expedited by the concerned Project Engineer. The Engineering Manager, Mine Design, will be notified if problems persist in obtaining required squad check signatures.

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

i. The Document Control Coordinator shall, upon completion of all sign-offs, return the squad check copy and initialed sign-off form to the originating Project Engineer or discipline lead engineer.

j. The originating Project Engineer or discipline lead engineer is responsible for incorporating any squad check comments by other disciplines or resolving any discrepancies. He shall review the noted changes and assign a qualified individual to incorporate the comments.

k. Final resolution of all squad check comments shall remain with the originating discipline. Any alteration to a change or comment must be discussed with the discipline originating the change or comment. The discipline originating the change or comment shall initial all alterations to his changes or comments. Meaningless comments such as "incredible" or "why" may be deleted by the originating discipline without further resolution.

l. After the original has been modified in accordance with the resolved comments by a qualified individual, the originating Project Engineer or discipline lead engineer shall review the document and assign a checker to back-check the changes.

m. The originating Project Engineer or discipline lead engineer ensures that any back-check comments are resolved and incorporated on the document. The document is then forwarded to the Document Control Coordinator who initiates the issue procedures.

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

n. Upon completion of the squad check, it shall be the originating Project Engineer's or discipline lead engineer's responsibility to maintain and file the squad check copy and the original Squad Check Sign-Off Sheet. Final disposition of squad check prints shall be in accordance with the project close-out procedure.

o. Revisions to drawings or documents previously issued for Squad Check or Review and Comment will require additional squad check or review of the revised portion by the affected group(s).

6.11.3 Issue Procedures

a. Types of Issue

The following types of drawing and document issues are to be used on the Salt Project. The applicable type of issue shall be clearly stamped above or near the title block on all drawings.

The type of issue to be used for various documents is shown on Attachment 6-7.

- Preliminary

  A preliminary issue is to be used for the distribution of any unchecked design information within Fluor. Preliminary information may be used by the disciplines for information and planning purposes only. Any type of drawing or document may be issued preliminary.

- Reference

  A reference issue is to be used for the distribution of checked information within M-K, Fluor, to DOE or to

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

other contractors. Reference information may be used for information to further the development of project documents and deliverables.

- o Squad Check
  Drawings and documents are issued for squad check for the purpose of interdiscipline review and comment, after check by the originating discipline.

- o Review and Comment by A/E Team
  Drawings and documents may be issued for review and comment prior to discipline check when input by the reviewing discipline is necessary to minimize recycle during and after check of that item.

- o For M-K Approval
  Drawings and documents are submitted to the Engineering Manager, Mine Design, for M-K approval and sign-off prior to submittal to Fluor. These documents shall be squad checked prior to issue for M-K approval.

- o For Fluor Approval
  Drawings and documents are submitted to the Fluor Technical Manager for Fluor approval and sign-off prior to submittal to DOE. These documents shall be approved by the Engineering Manager, Mine Design, prior to issue for Fluor approval.

b. Required Approval Signatures

- o Required approval signatures for the issue of each of the following types of documents are shown on Attachment 6-8.

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

- Basis for Design (Fluor Review and Comment only)
- Specifications
- Flow Diagrams
- Plot Plans and Equipment Arrangements
- Drawings (Types TBD)
- Engineering Study Reports

o All engineering documents requiring signatures or initials shall be dated using dashes and be in the order of month-day-year. For example:

  1-17-84

o Other variations of dating, such as 1/17/84 or Jan. 17, 1984, shall not be accepted.

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[redacted]

o For all document issues other than Approved for Conceptual Design (AFD), originals will be returned to the originating discipline after distribution of copies has been made by the DCC.

o All original tracings shall be filed by Document Control after AFD issue.

o All specification and engineering study report originals shall be retained by Document Control once they have been issued AFD. Document Control will also maintain a sign-out record for all originals.

o Drawings and flow diagrams shall also be maintained by Document Control on aperture cards. Specifications, bid packages, and bid package amendments shall be maintained by Document Control on microfiche.

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

- o Each discipline shall provide Document Control with their distribution requirements for all documents issued for Squad Check and Review and Comment. Document Control will maintain a master distribution chart for all distribution internal to M-K.

d. Originator's Responsibilities - General

- o Obtains internal approval signatures required on each document.
- o Completes Originator's Instructions (Attachment 6-9), including all special requirements for distribution.
- o Forwards documents and Originator's Instructions to Document Control for issue.

e. Document Control (DC) Responsibilities - General

- o Performs squad check routing as outlined in Section 6.11.2.
- o Verifies that all required approval signatures are affixed prior to ordering copies. When Fluor signatures are required, DC will maintain a record copy of each original and will transmit the originals to Fluor for signature. The originals will be returned within ten (10) working days of receipt, for distribution.
- o Orders the total quantity of prints and reproducibles for both internal and external distribution in accordance with distribution charts and/or Originator's Instructions.
- o Stamps each document with the type of issue (i.e., reference, review and comment, squad check, etc.) immediately above the revision area.

6.11 DRAWING & DOCUMENT PREPARATION REVIEW, APPROVAL, ISSUE, & REVISIONS (Cont)

- o Prepares Transmittal Letter (Attachment 6-10) for all distribution external to M-K. (Transmittal numbering shall be controlled by the Project Secretary.)
- o The transmittals are distributed as follows:
  - Copy 1 - to Fluor for their records.
  - Copy 2 - to Fluor, who signs to acknowledge receipt, and returns to M-K.
  - Copy 3 - retained by DC until Fluor's acknowledgement copy (Copy 2) is returned to M-K; Copy 3 is then discarded and Copy 2 becomes DC's permanent record.
- o Prepares an Interoffice Memorandum for all distribution which is solely internal to M-K, but external to the originating discipline.
- o Transmits documents to Fluor and to other contractors in accordance with the distribution charts in Section 9.0, plus any special distribution indicated on the Originator's Instructions.
- o Performs internal distribution of individual drawings and specifications in accordance with the distribution chart for distribution internal to M-K, plus any special distribution indicated on the Originator's Instructions.

6.11.4 Revisions

a. Revision numbering shall be in accordance with Section 6.2.4 of this manual.

b. Revisions to documents previously issued shall follow the same Approval and Issue procedures as the initial issue.

6.0 ENGINEERING (Continued)

6.12 DESIGN REVIEW AND DESIGN VERIFICATION

The procedures for independent technical review and design verification are presented in this section. Figure 6.12-1 illustrates the sequence of the following review and verification processes.

- o Design Review
- o Squad Check
- o Design Verification

These procedures have been prepared to conform with the requirements of the following:

- o Attachment C, Quality Assurance Specifications, of the Statement of Work for Architect/Engineer Services
- o Basic Requirement 3 of NQA-1-1983
- o Supplement 3S-1 of NQA-1-1983
- o Appendix 3A-1 of NQA-1-1983

6.12.1 Design Reviews

All design document reports, calculations, specifications, and drawings produced on the Salt Project shall undergo a Design Review. Procedures for this review are specified in Section 6.11.1, "Drawing and Document Preparation," of this Project Procedure Manual.

6.12.2 Squad Check

Drawings, documents or design reports that contain information or design philosophy that another discipline must be aware of, and/or agree with, shall be submitted to that discipline for review and comment. The Squad Check process, including resolution of all comments, shall be documented. Procedures for Squad Checking are specified in Section 6.11.2, "Review and Comment/Squad Check Procedures" of this Project Procedure Manual.

6.12 DESIGN REVIEW AND DESIGN VERIFICATION (Continued)

6.12.3 Design Verification

a. The purpose of design verification shall be to verify that conceptual design documents to be used as a bases for the Title I preliminary design phase and subsequent licensing process are correct and satisfactory.

b. Systems, portions of systems, structures, or components which are identified as Quality Level I items shall undergo Design Verification.

c. Design verification shall be conducted using design reviews, analysis of alternate calculations, or qualification tests.

d. Required design verifications shall be classified by the responsible discipline lead engineer, with concurrence of the QA Manager, as either Independent Reviews or Peer Reviews according to the following criteria:

- Independent Design Review

  Verification shall be classified as an Independent Design Review if the design involves state of the art technology for which codes, standards, regulations, and performance histories have been established.

  The review shall be performed by competent individuals or groups who are independent of the individuals responsible for performing the original design, but who may be from the same organization.

- Peer Review

  Verification shall be classified as a Peer Review if the design involves first of a kind technology or state of

6.12 DESIGN REVIEW AND DESIGN VERIFICATION (Continued)

the art technology for which no codes, standards, regulations, or performance histories exist.

The peer review shall be conducted by individuals and/or groups who are nationally recognized as experts in the particular field. Peer review groups shall be identified as soon as possible to allow time to coordinate the review process.

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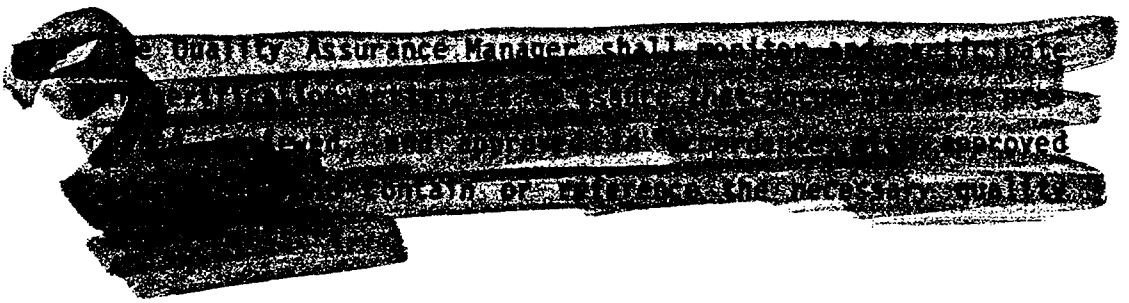

f. The need for Design Verification shall be identified during the work planning process so that appropriate time is allowed to complete the review process.

g. Individuals or groups who will be participating in Design Verification for a particular document shall be notified of their requested assistance, by the document originator a reasonable time in advance of document issue.

h. The document originator shall be responsible for ensuring that each individual participating in a Design Verification receives the following:
   - o A transmittal letter identifying the scope, objectives, and schedule for the Design Verification.
   - o A list of required codes, standards, regulations, and other guidelines with which the document should conform.

6.12 DESIGN REVIEW AND DESIGN VERIFICATION (Continued)

- o An acknowledgement sheet to be signed and returned to the originator, documenting comments and that the verification was completed.
- o A copy of the document to be verified.
- o A copy of supporting information necessary to verify that the design is correct and satisfactory.

i. The objectives of Design Verification shall, as a minimum, address the following questions:

- o Were the design inputs correctly selected?
- o Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?
- o Was the design input correctly incorporated into the design?
- o Is the design output reasonable compared to design inputs?
- o Are the necessary design input and verification requirements for interfacing organizations specified in the design documents or in supporting procedures or instructions?

j. Computer programs used in the design shall be verified to show they produce correct solutions for the encoded mathematical model within defined limits for each parameter employed.

k. Computer programs used in the design shall be validated to show they produce a valid solution to the physical problem associated with the particular application.

6.12 DESIGN REVIEW AND DESIGN VERIFICATION (Continued)

l. The document originator shall be responsible for resolving comments from Design Verification before the document is issued as a completed draft.

m. Verification and/or review of activities shall be completed and determined to be satisfactory prior to the release of the design documents for use in subsequent activities.

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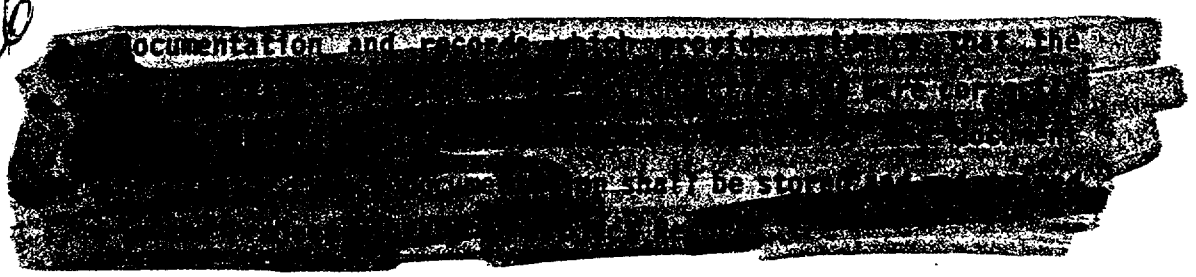
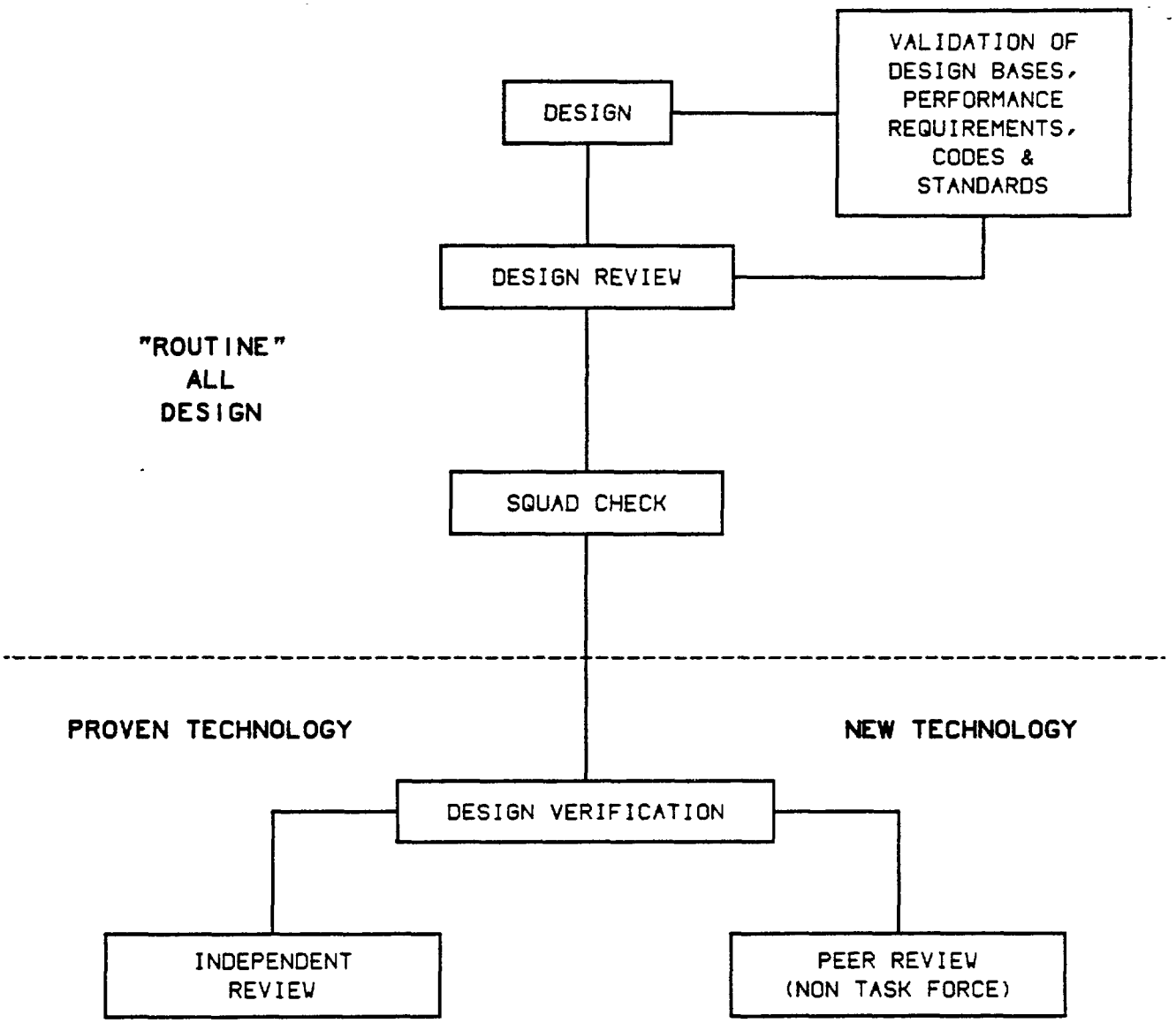


o. Changes to documents which have undergone Design Verification shall be subject to the controls specified in this Section 6.12.2. All changes shall be identified by revision number and date.

6.12 DESIGN REVIEW AND DESIGN VERIFICATION (Continued)

FIGURE 6.12-1



AS REQUIRED BY QUALITY LEVEL I IN QA MANUAL

Figure 6.12-1

6.0 ENGINEERING (Continued)

6.13 REVIEW OF DOCUMENTS GENERATED BY OTHERS

6.13.1 Internal Documents

All technical documents generated internally by the A/E Team and received for information, for review and comment, and/or for approval shall be processed according to procedures set forth in Section 6.11, Drawing and Document Approval, Issue and Revisions.

6.13.2 External Documents

All technical documents generated by others outside the A/E Team and received for information, for review and comment, and/or for approval, and all review comments by others shall be processed per provisions noted herein.

6.13.3 Distribution

Documents shall be logged and distributed per Section 4.0, Communications, and maintained on file per Section 8.1, Document Control.

6.13.4 Responsibility

The following personnel shall be responsible for consolidation and transmittal of any M-K comments:

a. The Project Manager, Mine Design, shall be responsible for items of a general or overall project nature.

b. The Engineering Manager, Mine Design, shall be responsible for items of a technical nature.

c. The respective Project Engineers, Mine Design, shall be responsible for items dealing with their specific areas of responsibility.

6.13 REVIEW OF DOCUMENTS GENERATED BY OTHERS (Continued)

d. The QA Manager, Mine Design, shall be responsible for items dealing with quality assurance.

6.13.5 Handling of Documents

a. Documents generated by others shall be reviewed by M-K team personnel whose work relates to the subject matter addressed in the documents.

b. Each Project Engineer or engineering discipline lead, with the concurrence of the Engineering Manager, Mine Design, shall determine whether the document received and reviewed is: 1) "Directly Relevant" to its work; or 2) serves only as "Background Information."

c. Each discipline shall maintain a list of these documents noting the category under which it classified the individual documents.

d. All documents generated by others and received for review shall be maintained on file per Section 8.1, Document Control.

e. Each discipline and subcontractor shall periodically (at least quarterly) update its category list and transmit a copy to Document Control.

6.13.6 Comments

All review comments on documents generated by others shall be recorded on the form as shown on Attachment 6-12. Besides the transmittal information, the following sections of the form shall be completed: item number, document number and paragraph, and comments. The form shall be signed by the person responsible for

6.13 REVIEW OF DOCUMENTS GENERATED BY OTHERS (Continued)

consolidation and transmittal of comments. Others shall then respond in the Action section of the form using the format indicated in 6.13.7 for "action column." Attachment 6-13 shows the continuation sheet for the form.

6.13.7 Responses

Responses to review comments by others on M-K/Fluor/Subcontractor generated documents shall also be recorded on the form as shown on Attachment 6-12. The "action column" shall be completed using the following standard responses: if in agreement with the comments, note Agree - will add, change, clarify, review, incorporate, or delete, etc., (as appropriate), if not in agreement, note Disagree - OK as is, and concisely state the reasons justifying the disagreement. The form is then signed by the person responsible for consolidation of responses. Attachment 6-13 shows the continuation sheet for the form.

6.13.8 Approval

Approval of the comments and corresponding action responses shall be indicated by the appropriate Fluor representative by his signature on the form.

6.13.9 Transmittal

All comments and responses shall be transmitted per Section 4.0, Communications, and shall be maintained on file per Section 8.1, Document Control.

6.0 ENGINEERING (Continued)

6.15 ENGINEERING DOCUMENTATION

6.15.1 Organization

Careful and thorough documentation of engineering and design information is essential to satisfy the review, quality assurance and licensing requirements for the Salt Project. Engineering and design information shall be maintained as a part of the overall Document Control system. Organization of these records shall be as illustrated in Attachments 8-1 and 8-2 in the Record Management Plan, Section 8.1. Section 8.1 describes the operation of Document Control.

6.15.2 Classification

a. Engineering and design output (i.e., drawings, specifications, and reports) shall be identified as "Engineering/Design Records."

b. Technical requirements (i.e., criteria, Basis for Design, Codes and Standards) and technical data necessary to meet the requirements (i.e., selected design data, analytical codes, design guides, design data sources and reference information) shall be identified as the "Technical Data Base."

c. All disciplines shall be responsible for assisting as required in the maintenance and documentation of engineering information.

6.0 ENGINEERING (Continued)

6.17 PERFORMANCE AND DESIGN REQUIREMENTS CONTROLS

6.17.1 Definition

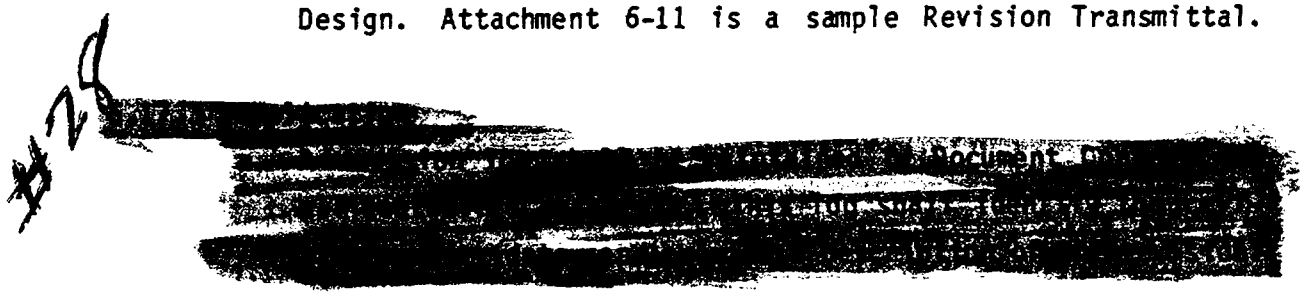
a. Performance and design requirements controls shall apply to stand alone documents, reports, manuals, design requirements, drawings, or other items (controlled documents) produced as a result of performance on this project, which will be maintained as project records and are subject to revision.

b. Engineering documents and drawings produced as a normal consequence of the conceptual engineering work shall be controlled in accordance with the procedures in Section 6.11, "Drawing and Document Preparation, Approval, Issue and Revisions."

6.17.2 Distribution

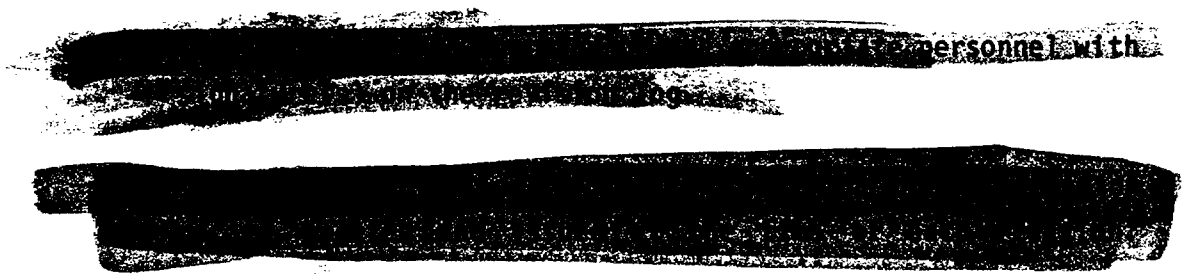
a. Distribution of controlled documents shall be limited to a specified group of individuals or organizations.

c. Revisions shall be issued to those on the distribution log via Revision Transmittal from the Project Manager, Mine Design. Attachment 6-11 is a sample Revision Transmittal.



6.17 PERFORMANCE AND DESIGN REQUIREMENTS CONTROLS

c. Revised information to controlled documents shall be identified by a " " with the revision number specified inside the symbol.



f. Each individual in possession of controlled documents shall be responsible for replacing revised material in their copies.

6.0 ENGINEERING (Continued)

6.18 ATTACHMENTS

6-1 Specification Cover Sheet
6-2 Equipment Identification Symbols
6-3 Drawing Title Block
6-4 Index for Squad Checking
6-5 Squad Check Sign-Off Sheet
6-6 Squad Check Memorandum
6-7 Types of Issue for Various Documents
6-8 Required Signatures
6-9 Originator's Instructions
6-10 Transmittal Form Sample
6-11 Revision Transmittal
6-12 Contractor Review Record
6-13 Contractor Review Record (Continued)

TYPES OF ISSUE FOR VARIOUS DOCUMENTS

	PRELIMINARY	REFERENCE	SQUAD CHECK	REVIEW & COMMENT	FOR M-K APPROVAL	FOR FLUOR REVIEW AND COMMENT	FOR FLUOR APPROVAL	APPROVED FOR CONCEPT. DES.
BASIS FOR DESIGN	X	X	X		X		X	X
SPECIFICATIONS	X	X	X		X	(2)	X	X
FLOW DIAGRAMS	X	X	X		X	(2)	X	X
DRAWINGS – PLOT PLANS	X	X	X		X	(2)	X	X
DRAWINGS – EQUIPMENT ARRGT.	X	X	X		X	(2)	X	X
DRAWINGS – ELECT. ONE-LINE	X	X	X		X	(2)	X	X
DRAWINGS – OTHER	X	X	(1)	(1)	X	(2)	X	X
ENGINEERING STUDY REPORTS	X	X	(1)		X		X	X
CONCEPTUAL DESIGN REPORT	X	X	(1)		X		X	X
TITLE I PLANNING DOCUMENTS	X	X	X		X		X	X
DSSR – DRAWING & SPECIFICATION INDEX		X						
PROJECT PROCEDURE MANUAL		X	X		X	(3)	X	
MANAGEMENT PLAN		X	X		X	(3)	X	
QUALITY ASSURANCE MANUAL					X		X	X

(1) AS REQUESTED BY ORIGINATOR ON "INDEX FOR SQUAD CHECKING"

(2) FOR DOE REVIEW AND COMMENT. DOE APPROVAL FOR THESE DOCUMENTS IS COVERED IN THE APPROVAL PROCESS FOR THEIR RESPECTIVE TECHNICAL DELIVERABLE (e.g., CONCEPTUAL DESIGN REPORT)

(3) INTERIM REVIEWS PRIOR TO FINAL APPROVAL AS REQUIRED

REQUIRED SIGNATURES

ITEM \ TYPE OF ISSUE	PRELIMINARY	REFERENCE	SQUAD CHECK REVIEW & COMMENT	FOR M-K APPROVAL	FOR FLUOR REVIEW AND COMMENT	FOR FLUOR APPROVAL
BASIS FOR DESIGN	1	2,3,5	2,3,5,6	2,3,5,6		2,3,5,6, 7,8
SPECIFICIATIONS (See Note 3, Att. 6-7)	1	2,3,6	2,3,5,6	2,3,5,6	2,3,4,5, 6,7	
FLOW DIAGRAMS	1	2,3	2,3,4,5 6	2,3,4,5 6	2,3,4,5, 6,7	2,3,4,5, 6,7,8
PLOT PLANS / EQUIPMENT ARRANGEMENTS	1	2,3	2,3,4,5	2,3,4,5	2,3,4,5, 6,7	2,3,4,5, 6,7,8
DRAWINGS – OTHER (See Note 3, Att. 6-7)	1	2,3	2,3,4,5 6	2,3,4,5 6	2,3,4,5, 6,7	2,3,4,5, 6,7
ENGINEERING STUDY REPORTS	1	2,5	2,5,6	2,5,6		2,5,6,7, 8

Signatures for a particular issue of the above listed items are defined by the numerical designation for one or more of the following listed individuals in the appropriate matrix block.

No Signature Required	1
Originator	2
Discipline Checker	3
Design Supervisor	4
Project Discipline Engr	5
Quality Assurance	6
Engineering Manager	7
Project Manager	8