

nb 3123100

COEM VOLUME 1

Table of Contents

TABLE OF CONTENTS

REV DATE

77 03/30/00

Glossary

GLOSSARY

16 11/25/97

Document Control Process

1-W56-COEM-AMN-101 Site Design Document Control
Rev 1, Ch 1
Rev 1, Ch 2
Rev 1, Ch 3

1 01/01/99
02/25/99
05/11/99
07/15/99

Operations Support

1-W59-COEM-AMN-161 Preparation, Review, and Approval of System Evaluation
Reports
Rev 1, Chg 1

1 01/21/98
07/02/98

COEM VOLUME 2

1-V51-COEM-DES-210 Site Engineering Process Procedure

REV DATE

5 03/30/00

Planning, Budgets, & Procurement

2-C93-COEM-DES-273 Engineering Standards for Procurement
Rev 1, Ch 1

1 04/30/99
06/24/99

PADC-1996-00818

CONTROLLED DOCUMENT

(if numbered in red ink black numbering indicates information only copy)

CC (if: numbering (copy))

Copy Number

Copy Number

ADMIN RECCRD

SW-A-004004

1/164

COEM VOLUME 3

REV DATE

Directives

Project Conception & Request

2-F32-COEM-PMG-301	CANCELLED		08/01/99
2-L92-COEM-PMG-302	Overview to Quality, Environmental, Davis-Bacon, Security, and Safety and Health Requirements for Project Managers	0	07/18/95
	96-DMR-000127		02/05/96
3-L88-COEM-PMG-303	Project Initiation Guide	0	04/14/95
3-P31-COEM-PMG-307	Project Data Sheet (PDS) Preparation Guide	0	04/14/95

Scope Development, Planning, Funding

3-K08-COEM-PMG-309	Operational Requirements Document (ORD)	0	10/01/94
	96-DMR-000128		02/05/96
3-P32-COEM-PMG-311	Scope and Estimate	0	10/01/94
3-L82-COEM-PMG-315	Line Item Budget Process Guide	0	04/14/95
3-L01-COEM-PMG-317	Work Breakdown Structure	0	10/01/94
3-L76-COEM-PMG-319	Scheduling	0	10/01/94
2-H36-COEM-PMG-321	Project Risk Management	0	07/18/95
3-K78-COEM-PMG-323	Preparation of Project Management Plan/Work Package	0	10/01/94
2-P33-COEM-PMG-325	Engineering Subcontracting Guide	0	07/18/95
	96-DMR-000129		02/05/96
2-M54-COEM-PMG-327	Government Furnished Equipment (GFE)	0	07/18/95
	96-DMR-000130		02/05/96

Detailed Design

Procurement & Construction

Close-out & Turnover

3-J68-COEM-PMG-331	Project Closeout and Turnover	0	10/01/94
	96-DMR-000131		02/05/96

Administrative

3-M02-COEM-PMG-333	Baseline Management	0	10/01/94
3-P35-COEM-PMG-335	Baseline Change Proposal Guide	0	04/14/95
3-L89-COEM-PMG-337	Cost Estimating	0	10/01/94
3-P29-COEM-PMG-339	Reporting and Reviews Guide	0	10/01/94
3-M49-COEM-PMG-341	Construction Management Review Guide	0	04/14/95
ENG-PILOT-PM-009	Project Summary Report (Pilot)	0	08/05/94
3-P36-COEM-PMG-345	Project Control/Management Control System Interface	0	10/01/94
3-M55-COEM-PMG-346	Progress Tracking System/4700.1 Report Guide	0	04/14/95
2-P38-COEM-PMG-349	Records and Document Management for Authorization Projects	0	07/18/95
	96-DMR-000132		02/05/96
ENG-PILOT-PM-011	Transfer of Project Management (Pilot)	0	08/31/94
	Glossary of Project Management Terms	0	10/01/94

**Rocky Flats
Environmental Technology Site**

1-V51-COEM-DES-210

**SITE ENGINEERING
PROCESS PROCEDURE**

Revision 5

APPROVED BY:  / G. M. Voorheis / 3/16/2000
Site Chief Engineer / Print Name / Date
Kaiser-Hill Company, LLC

Effective Date: 3/30/2000

CONCURRENCE BY THE FOLLOWING IS DOCUMENTED IN THE PROCEDURE HISTORY FILE:

K-H Closure Projects Integration
K-H Nuclear Operations
K-H Safeguards, Security, Site Operations & Integration
K-H EES&QP
Rocky Flats Closure Site Services
Rocky Mountain Remediation Services
Safe Sites of Colorado
Wackenhut Services LLC

CONTROLLED COPY

USE CATEGORY 3

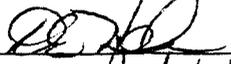
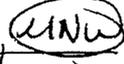
THE PROCEDURE SHALL BE AVAILABLE AT A KNOWN LOCATION FOR REFERENCE

Independent Safety Review: SORC-00-05

Nuclear Safety Review: USQD-RFP-00.0864-WGH

The following have been incorporated into this revision:

Reviewed for Classification/UCNI:

By:  

Periodic review frequency: 4 years from the effective date.

Date: 3/16/2000

PADC-2000-03087

This page intentionally left blank

LIST OF EFFECTIVE PAGES

<u>Pages</u>	<u>Effective Date</u>	<u>Pages</u>	<u>Effective Date</u>
1 - 162	03/30/00		

The following DCFs are active for this document:

DCF-5-0

This page intentionally left blank

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
COVER PAGE.....	1
LIST OF EFFECTIVE PAGES	3
TABLE OF CONTENTS.....	5
CHAPTER 1 – SITE ENGINEERING PROCESS PROCEDURE OVERVIEW	7
1.1 Purpose.....	7
1.2 Scope.....	8
1.3 Overview.....	9
1.4 Definitions and Acronyms	11
1.5 Responsibilities.....	21
CHAPTER 2 – PERSONNEL QUALIFICATIONS.....	31
2.1 Purpose.....	31
2.2 Applicability	31
2.3 Instructions.....	31
Appendix 2-1, Engineering Qualification Card	35
Appendix 2-2, Specification Writer Qualification Card	37
CHAPTER 3 – ENGINEERING APPROACH DETERMINATION	39
3.1 Purpose.....	39
3.2 Applicability	39
3.3 Engineering Approach Determination	39
3.4 Instructions.....	44
CHAPTER 4 – ENGINEERING DESIGN PACKAGE.....	45
4.1 Purpose.....	45
4.2 Applicability	45
4.3 Overview.....	46
4.4 Instructions.....	50
Appendix 4-1, Engineering Design Package Template	75
Appendix 4-2, Examples Of Design Documents And Information	81
Appendix 4-3, Review Comment Sheet.....	87
Appendix 4-4, Baseline Document Change Form	89
Appendix 4-5, Engineering Order EDP Cover Sheet	91
CHAPTER 5 – ENGINEERING CHANGE REQUESTS	92
5.1 Purpose.....	93
5.2 Applicability	93
5.3 Type 1 ECR (Administrative Clarification or Corrections).....	94
5.4 Type 2 ECR (Non-Administrative Changes).....	95
5.5 Revisions to ECRs	99
CHAPTER 6 – CALCULATIONS.....	101
6.1 Purpose.....	101
6.2 Applicability	101
6.3 Instructions.....	102
Appendix 6-1, Calculation Template	111
Appendix 6-2, Calculation Cover Sheet	113

CHAPTER 7 – SPECIFICATIONS	1145
7.1 Purpose.....	115
7.2 Applicability	115
7.3 Overview.....	115
7.4 General Instructions	118
7.5 Instructions for Developing Specification(s).....	120
7.6 Instructions for Revising Specification(s)	124
7.7 Instructions for Canceling Specification(s).....	128
Appendix 7-1, Procurement Specifications Template	129
Appendix 7-2, Specification Cover Sheet.....	139
Appendix 7-3, Bill Of Material.....	141
CHAPTER 8 – DRAWINGS.....	143
8.1 Purpose.....	143
8.2 Applicability	143
8.3 Instructions for Creating a New Drawing.....	144
8.4 Instructions for Using the Drawing Excerpt Process.....	146
8.5 Instructions for Revising an Approved or a Master Drawing.....	147
8.6 Redlining a Drawing for Closeout.....	149
8.7 Voiding a Drawing.....	150
Appendix 8-1, Drawing Excerpt Form	151
CHAPTER 9 – SITE DESIGN DOCUMENT CONTROL.....	153
9.1 Purpose.....	153
9.2 Applicability	153
9.3 Instructions.....	154
Appendix 9-1, Site Design Document Control Request Form	155
CHAPTER 10 – SITE ENGINEERING STANDARDS.....	157
10.1 Site Engineering Standards.....	157
CHAPTER 11 – RECORDS.....	159
11.1 Engineering Design Package (EDP) Forms.....	159
11.2 Records Processing Instructions	159
CHAPTER 12 – REFERENCES.....	161

TABLES

Table 1 – Interfacing Disciplines/Programs.....	51
Table 2 – Records Processing	159

FIGURES

Figure 4-1 – Engineering Design Package Content.....	49
Figure 4-2 – Table of Contents Example.....	63

CHAPTER 1 – SITE ENGINEERING PROCESS PROCEDURE OVERVIEW

1.1

Purpose

The purpose of this procedure is to provide instructions for developing and controlling design documents at the Rocky Flats Environmental Technology Site (Site). This procedure describes the Site design control process which ensures design and design changes are defined, controlled, verified, approved, and revised. It also defines the processes for developing and controlling drawings, specifications, calculations and engineering procurements. Design document control and engineering personnel qualifications and requirements are also provided.

1-V51-COEM-DES-210, Revision 5, is a total rewrite superseding Revision 4; therefore, the revision bars have been omitted. Revision 5 includes the requirements previously contained in 1-W56-COEM-AMN-101, *Site Design Document Control (SDDC)* (Ref. 1), 2-C93-COEM-DES-273, *Engineering Standards for Procurement* (Ref. 2), and the engineering portions of Standing Order 63 (SO-63), *Interim Measures for Procurement Specification Application* (Ref. 34).

Any design documents initiated prior to March 31, 2000, may be processed under the requirements of DES-210, Rev. 4, until May 30, 2000. The requirements of AMN-101, Rev.1; DES-273, Rev. 1; and SO-63 may not be used after March 31, 2000.

Any waiver to the above requirements must be granted by the Site Chief Engineer (SCE) in writing.

1.2

Scope

This procedure addresses requisite development and control instructions for various Site engineering products including Engineering Design Packages (EDPs), specifications, drawings, and calculations. Provisions are provided for creating, reviewing, approving, releasing, and redlining as-built design output documents. These documents will be used for Site construction (both design-build and design-bid-build), modification, decontamination and decommissioning (D&D), research and development (R&D), and demolition of Site structures, systems, and components (SSCs).

1-V51-COEM-DES-210 can be used for stand-alone design products or executed in association with MAN-071-IWCP, *Integrated Work Control Program Manual (IWCP)* (Ref. 3).

When designing products intended for use at the Waste Isolation Pilot Plant (WIPP), additional engineering requirements may be necessary according to 1-MAN-008-WM-001, *Transuranic (TRU) Waste Management Manual* (Ref. 4).

1.3

Overview

The Site Engineering Process and the interrelationships of the various design products are described in this procedure. Details of each of these design products such as EDPs, Calculations, Specifications, and Drawings are described in specific chapters.

For certain Site projects it may be decided that the design process should be performed in a phased manner that may include concurrence and approval for each phase. This phased approach helps to ensure that the final design product meets the end user's expectations with minimal redesign.

Typically, these phases are as described below; however, it may be decided to include only certain ones. The typical phases are:

- **Conceptual Design Phase** – The Conceptual Design Phase includes conceptual layout and design with diagrams and/or sketches, logic flow diagrams necessary to define utility-support, and Quality Assurance (QA) Plan. This phase of the design activity will support the activities necessary to transition into the Detailed Design Phase.
- **Detailed Design Phase** – The Detailed Design Phase includes preliminary and final design. During this phase, all design details are finalized, calculations are developed as required, and specifications are developed.
 - **Preliminary Design Phase** – The Preliminary Design Phase includes initial layout, preliminary design drawings, flow diagrams, utility tie-ins, failure rate information, and Startup Test Plan.

- ***Final Design Phase*** – The Final Design Phase represents the expectation that the design is ready for issuance of construction drawings if there are no further changes or comments from the reviewing authority. A Final Design is expected to completely finish a design package. The Final Design Phase utilizes the Preliminary Design which has been prepared for the project as the design basis.

The requirements of this procedure should be followed to the extent necessary to complete the documentation for each phase except for the final design where all requirements of this procedure apply.

For engineering design which is subcontracted in order to complete any of the above, the Statement of Work is completed in accordance with 1-W36-APR-111, *Acquisition Procedure for Requisitioning Commodities and Services* (Ref. 5), and includes all required deliverables and specific required Site reviews and approvals of the deliverables.

Adherence to this procedure is prescribed in MAN-027-SERM, *Site Engineering Requirements Manual* (Ref. 6), which is the requirements manual for the Site Engineering Program. All requirements in the Site Engineering Requirements Manual (SERM) are based on Department of Energy (DOE) Orders and Standards, Federal and State regulations, standard industry codes and practices, and Kaiser-Hill (K-H) requirements.

In Site technical/design development effort, the principles and functions of Integrated Safety Management initiatives must be considered in the planning and conduct of the work. Specifically, the following functions apply:

- 1) Define the scope of work,
- 2) Analyze the hazards,
- 3) Develop and implement hazard controls,
- 4) Perform work within controls, and
- 5) Provide feedback and continuous improvement.

1.4

Definitions and Acronyms

Also see Section 10 of the *MAN-027-SERM* (Ref. 6).

1.4.1 **Definitions**

Activity Screening Form. See *MAN-071-IWCP* (Ref. 3).

Administrative Change. An enhancement to a document that does not change the intended use or purpose. Administrative changes are limited to enhancing legibility, correcting a typographical error, making editorial change, and adding or correcting page counts or page numbering.

As-Built Document. An as-built document is a project document which has had redlines incorporated.

As Low As Reasonably Achievable. See *Rocky Flats Environmental Technology Site Radiological Control Manual* (Ref. 7).

Analysis. 1) The record of how design inputs are translated into the design of structures, systems, and components; 2) the process of defining, investigating, validating, reviewing, and documenting the study or evaluation of the performance of an engineering system or component of the system; or 3) a scientific investigation that quantitatively or qualitatively describes, interprets, explains, or models a process or phenomenon. An analysis may include one or more calculations, as well as interpretation of the results of calculations.

Assumption. A statement or proposition that is taken to be true or representative in the absence of direct confirming data or evidence and that is identified and explained in the analysis.

Authorization Basis. See 1-MAN-018-NSM, *Nuclear Safety Manual* (Ref. 8).

Authorization Project. A construction or decommissioning project authorized by Congress.

Baseline Document Change Form. The Baseline Document Change Form is used to identify controlled documents needing to be changed as a result of design changes (for example, drawings, procedures, Preventive Maintenance Orders, and System Evaluation Reports).

Checking. The determination of technical adequacy and correctness of a design output, completeness of the associated documentation, and compliance with applicable design procedures.

Construction Specifications Institute. The Construction Specifications Institute is a national professional association that provides technical information and products, continuing education, professional conferences, and product shows to enhance communication among all the nonresidential building design and construction industry's disciplines and meet the industry's need for a common system of organizing and presenting construction documents.

Construction Specifications Institute *Manual of Practice.* *Manual of Practice* outlines recommended techniques and a philosophy for preparing, organizing, using, and interpreting construction documents, but it does not contain the technical product or design information needed to develop and produce project specifications. The *Manual of Practice* is intended to serve as a reference document covering a wide range of information needed by those involved in the design or construction process.

Decommissioning. See *1-MAN-018-NSM* (Ref. 8).

Decontamination. See *1-MAN-018-NSM* (Ref. 8).

Decontamination and Decommissioning. See *MAN-071-IWCP* Glossary (Ref. 3).

Demolition. Demolition means removal or destruction of the facility, the salvage of materials (if necessary), the packaging of bulk materials (if necessary), and the turnover of the facility to environmental restoration (if necessary).

Design. The process, analysis, and technical translation of requirements to develop specifications, drawings, design criteria, and component performance requirements involved in the development of new and modified systems, structures, and components, and in support of decontamination and decommissioning activities.

Design Basis. See *1-MAN-018-NSM* (Ref. 8).

Design Change. Changes to an approved design that alters the project technical scope, design basis requirements, or specifications.

Design Check. In-depth determination that the design is technically and administratively correct.

Design Input. Those criteria, parameters, design bases, or other design requirements on which detailed engineering design is based.

Design Output. Drawings, specifications, and other documents that fulfill technical requirements of structures, systems, or components, and computer programs. Design output is drawings, specifications, calculations, and studies.

Design Performance Criteria. The criteria set that addresses such things as structure, system, or component electrical, I&C, civil, structural, nuclear, security, and mechanical requirements (for example, flowrate, pressure, temperature, set points, impedance, duty cycle), required or preferred failure modes, reliability/availability goals, transient response, testability, and separation/independence/diversity requirements.

Design Process. Technical and management processes that commence with identification of design input and lead to and include the issuance of Design Output Documents.

Design Review. The formal review of an existing or proposed design for the purpose of:

- Detection and remedy of design deficiencies which could affect fitness for use and environmental aspects of the product, process, or service, and/or
- Identification of potential improvements of performance, safety, and economic aspects.

Dismantlement. The taking apart and removal of any facility/infrastructure/structure, system, or component during decommissioning.

End-user. The person or group who is responsible for the structure, system, or component upon completion of the activity/project.

Engineering Analysis. An engineering evaluation of an existing, proposed, or postulated condition of a structure, system, and component. An engineering analysis can be used to document, justify, or support project or maintenance activities such as:

- Authorization Basis parameter change,
- Possible approaches for operating strategy,
- Testing results,
- Engineering feasibility or approach for structure, system, or component modification,
- Engineering decisions made during the development of a modification,
- Disposition of Nonconformance Reports.

Engineering Change Request. A process used to revise an approved design package output document.

Engineering Design Package. The final engineering documentation resulting from the design of a structure, system, or component.

Engineering Order EDP Cover Sheet. The form used to document engineering design package approval and to provide specific information to Site Design Document Control regarding control, maintenance, and distribution of the Engineering Design Package.

Functional Criteria. The qualitative requirements that address structures, systems, and components desired and expected functions.

Independent Verification. The act of confirming the technical validity, adequacy, and completeness of a design package in context with the total design by individuals or groups other than those who performed the work prior to approval.

Interface Discipline Review. An evaluation performed outside the originating engineer's discipline verifying that other discipline information is correct.

Job Hazards Analysis. See *MAN-071-IWCP* Glossary (Ref. 3).

Job Hazards Identification Tool. See *MAN-071-IWCP* (Ref. 3)

Lessons Learned. See 1-MAN-017-LLGI-RM, *Site Lessons Learned/Generic Implications Requirements Manual* (Ref. 9).

Natural Phenomena Hazard Performance Category. See Site Engineering Standard SC-206, *Natural Phenomena Hazard Analysis of Structures, Systems, and Components* (Ref. 10).

Peer Review. An independent review of natural phenomena hazard calculations, design, or evaluations performed by a Qualified Peer Reviewer.

Phased Closeout. An engineering design package closed-out in parts (or phases) prior to submitting the Engineering Design Package for final closeout.

Project. A scope of activities with firmly scheduled beginning and end points, specific performance requirements, established costs, and cognizant management, planning, and control elements.

Qualifying Authority. The Responsible Engineering Manager as designated by the Site Chief Engineer in writing documents and approves that Designers, Checkers, Independent Verifiers, Responsible Engineering Managers, Specification Writer, and Specification Checkers meet the qualifications appropriate to the level required to perform their duties.

Redline Document. A redline document is a mark up to a project document during the construction phase which reflects the actual project configuration, but is not yet incorporated into the Master Document.

Responsible Facility Manager. A facility representative responsible for the structures, systems, and components operation for which the Engineering Design Package is applicable.

Safety Class Structures, Systems, and Components. See *1-MAN-018-NSM* (Ref. 8).

Safety Equipment. See *MAN-071-IWCP* (Ref. 3).

Safety-Significant Structures, Systems, and Components. See *1-MAN-018-NSM* (Ref. 8).

Sketch. A noncontrolled drawing used for clarification during design, construction, deactivation and decommissioning, or temporary modification.

Subject-Matter Expert. An individual who satisfies the following criteria:

- Knows the technical requirements of the item/activity.
- Knows the regulatory requirements of the item/activity.
- Knows the quality assurance requirements of the item/activity.
- Is designated in writing by management.

System Category (i.e., SC-1/2, SC-3, SC-4). See *1-MAN-018-NSM* (Ref. 8).

Technical Basis. A justification for the acceptability or suitability of an engineering methodology.

Temporary Modification. See MAN-066-COOP, *Site Conduct of Operations Manual* (Ref. 11), and Section 10 of the *Site MAN-027-SERM* (Ref. 6).

Work Package. See *MAN-071-IWCP* (Ref. 3) Chapters 4 and 5.

1.4.2 Acronyms

A-E	Architect-Engineers
ALARA	As Low As Reasonably Achievable
AB	Authorization Basis
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASF	Activity Screening Form
ASME	American Society of Mechanical Engineers
BDCF	Baseline Document Change Form
BFO	Basis for Operation
BIO	Basis for Interim Operation
BOM	Bill of Material
COOP	Conduct of Operations
CSI	Construction Specifications Institute
D&D	Decontamination and Decommissioning
DOE	Department of Energy
ECR	Engineering Change Request
EDOC	Engineering Documentation
EDP	Engineering Design Package
EO	Engineering Order
EOE	Engineering Operability Evaluation
FSAR	Final Safety Analysis Report
HI	Hydraulics Institute
HVAC	Heating, Ventilating, and Air Conditioning

IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
ISR	Independent Safety Review
IWCP	Integrated Work Control Program
JCO	Justification for Continued Operation
JHA	Job Hazards Analysis
JHIT	Job Hazards Identification Tool
K-H	Kaiser-Hill
LCO	Limiting Condition of Operation
NPH	Natural Phenomena Hazard
NSE	Nuclear Safety Evaluation
NSM	Nuclear Safety Manual
OSR	Operational Safety Requirements
PC	Performance Category
PEMS	Parts and Equipment Management System
PL	Procurement Level
PMO	Preventive Maintenance Order
PMT	Post-Maintenance Test
PR	Purchase Requisition
QA	Quality Assurance
R&D	Research and Development
REM	Responsible Engineering Manager

SAR	Safety Analysis Report
SCE	Site Chief Engineer
SDDC	Site Design Document Control
SER	System Evaluation Report
SERM	Site Engineering Requirements Manual
SME	Subject-Matter Expert
SO	System Operability
SSC	Structure, System, or Component
TM	Temporary Modification
TSR	Technical Safety Requirement
USQD	Unreviewed Safety Question Determination
USQ	Unreviewed Safety Question
WCF	Work Control Form
WIPP	Waste Isolation Pilot Plant

1.5

Responsibilities

This section includes responsibilities for engineering design and other engineering products. Most responsibilities are listed under General Responsibilities. Additional responsibilities for specific tasks are listed under sections entitled Calculations, Specifications, Engineering Procurement and Drawings.

1.5.1 **Designer**

1.5.1.1 *Designer (General)*

Determines the Safety Classifications for affected SSC.

Performs a search for drawings related to the proposed activity/project.

Performs walkdown(s) to ensure the technical scope is accurate.

Performs walkdown(s) with craft, support personnel, and end user to ensure minimum changes are made to meet activity/project requirements.

Notifies appropriate building personnel when a design affects a building surveillance or other building functions.

Obtains input from appropriate end-user and sponsor organization (for example, operations personnel) during initial design development to ensure factors have been identified that may affect the design parameters.

Prepares the appropriate Design Output Documents such as the following:

- Design Analysis
- Calculations, as necessary to the design,
- Construction Component and System Operability Tests,
- Design Specifications,
- Drawings,
- Bills of Material (BOM),
- Procurement Specifications,
- Testing and Inspection Plans, and/or
- Post-Maintenance Tests (PMTs).

For EDP review:

- Ensures that the required and appropriate technical disciplines and end-users are involved in reviews of the package,
- Submits for review, copies of the EDP with an attached Review Comment Sheet,
- Prepares disposition of reviewer's comments on Review Comment Sheet(s),
- Resolves comments with reviewer, and
- Obtains reviewer's concurrence on the Review Comment Sheet(s).

Ensures all applicable package forms are complete including all approval signatures on applicable DES-210 forms.

Ensures completed and approved *original* packages are submitted to Site Design Document Control (SDDC).

Determines need to procure an engineered item.

Gathers existing or develops new documentation, such as drawings, specifications, and BOM, that will ensure the correct engineered items or engineering design-related services are procured.

Makes assignment of Procurement Level (PL) to engineered items and engineering design-related services in accordance with *1-W36-APR-111*, (Ref. 5). Obtains input from the Customer Service Organization for purchase of closure commodities in accordance with PRO-492-CCP-001, *Closure Commodity Procurement* (Ref. 12).

Ensures that the QA and quality control attributes are applied in accordance with PRO-572-PQR-001, *Procurement Quality Assurance Requirements* (Ref. 13).

Reviews Purchase Requisition (PR) and attachments for technical adequacy against the design prior to PR being submitted to procurement.

Ensures that revisions to specifications, drawings, and BOM are submitted to Procurement with a revised PR.

Assists in resolving nonconforming items and conditions found during receipt, certification, and inspection.

Generates Master Agreement Order/Receiving Forms for items to be purchased through Master Agreement subcontracts in accordance with procedure 1-PRO-453, *Master Agreement Subcontract Procurement* (Ref. 14).

Does **not** also function as the Design Checker, Independent Verifier, or Responsible Engineering Manager (REM) for the drawings, specifications, or any element of an EDP for which he/she is the Designer.

1.5.1.2 Designer (Calculations)

Determines need for calculation.

Prepares and completes the calculation package using applicable codes and standards.

Initiates calculation revisions when required.

1.5.1.3 Designer (Specifications)

Acts as the Subject-Matter Expert (SME) for EDP specifications.

Writes or assigns a writer for the specification(s).

Approves and signs the specification(s) Cover Sheet.

Initiates specification(s) revisions, when required.

1.5.1.4 Designer (Drawings)

Ensures that drawing requirements set forth in Site Engineering Standard SX-300, *General Drafting Standard* (Ref. 15) are met.

Provides correct information for drawing title blocks.

Ensures that a drawing is checked by a qualified Checker.

Obtains approval signatures for drawings in accordance with *SX-300* (Ref. 15).

Submits drawings to SDDC.

1.5.2 Checker

1.5.2.1 Checker (General)

Performs an independent technical check of design documents in the EDP to verify that:

- Documents are administratively correct.
- Controlled drawings included in the package meet the requirements of *SX-300* (Ref. 15) to avoid issuance delays.
- Documents are technically adequate.
- The assigned Safety Classifications are correct.
- Design assumptions are realistic.
- Supporting design decisions are adequate.
- Methods and approach for the design are appropriate.

- References are provided.
- Proper design inputs and construction techniques are used.
- Appropriate codes and standards are used.
- As Low As Reasonably Achievable (ALARA) considerations have been incorporated.
- Checks accuracy of the calculation and design.

Signs all checked documents after comments have been resolved.

Does **not** also function as the Designer or REM but, if appropriately qualified and meets the requirement of independence, may serve as Independent Verifier for an EDP and Type 2 ECRs for which he/shé is the Checker.

1.5.2.2 Checker (Calculations)

Checks the technical and administrative accuracy of the calculation package.

Checks to ensure that the technical content, use of design inputs, assumptions, and specificity are correct and support the conclusions reached by the calculation.

Checks calculation revisions when required.

Signs Calculation Cover Sheet.

Does **not** also function as the Designer or Peer Reviewer for the same Calculation.

1.5.2.3 Checker (Specifications)

Checks the technical content, format, assumptions, and specificity to assure the specification is correct.

Signs the Specification Cover Sheet.

Does **not** also function as the Designer or Specification Writer.

1.5.2.4 Checker (Drawings)

Checks the drawing for technical and administrative accuracy.

Signs the drawing title block.

1.5.3 Responsible Engineering Manager (REM)

1.5.3.1 REM (General)

Ensures engineering personnel are qualified for their roles in accordance with the Engineering Qualification Card and the Specification Writer Qualification Card.

Determines the EDP approach to be applied as it relates to General Modification work or project work.

Selects a qualified Designer, Checker, and Independent Verifier.

Ensures disposition of unresolved review comments.

Ensures policies, procedures, and Site Engineering Standards are followed.

Ensures administrative and technical reviews are accomplished by qualified individuals and comment disposition is acceptable.

Ensures that the review and approval of completed design/excerpt drawing(s) is/are conducted in accordance with Chapter 8, and the *SX-300* (Ref. 15).

Ensures as-built master drawing(s) is/are completed to reflect actual closeout conditions of the activity/project.

For projects, the REM may delegate the following responsibilities to an appropriately qualified Designer who will be designated as a Project Engineer:

- Participates in the earliest possible scoping and planning of the project.
- Makes recommendations to the Project Manager or Project Team in the scoping and planning of the project, especially those recommendations related to the design aspects of the project.
- Interfaces with the Project Manager of the affected project and communicates all requirements of the project to the design team (if any).
- Reviews the requirements of the design with the design team and ensures that the appropriate level of detail and documentation is agreed on for the type of project.
- Provides all engineering information to the Project Manager as necessary. This includes scoping, budgetary needs, schedules, progress, problems, or delays.
- Participates in the selection of the subcontractor from a technical standpoint, if any engineering for the project is subcontracted.
- May act as technical support for administration of subcontracted technical issues.
- Approves design outputs.
- Coordinates the design interfaces and ensures that the completed project design meets the final design requirements of the project, if there is more than one Designer involved.
- Ensures the design package(s) is/are developed, reviewed, documented, approved, and changed in accordance with the requirements of this procedure.

Does **not** also function as the Checker or Independent Verifier for the same EDP for which he/she is the REM.

1.5.3.2 REM (Calculations)

Determines the need for a calculation in conjunction with the Designer.

Assigns a Checker and a Peer Reviewer, if required, to check and verify original calculations and revisions, as required.

Approves the calculation on the Calculation Cover Sheet.

1.5.3.3 REM (Specifications)

Determines the need for a specification with the SME and/or Designer.

Assigns a Checker to check specifications and revisions to specifications.

Approves the specifications contained in an EDP.

1.5.3.4 REM (Drawings)

Ensures that the review and approval of completed design/excerpt drawings is conducted in accordance with the requirements in this procedure.

Signs approval on drawing title block.

1.5.4 SDDC

Processes the Design Output Documents.

Maintains control of Design Output Documents in accordance with this procedure.

1.5.5 Peer Reviewer (Calculations)

Verifies all Natural Phenomena Hazard (NPH) Performance Category (PC) 2 and 3 calculations.

Verifies that the technical content, use of design inputs, assumptions, and specificity are correct and support the conclusions reached by the calculation.

NOTE *For NPH verifications, the peer review is to be performed by qualified personnel. The Peer Reviewer must not have been involved in the original design or evaluation. If the Peer Reviewer is from the same company/organization as the Preparer, he must not be part of the same activity where he could be influenced by cost and schedule considerations. Individuals performing Peer Review must be degreed civil/mechanical engineers with 5 or more years of experience in NPH evaluations.*

Does **not** also function as the Designer or Checker for the same Calculation.

1.5.6 Customer Service Organization (Specifications)

Signs Procurement Specification Cover Sheet, if applicable, in accordance with PRO-492-CCP-001, *Closure Commodity Procurement* (Ref. 12).

1.5.7 Specification Writer (Specifications)

Writes or revises specifications at the request of the SME or Designer.

1.5.8 SME (Specifications)

Ensures that the Procurement Specification is written.

Approves and signs the Specification Cover Sheet.

1.5.9 Engineering Drafting/Computer Aided Drafting Design (Drawings)

Completes a drawing using the standards set forth in *SX-300* (Ref. 15).

Converts drawings to as-built master drawings, if requested.

1.5.10 Responsible Facility Manager

Signs Engineering Order EDP Cover Sheet.

Signs Calculation Cover Sheet, if applicable.

Signs the drawing title block.

1.5.11 Independent Verifier

Verifies the checked document or process prior to REM approval.

Determines that sound engineering/scientific principles and appropriate standards were used.

Determines applicable requirements and design bases were incorporated.

Verifies construction/assembly techniques to implement the design.

Does **not** also function as the Designer or REM but, if appropriately qualified, may serve as Checker for the drawings, specifications, or any element of an EDP for which he/she is the Independent Verifier.

1.5.12 Site Chief Engineer (SCE)

Establishes required qualifications and maintains qualification file for Designer, Checker, Independent Verifier, Peer Reviewer, REM, and Specification Writer.

Determines the need for and approves Site Standard Specification, Site Standard Drawings, and Site Engineering Standards.

1.5.13 Engineering Procurement Responsibilities

The responsibilities in this section are to be performed by the project company which is responsible for the engineering design of the item or service to be procured. See Chapter 4 and *1-W36-APR-111* (Ref. 5) for further information.

CHAPTER 2 – PERSONNEL QUALIFICATIONS

2.1 Purpose

This chapter presents the specific qualification requirements for the major performers involved in Engineering Design Package (EDP) and specification development.

2.2 Applicability

This qualification process applies to anyone performing engineering work on the Rocky Flats Environmental Technology Site (Site), including all subcontract engineers.

2.3 Instructions

Qualifying Authorities

- [1] Implement the *Engineering Qualification Card*, Appendix 2-1, and the *Specification Writer Qualification Card*, Appendix 2-2 to document qualifications for personnel in their appropriate roles.

The required level of working knowledge for the procedures specified on the qualification card is left to the discretion of the Qualifying Authority and should be appropriate to the level required for the engineer's duties. The Engineering Qualification Card and Specification Writer Qualification Card specify minimum requirements; thus, the Qualifying Authority as designated in writing by the Site Chief Engineer (SCE) may specify an additional level of knowledge required for their area of responsibility. The Qualifying Authority's signature is required on the Qualification Card.

It is the responsibility of the Qualifying Authority to satisfy him/herself that an individual possesses the required level of knowledge for any new scope of work.

The Qualifying Authority shall retain and maintain completed Qualification Cards in accordance with Chapter 11, *Records*. A copy should be forwarded to the Kaiser-Hill (K-H) SCE.

The qualification requirements are specified below and in Appendices 2-1 and 2-2.

[A] Designer

Possesses, as a minimum, 4 years engineering experience in the working engineering discipline, or possess a 4-year Bachelor of Science degree in Engineering/Science that is related to the working discipline.

Demonstrates a working knowledge of Site infrastructure programs, procedures, standards, and processes relevant to the position.

Demonstrates familiarity with the Site processes to acquire drawings and specifications.

Demonstrates familiarity with any recent design- and procurement-related lessons learned and the process to obtain lessons learned information.

Possesses approval by the cognizant Qualifying Authority to perform tasks consistent with the individual's qualifications and experience.

The Designer function may be performed by personnel with Checker or Responsible Engineering Manager (REM) qualifications.

[B] Checker

Qualified as a Designer.

Possesses, as a minimum, a 4-year Bachelor of Science degree in Engineering or a related Science degree, preferably a Professional Engineer, or possesses a minimum of 4 years engineering-related experience within the applicable working discipline as classified and verified by Human Resources.

Possesses approval by the cognizant Qualifying Authority to perform tasks consistent with the individual's qualifications and experience.

[C] Independent Verifier

Qualified as a Designer.

Has no current or prior technical authority or responsibility for the work being verified.

Possesses approval by the cognizant Qualifying Authority to perform tasks consistent with the individual's qualifications and experience.

[D] REM

Qualified as a Designer.

Possesses a minimum of 8 years engineering experience, with 4 years minimum as nuclear-related. Exemption is possible from the 4 years nuclear-related engineering experience requirement as defined by MAN-094-TUM, *Training Users Manual* (Ref. 16) if approved by the Qualifying Authority. Job related experience may be substituted for the required education on a case-by-case basis as authorized by the cognizant Qualifying Authority.

Possesses approval by the cognizant Qualifying Authority, and the company's Human Resources department to perform tasks consistent with the individual's qualifications and experience.

[E] Peer Reviewer

Qualified as a Designer.

Possesses a degree in civil/mechanical engineering.

Possesses 5 years or more experience in Natural Phenomena Hazard (NPH) evaluation or qualified by the REM.

[F] Specification Writer

Possesses as a minimum, 1 year of engineering, architectural, construction management, project management, or procurement experience including experience in writing specifications.

Demonstrates a working knowledge of Site infrastructure programs, procedures, standards, and processes relevant to the specification writer position and is familiar with specifications role in the Site procurement process.

Familiar with the purpose of, and basic reference processes for, Site drawings and specifications.

Familiar with any recent specifications- and procurement-related lessons learned and the process to obtain lessons learned information.

Possesses background and experience as a specification writer as classified and authorized by the cognizant Qualifying Authority.

APPENDIX 2-1
Page 1 of 2
ENGINEERING QUALIFICATION CARD

Employee Name _____	
Employee Number _____	
Note (1): Experience that is job related may be substituted for the required education on a case-by-case basis as authorized by the Qualifying Authority.	
Note (2): The required level of working knowledge for the specified procedures is left to the discretion of the Qualifying Authority and should be appropriate to the level required for the Engineer's duties.	
I. Designer	Signature/Date
A. Prerequisites:	
1. 4 Years Engineering Experience in discipline	_____
OR	
2. 4 Year Degree in Engineering/Science (BS)	_____
B. Demonstrate a working knowledge of the following:	
1. MAN-027-SERM, Site Engineering Requirements Manual	_____
2. 1-V51-COEM-DES 210, Site Engineering Process Procedure	_____
3. 1-W36-APR-111, Acquisition Procedure for Requisitioning Commodities and Services	_____
4. PRO-572-PQR-001, Procedure Quality Assurance Requirements	_____
5. 1-W59-COEM-AMN-161, Preparation, Review, and Approval of System Evaluation Reports	_____
6. MAN-071-IWCP, Integrated Work Control Program Manual	_____
7. MAN-066-COOP, Conduct of Operations Manual	_____
8. Site Engineering Standards	_____
9. CSI Specifications format	_____
10. 1-PRO-072-001, Inspection and Acceptance Test Process	_____
C. Discuss how to find and reference:	
1. Site Standard Drawings	_____
2. Site Standard Specifications	_____
3. Standard CSI Specifications	_____
D. Discuss Recent Design and Procurement Lessons Learned and the process to obtain lessons learned information, with Qualifying Authority.	_____
E. Eligible for Designer based upon background and experience	_____
F. Qualified as Designer within the following disciplines:	_____
	Qualifying Authority

APPENDIX 2-1
Page 2 of 2
ENGINEERING QUALIFICATION CARD

Employee Name _____	
Employee Number _____	
II. Checker	Signature/Date
A. Qualified as Designer	_____
B. Qualified as Checker within the following disciplines: _____	Qualifying Authority: _____
III. Independent Verifier	
A. Qualified as Designer.	_____
B. Qualified as Independent Verifier within the following disciplines: _____	Qualifying Authority _____
IV. Peer Reviewer	
A. Qualified as Designer.	_____
B. Possess a degree in civil/mechanical engineering.	_____
C. Possess 5 or more years of experience in Natural Phenomena Hazard evaluation.	_____
OR	
D. Qualified by the Responsible Engineering Manager.	Qualifying Authority _____
V. Responsible Engineering Manager	
A. Qualified as Designer.	_____
B. Minimum 8 years Engineering experience	_____
C. 4 years nuclear-related engineering experience (may be waived by Qualifying Authority)	_____
D. Eligible for Responsible Manager based upon background and experience	_____
E. Qualified as Responsible Engineering Manager	Qualifying Authority _____
* Copy of completed qualification card is to be sent to K-H Site Chief Engineer.	

APPENDIX 2-2
Page 1 of 2
SPECIFICATION WRITER QUALIFICATION CARD

Employee Name _____
Employee Number _____

Note: The required level of working knowledge for the specified procedures is left to the discretion of the Qualifying Authority and should be appropriate to the level required for the Specification Writer's duties.

A. Prerequisites:

Signature/Date

1. One year of either engineering, architectural, construction management, project management or procurement experience which included experience writing specifications

Qualifying Authority

B. Demonstrate a working knowledge of the following:

1. 1-V51-COEM-DES-210, Site Engineering Process Procedure, Chapters 7 and 8
2. 1-W36-APR-111, Acquisition Procedure for Requisitioning Commodities and Services
3. PRO-572-PQR-001, Procedure Quality Assurance Requirements
4. MAN-071-IWCP, Integrated Work Control Program Manual (BOM/Specifications Sections)
5. CSI Manual of Practice

Qualifying Authority
(Each Item)

C. Discuss how specifications fit into the current Site procurement process

Qualifying Authority

APPENDIX 2-2
Page 2 of 2
SPECIFICATION WRITER QUALIFICATION CARD

Employee Name _____
Employee Number _____

D. Discuss the purpose of, and how to find and reference the following items:

1. Site Standard Drawings
2. Site Standard Specifications
3. Standard CSI Specifications
4. Item Specifications
5. Procurement Specifications
6. Receipt Inspection Requirements
7. Subject-Matter Experts for procurement specifications
8. MasterSpec Specifications
9. Source Inspection

Signature/Date

Qualifying Authority
(Each Item)

E. Discuss Recent Specification and Procurement Lessons Learned, and the process to obtain Lessons Learned information with Qualifying Authority

Qualifying Authority

F. Qualified as Specification Writer based on background and experience*

Qualifying Authority

G. Restrictions as listed below: (i.e., procurement only; construction only, etc.)

Qualifying Authority

* Copy of completed qualification card is to be sent to K-H Site Chief Engineer.

CHAPTER 3 – ENGINEERING APPROACH DETERMINATION

3.1 **Purpose**

This chapter presents the criteria and guidance for selecting the appropriate engineering approach for the engineering task at hand. The engineering documents include Engineering Design Packages (EDPs), specifications, engineering procurement methods, calculations, engineering analyses, and drawings.

3.2 **Applicability**

This chapter applies to all engineering work performed for the Rocky Flats Environmental Technology Site (Site) including that done by Architect-Engineers (A-E) and subcontractors.

3.3 **Engineering Approach Determination**

The following sections will assist in determining when an EDP is required or whether stand-alone elements of the EDP process, such as calculations, design analysis, specifications, and drawings provide sufficient design input and documentation.

3.3.1 **Engineering Design Package (EDP)**

- A. According to Chapter 4, *Engineering Design Package*, an EDP is required when the activity is not on the list of exempt activities (see Section B below), and involves new design and changes to existing Site structures, systems, or components (SSCs), that:
- 1) Alters the technical/design basis as described in Site or Building Authorization Basis (AB) documents as defined by the *I-MAN-018-NSM* (Ref. 8), or
 - 2) Alters any existing Site controlled design document including drawings, calculations, and specifications, or

- 3) Requires generation of a new Site controlled design document in order to affect the structure, system or component (SSC) installation(s), or change(s), or
 - 4) Involves temporary modifications (TMs) as controlled under *MAN-066-COOP* (Ref. 11).
- B. An EDP is not required for the following items/activities, unless a master drawing is changed. These activities may be accomplished through the *MAN-071-IWCP* (Ref. 3) Type 1 process:
- Signage smaller than 6 feet by 8 feet
 - Sidewalks in non-contaminated soils
 - Painting/stenciling
 - Lawn sprinkler system
 - Installation of Tuff Sheds or equivalent with or without pads
 - Concrete pads intended to support loads less than 50 pounds per square foot in non-contaminated soils
 - Movement of 120-volt circuits protected by existing circuit breakers (increase or decrease in power load is not allowed without design)
 - Brackets and attachment devices for hanging items weighing less than 50 pounds
 - Non-security fences
 - Machinery/equipment guards and attachment devices
 - Road improvements, asphalt repairs, drainage improvements in non-contaminated soils
 - Office partitions and associated utilities installation in office and industrial facilities
 - Concrete curbing, drainage in non-contaminated soils
 - Non-contaminated trailer removal and relocation
 - Adding air conditioners to offices, conference rooms

3.3.2 Calculations (Including Engineering Analysis)

A calculation is used to confirm or substantiate engineering decisions based on equations, references, inputs, assumptions, and conclusions. It is a stand-alone document and may be developed in conjunction with an EDP.

An engineering analysis is used to evaluate an existing, proposed, or postulated condition where scientific investigation is applied that quantitatively describes, interprets, explains, or models a system, process, or phenomenon.

Develop calculations in accordance with Chapter 6, *Calculations*.

Independent design analysis is developed in accordance with Chapter 6, *Calculations*. Design analysis developed in accordance with an EDP follow the requirements of Chapter 4, section entitled, *Design Analysis and Calculations*.

3.3.2 Specifications

A specification is used to provide specific detail regarding types of equipment, materials, safety, instructions for performing work, or services. In addition, a specification is one method available to provide details for procurement of an item. A specification is a stand-alone document which may be developed in conjunction with an EDP.

Types of specifications are:

- EDP Specification
- Site Standard Specification
- Procurement Specification

Develop a specification in accordance with Chapter 7, *Specifications*.

743

3.3.3 Drawings

A drawing is used to prepare a graphical representation of the physical or diagrammatic configuration of SSCs. A drawing is a stand-alone document which may be developed in conjunction with an EDP. Develop a drawing in accordance with *SX-300* (Ref. 15) and Chapter 8, *Drawings*.

3.3.4 Engineering Procurement

Engineering procurement is the activity used to purchase items and design-related services for an EDP. Engineering procurement of design-related services is limited to services purchased in conjunction with an item. For instance, services to install and balance a new heating, ventilating, and air conditioning (HVAC) system would be an engineering design-related service. A service to balance an existing HVAC system would be purchased through another procurement process such as a Statement of Work. The determination must be made early in the EDP development whether Engineering procurement:

- Will be delineated as part of project specification,
- OR**
- Will be developed as a stand-alone procurement specification.

Engineering procurement must adhere to the requirements in this procedure as well as the following Site procedures:

- 1-W36-APR-111, *Acquisition Procedure for Requisitioning Commodities and Services* (Ref. 5)

This procedure provides direction for requisitioning commodities and services (including construction) at the Site. The requirements in this procedure apply to all Site personnel when requisitioning commodities and services.

This procedure applies to the quality-related aspects of procurements designated Procurement Levels (PL) 1, 2, 3 and C. It establishes the responsibilities for applying procurement quality assurance (QA) requirements to subcontractors to ensure procured items and services meet specified needs. The definition of PLs is provided in this procedure.

- MAN-071-IWCP, *Integrated Work Control Program (IWCP) Manual* (Ref. 3)

This procedure details the work process and controls required to do work at the Site.

- 4-J44-RC&I-6600, *Procured Item Acceptance and Certification* (Ref. 17)

This procedure describes the engineering activities, responsibilities, and documentation necessary for processing deficiencies which are identified and documented as nonconforming items found during receipt, certification, and inspection.

- 1-PRO-572-PQR-001, *Procurement Quality Assurance Requirements*.

This procedure establishes the responsibilities for applying procurement quality assurance requirements to subcontractors. The definitions of PL-1, -2, -C, and -3 are provided in 1-W36-APR-111. This procedure also provides the requirements for qualifying QA review personnel.

3.4

Instructions

Responsible Engineering Manager (REM)

[1] Select the appropriate engineering approach based on the engineering task.

- Engineering Design Package Chapter 4
- Calculations Chapter 6
- Specifications Chapter 7
- Drawings Chapter 8

NOTE *The EDP may include any or all of the above documents.
Calculations, Specifications, or Drawings may be stand-alone documents.*

[2] For Project Packages, select and assign qualified Designer(s) in conjunction with the REM in the appropriate discipline to initiate, define, and complete the engineering solution.

REM

[3] For General Modification work, select and assign the qualified Designer(s) in the appropriate discipline to initiate, define, and complete the engineering solution.

CHAPTER 4 – ENGINEERING DESIGN PACKAGE

4.1

Purpose

This chapter specifies the requirements and instructions for developing an Engineering Design Package (EDP) for both General Modification Work and Project Work. The phases of the EDP development are as follows:

1. Design Inputs Identification
2. Design Analysis and Calculations
3. Design Output Document Development
4. Procurement of EDP Items Prior to EDP Approval
5. EDP Check
6. Independent Verification
7. EDP Review
8. EDP Approval
9. EDP Release
10. Procurement of EDP Items Using Master Agreement Subcontract Procurement Process
11. Procurement of EDP Items
12. Redlined Documents and Drawings
13. EDP Closeout and Cancellation
14. Lessons Learned

This chapter also discusses the treatment of the following activities as related to EDP development and use:

1. Temporary Modifications (TM)
2. Engineering Analysis for Long Term Abandonment or Significant Delay of a Project/Activity or Process

4.2 **Applicability**

This chapter applies to all engineering activities performed for the Rocky Flats Environmental Technology Site (Site) including that by Architectural-Engineering (A-E) and subcontractors. This includes all structures, systems, or components (SSCs) modifications, except for software. If software is modified, see the requirements in 1-MAN-004-CSMM, *Computer Software Management Manual* (Ref. 18).

4.3 **Overview**

The EDP may be used for both Site project work and General Modification work. The EDP Template is required and is the primary tool to document the contents of the EDP package. The *EDP Template* provided in Appendix 4-1 includes examples that should be considered by the Designer.

4.3.1 **General Discussion of EDP Uses**

The EDP is used for General Modification work and project work described below. The Responsible Engineering Manager (REM) prescribes the type of approach that should be taken by the Designer for EDP development.

(A) EDP for General Modification Work

General Modification work includes modifications in support of routine maintenance and operations, including TMs and decontamination and decommissioning (D&D). General Modification work is generally smaller in scale than Project level modification work. The Designer applies the Activity Screening Form (ASF) and Job Hazards Identification Tool (JHIT) in accordance with the Integrated Work Control Program (IWCP) process to assist with design development. The Designer is the key individual in the management of the EDP through the development and approval process.

48

(B) EDP for Project Work

A Project can be described as a work activity which may involve multiple organizations.

SSC projects at the Site may include Research and Development (R&D) modification activities, new construction, procurement of new equipment under the capital equipment program, and may include D&D. R&D may include development and fabrication of devices to be used as tooling for the D&D effort.

The EDP provides a complete package for both General Modification Work or Project Work and may include input from multiple discipline(s).

4.3.2 General Design Requirements

Design considerations that apply to both General Modification Work Packages and Project Work Packages are:

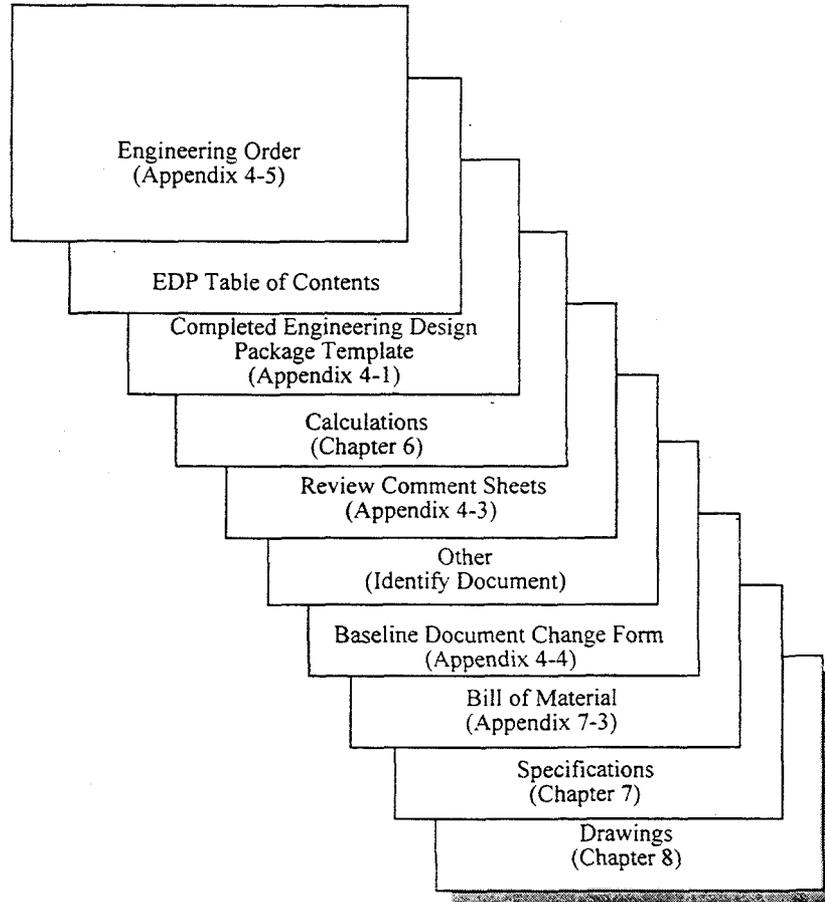
- The design may be subcontracted or developed by a Site engineering group. If developed by a subcontractor, the appropriate REM shall verify that the appropriate Site management approvals have been obtained.
- Modifications to existing SSCs, D&D, and the design of new nuclear SSCs will incorporate As Low As Reasonably Achievable (ALARA) features in accordance with the *Site Radiological Control Manual* (Ref. 7) and *Radiological Safety Practices (RSP) 08.02* (Ref. 19).

- Design of a new explosives facility and modification to an existing explosives facility, such as the Site security force munitions storage building, must conform to the safety requirements established in Department of Energy (DOE) M 440.1-1, *DOE Explosives Safety Manual* (Ref. 20).
 - Facility structural design must comply with the following:
 - a. TM5-1300, *Structures to Resist the Effects of Accidental Explosions* (Ref. 21)
 - b. DOE/TIC-11268, *Matrix for a Manual for the Prediction of Blast and Fragment Loading of Structures* (Ref. 22)
TM5-1300 requires that blast-resistant design for personnel and facility protection be based on the TNT equivalency increased by 20 percent of the maximum quantity of explosives and propellants permitted.
- The requirements of Natural Phenomena Hazards (NPH) must be considered in all designs. *SC-206* (Ref. 10) gives guidance and requirements of NPH.

4.3.3 EDP Content

The completed EDP will be comprised of the documents shown in Figure 4-1 below:

Figure 4-1 – Engineering Design Package Content



4.4

Instructions

4.4.1 **Design Inputs Identification**

This task results in the systematic identification of the scope, functional requirements, system parameters, regulations, codes and standards, or other design requirements that govern the scope and bases of an EDP. Appendix 4-2, *Examples of Design Documents and Information*, contains a listing of design input examples.

Designer

- [1] Ensure an ASF and JHIT are completed, in accordance with *MAN-071-IWCP* (Ref. 3), and document on the EDP Template. This includes the development of, and the contribution from, a Planning Team, in accordance with the IWCP.
- [2] Initiate the *EDP Template* (Appendix 4-1).

NOTE Use *N/A* in *Template* section(s) which do not apply. The *EDP Template* consists of 10 Sections. It also includes numerous examples. It is not necessary to use *N/A* for examples.

- [A] Specify Work Control Form (WCF) Number/Authorization Project Number.
- [B] Specify Design Activity Title.
- [C] Specify Design Activity Description and Scope.
- [D] Specify Design Objective(s) including:
 - Reasons the design is necessary, and
 - Accomplishments of the design.

[3] Identify Design Input.

[A] Must consider the Authorization Basis (AB), activity characterization, and the other sources and criteria identified in Steps [3] through [12] below to determine the safety functions (for example, safety equipment) involved in the design such that appropriate design controls and features are applied.

Safety classification, if needed, will be determined by the Designer as part of the process, for example, in support of Procurement Level (PL) determination.

[B] Determine appropriate interfacing disciplines/programs required to support identification of applicable design inputs and the preparation of the EDP. Consider ASF, JHIT, Table 1, and the ALARA Design Review Screen for interface during design. The following table lists examples of interfacing disciplines/programs to consider.

Table 1 – Interfacing Disciplines/Programs

INTERFACING DISCIPLINES/PROGRAMS	
<ul style="list-style-type: none"> • Architectural • Chemical Engineering • Civil Engineering • Construction Engineering • Criticality Safety • Ecology and Watershed Sciences • Electrical Engineering • Environmental Engineering/Science • Environmental Protection • Ergonomics 	<ul style="list-style-type: none"> • Fire Protection Engineering • Heating, Ventilating and Air Conditioning (HVAC) • Industrial Health & Safety • Instrumentation and Controls • Mechanical Engineering • Nuclear Safety • Radiological Engineering/ALARA • Safeguards and Security • Structural and Stress Mechanics • Surveying

- [4] Indicate all necessary interfacing disciplines in Section 6.1 of the *EDP Template* (Appendix 4-1).
- [5] Design input from Radiological Engineering is required when the answer to any of the following questions is *yes*:

ALARA DESIGN REVIEW SCREEN
Is the proposed work for new installation, modification, relocation, or removal of:
1. A radioactively contaminated or potentially radioactively contaminated system or piece of equipment?
2. A radioactive or potentially radioactive material processing line?
3. Permanent radiation shielding?
4. Major structures or equipment for radioactive material storage?
5. Major structures, walls, or equipment inside radiological areas?
6. Other engineering changes of radiological significance?

- [6] Indicate in the *EDP Template*, Section 6.2, the questions which were answered *yes*.
- [7] Identify and document all applicable Functional Criteria in the *EDP Template*. Consideration should be given to the following in addition to any others that are applicable:
- User system/process functional performance criteria/expectations
 - Technical requirements
 - Interlocks/protection
 - Interfacing systems/functions requirements
 - Operational requirements
 - Interface requirements
 - Bypass indications

- Post-event accessibility
- System support requirements
- Maintainability requirements
- Reliability requirements
- Constructability considerations
- ALARA considerations
- Health, Safety & Environment requirements
- Lessons Learned input
- D&D requirements

[8] Identify all applicable Design Performance Criteria and document in the EDP Template. Consideration should be given to the following functional performance criteria in addition to others that may be applicable:

- SSC electrical, I&C, civil, structural, nuclear, and mechanical requirements (for example, flowrate, pressure, temperature, set points, impedance, duty cycle)
- Required or preferred failure modes
- Reliability/availability goals
- Transient response
- Testability
- Separation/independence/diversity requirements
- Normal service environment
- Loss of HVAC
- Site hazards [seismic, tornado, missile, flood freeze, lightning] in accordance with *SC-206* (Ref. 10)
- Fire/Safe shutdown
- Vibration

[9] Identify all applicable Design Standards including standard title and number, and document in the EDP Template. Examples for consideration include:

- Site Engineering Standards
- American Society of Mechanical Engineers (ASME)
- American National Standards Institute (ANSI)
- American Society of Civil Engineers (ASCE)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Concrete Institute (ACI)
- American Institute of Steel Construction (AISC)
- Hydraulics Institute (HI)
- Instrument Society of America (ISA)
- Standards from DOE Orders, commitments, etc.

[10] Identify all applicable design related drawings and reference drawings, and document in the EDP Template. This process must be completed even for strip-outs and demolitions to identify drawings that can be eliminated from the databases.

Review master drawings, current redline drawings and open Engineering Change Requests (ECRs) which may or will affect the design products to identify interactions between jobs and documents to be utilized. The extent of this review should be consistent with the complexity of the activities and significance of the JHIT and ASF results.

NOTE *For a D&D project, obtain a list of all affected master drawings from Site Design Document Control (SDDC) and document those master drawings on the Baseline Document Change Form (BDCF) and check box marked void at Closeout.*

[11] Identify all applicable AB and AB-related documents and requirements and document in the EDP Template. Documents for consideration include those listed on the:

- Documents listed on the Authorization Basis Document List (ABDL), and
- System Evaluation Report (SER)

- [12] Perform a walkdown to ensure clear understanding of the technical scope and constructability issues, utilizing necessary craft, planning, safety, and operations personnel (reference ASF/JHIT organizations). The extent of the walkdown will be limited by ALARA considerations. Document the pertinent Walkdown Results/Conclusions in the EDP Template.
- [A] Based on walkdown results, revise outputs from Steps [2]-[12], as necessary.

4.4.2 Design Analysis

Designer

- [1] Perform the design analysis, if not included with calculations developed in accordance with Chapter 6.
- [2] If design analysis was developed in accordance with the requirements of Chapter 6, include the completed and approved Calculation Template and Cover Sheet.
- [3] If the Design Analysis was not documented in accordance with Chapter 6, document in the EDP Template specifying the following:
 - [A] Purpose - Provide a statement of the purpose of the analysis or model. It shall identify any constraints or limitations associated with the analysis or model.
 - [B] Computer Software and Model Usage - Computer programs used in the design process shall be used in accordance with *I-MAN-004-CSMM* (Ref. 18).

- [C] Inputs - Inputs and their sources shall be identified and documented. Data must be identified in a manner that facilitates traceability to associated documentation and its qualification status. This section may contain applicable inputs, as described below:
- *Data and Parameters* - Provide a list or tables of data and parameters and their sources.
 - *Criteria* - Provide criteria directly applicable to the analysis or model subject. These criteria shall include the requirements contained in the applicable requirement documents identified as specific to the analysis or model subject.
 - *Codes and Standards* - Provide a list of the applicable codes and standards used in the analysis by name, number, and date, including applicable revision status using date or revision designator.
 - *Interfacing SSCs* - Identify interfacing SSCs and their shared functions and interactions to assure that they are adequately accommodated by the design and post-installation testing.
- [D] Assumptions - Document the assumptions. A technical justification must be provided which may include testing, calculations, historical data, sampling, bounding data, and/or previous proven designs.
- [E] Analysis Discussion - This section shall include a brief description of the system, process, or phenomenon that is analyzed. Include the scientific, engineering, and mathematical concepts and principles on which the analysis is based, as applicable. Results of literature searches or applicable background data may be discussed. Document the analysis in sufficient detail, including units of measurement, so that any qualified individual may review the documentation independently without recourse to the analysis originator. Applicable codes and standards satisfaction shall be demonstrated in the analyses.

- [F] Calculations - Perform design calculations in accordance with Chapter 6, *Calculations*.
- [G] Conclusions - Provide a summary of the analysis activity, any decisions or recommendations based on the analysis activity, and specify the analysis conclusions. Include any uncertainties and restrictions for subsequent use.
- [H] References - Source of inputs, software, and cited references shall be listed in this section. Inputs and references include material that supports the conclusions of the analysis. These may include published reports, technical papers, scientific notebooks, literature searches, or other background information.
- [I] Attachments - Supporting documentation can be included as attachments to the EDP Template. This may include lengthy computer output that cannot be conveniently included within the main text of the documentation.

4.4.3 Design Output Document Development

Design Output Documents provide the design technical direction for EDP implementation. All aspects of the designing/planning process are to be considered when deciding the Design Output Documents that are applicable, such as drawings, specifications, work instruction recommendations, and testing. Appendix 4-2, *Examples of Design Documents and Information*, contains a listing of design output examples.

Designer

- [1] Prepare Output Documents, such as drawings, specifications, and testing requirements, using Design Analysis and Calculation results.

- [2] Ensure completion of drawings and excerpts in accordance with *SX-300* (Ref. 15), and Chapter 8, *Drawings*.
 - Classified drawings are referenced in the template with the location (Bldg. 750 storage) given.
- [3] For non-D&D projects which use excerpts, document master drawing numbers on the BDCF. SDDC will add excerpt numbers to BDCF by the side of Master Drawing Numbers.
- [4] For D&D projects, obtain a list of all affected master drawings from SDDC and document those master drawings on the BDCF.
 - For a D&D project, excerpts are not required, but may be used.
 - Sketches may be used for clarification.
- [5] Ensure completion of specifications in accordance with Chapter 7, *Specifications*.
- [6] Document all specification titles and numbers in the EDP Template including those developed with the EDP, Site Standard Specifications, and those entered into SDDC with an SDDC Control Number.
- [7] Provide appropriate Work Instruction Recommendations in the EDP Template when not addressed in construction specifications, indicating:
 - Construction work sequence - Identify a construction work sequence when appropriate, identifying responsibilities and interfaces with all parties to ensure construction is completed safely and efficiently. This process will maintain system operability (SO) and minimize downtime. Identify activities to be performed by operations personnel or other subcontractors before the contractor initiates the work.

- [A] Provide instructions for calibration in the Work Instruction Recommendations portion of the EDP Template, ensuring:
- Installed or modified instrumentation is calibrated, as required, before it is made operational.
 - Appropriate instrument calibration tracking system is updated.
- [8] Develop Inspection/Testing Requirements considering the requirements identified in 1-PRO-072-001, *Inspection and Acceptance Test Process* (Ref. 23) and list in the EDP Template or reference inspection/testing requirements out of specifications, indicating:
- Code requirements
 - Acceptance criteria
- [9] Develop Post-Installation Testing Requirements and list in the EDP Template and/or reference testing requirements specified in specifications. The design package shall identify required testing of all equipment, components, and/or systems for functional operation, design verification, and SO. Specify acceptance criteria.
- *Construction Component Tests* - Equipment, component, and certain operational system testing designated as Construction Component Tests shall be stipulated by the Designer. The procedures for these tests shall list the items and operations necessary for checking the installation for conformity to the manufacturer's specifications and to the drawings and specifications. The Designer shall utilize applicable codes and standards whenever possible to define testing parameters.
 - *Systems Operational Testing* - Systems operational testing is normally required to verify conformance to drawings and specifications. Systems operational testing requirements cover the complete operation of each system and include the determination that the system operating performance is as designed. Operational systems testing should integrate the operation of, and interactiveness with, interfacing systems.

- [10] Prepare additional output documents that apply to the specific design activity and identify in the EDP Template.
- [11] Prepare a List of Required Materials and document it in the EDP Template or attach a Bill of Material (BOM), providing:
- *Description* - Enter a description of each component or part (noun name, descriptors). Provide enough detailed information to ensure that the component/part is correctly identified.
 - *Manufacturer Part Number* - Enter manufacturer name and part number, if known.
 - *Quantity* - Enter the quantity of each component/part required.
 - *PL/Other* - Enter PL for each component/part based on its Safety Classification/Safety Function. Specify the lowest applicable PL level.

Refer to Section 4.4.4 for instructions regarding procurement of EDP items prior to EDP approval, as applicable.

NOTE *Master Drawings from which excerpts are made are listed on the BDCF. When submitted to SDDC, excerpts are given a unique identifying number which SDDC adds to the BDCF next to the Master Drawing number.*

- [12] Complete the BDCF (see Appendix 4-4). The BDCF is used to identify controlled documents affected by the design activity. List drawings, excerpts, specifications, and calculations in the section entitled "*Baseline Design Documents*". List all other controlled documents [for example, procedures, Preventative Maintenance Orders (PMOs), surveillances, and SERs] in the section entitled "*Other Baseline Documents*". If there are no entries, indicate this on the BDCF.

4.4.4 Procurement of EDP Items Prior to EDP Approval

Items that require long lead time in accordance with project schedule may be procured prior to approval of the associated EDP. If specifications or drawings are required for the procurement, they must have been completed, entered into SDDC and given a unique control number prior to being attached to the Purchase Requisition (PR).

Designer/REM

- [1] Determine need for an item to be procured prior to submit approved EDP to SDDC.

Designer

- [2] Gather approved documentation to be included with the PR, such as approved specifications, drawings, and BOM.
 - Specifications are developed in accordance with Chapter 7 of this procedure.
 - Drawings are developed in accordance with Chapter 8 of this procedure.
 - The BOM is a list of items to be procured for an activity or a project.
- [3] Determine PL of item to be procured in accordance with *1-W36-APR-111*, (Ref. 5) based on its Safety Classification/Safety Function. Specify the lowest applicable PL level.
- [4] Prepare or ensure that a PR is prepared in accordance with requirements of *1-W36-APR-111* (Ref. 5).
- [5] Include applicable specification(s) drawing(s) and BOM with PR.
- [6] Obtain Wadlet Manager approval on the PR.
- [7] Ensure the PR and attachments are given to Procurement.
- [8] Ensure that revisions to specifications, drawings, and BOM are submitted to Procurement with a revised PR.
- [9] Assist in resolving nonconforming items and conditions found during receipt, certification, and inspection.

- [10] Ensure that specification(s), and drawing(s) used in the procurement of long lead items are incorporated into the EDP prior to approval of and submittal of the EDP to SDDC.

4.4.5 EDP Check and Independent Verification

This task addresses the checking and verifications by the Checker(s) and Independent Verifier(s) of the assembled EDP. Individual drawings and specifications should have been previously checked and verified. Calculations should have been checked and peer reviewed in accordance with the instructions in Chapter 6.

Independent verification is required for every EDP and Type 2 ECR. The Checker may also serve as Independent Verifier provided he/she has been qualified for both functions, meets the requirement of independence, and performs the duties of both functions.

Designer

- [1] Assemble the design package for checking and independent verification. Include a Table of Contents, all design documents including design output documents, the EDP template, and all EDP forms and associated documentation.

Figure 4-2 – Table of Contents Example

Indicate the number of pages in each section following each major section.

A Table of Contents includes:

I. Engineering Design Package Template	[indicate number of pages]
II. Calculations (if applicable)	[indicate number of pages]
III. Review Comment Sheets	[indicate number of pages]
IV. Other (identify document)	[indicate number of pages]
V. Baseline Document Change Form	[indicate number of pages]
VI. Bill of Material	[indicate number of pages]
VII. Specifications	[indicate number of pages]
VIII. Drawings (if applicable)	[indicate number of sheets]

REM

- [2] Select and assign qualified Checker(s) and a qualified Independent Verifier.

If more than one Checker is assigned, either coordinate the checking or designate a lead Checker to coordinate the checking effort to ensure that all parts of the package are checked.

Designer

- [3] Submit a copy of the EDP to the Checker(s) for check.

Checker

If the Checker meets the qualifications and the independence of an Independent Verifier, he/she may perform the Independent Verification in Step [7].

- [4] Perform or ensure a check of all documents of the EDP which have not previously been checked, and verify that the overall design package documents are administratively correct in accordance with Checker responsibilities.
- [5] Provide comments by redlining a copy of the EDP and submit comments to Designer(s).

Designer

- [6] Submit a copy of the EDP for review to the Independent Verifier.

Independent Verifier

- [7] Perform the overall independent verification required to verify that the assembled design package is technically sound, considering:
 - Design inputs were correctly selected.
 - Assumptions necessary to perform the design activity are adequately described.
 - An appropriate design method and approach was used.
 - The design inputs were correctly incorporated.
 - The design output is reasonable considering the inputs.
 - Sound engineering/scientific principles and appropriate standards were used.
 - Applicable requirements and design bases are incorporated.
 - Construction/assembly techniques to implement the design are appropriate.
- [8] Provide comments by redlining a copy of the EDP and submit to Designer(s).

Designer(s)

[9] Resolve all Checker and Independent Verifier comments.

[10] Escalate unresolved comments to the REM.

NOTE *Multidiscipline designs may require review and checking of drawings, calculations, and specifications by Checker(s) representing each discipline.*

REM

[11] Resolve the Comments.

[12] Ensure that the final design product meets the design requirements, all interfacing design disciplines are correct, and the design will function as intended.

4.4.6 EDP Review

Designer

[1] Distribute copies of the design package, with attached *Review Comment Sheets* (Appendix 4-3), for review to the personnel/organizations that have been identified in the ASF/JHIT, and as indicated in Table 1, and if the ALARA review determines that they are an interfacing discipline. (See Section 4.4.1[4]).

NOTE *Comments not submitted on a Review Comment Sheet may not be addressed.*

[2] Distribute copies of the design package, with attached *Review Comment Sheets* (Appendix 4-3), for review to any additional personnel/organizations having appropriate subject matter expertise as deemed necessary, including those organizations/individuals participating on the JHA Planning Team.

- [3] Disposition all comments and obtain concurrence signatures on the Review Comment Sheet(s).
- [4] Escalate unresolved comments to REM.

REM

- [5] Resolve unresolved comments.

4.4.7 EDP Approval

This task results in the final review and approval of the completed design package.

Designer

- [1] Prepare the EDP for final approval, including Engineering Order EDP Cover Sheet (EO), drawings, calculations, specifications, studies, excerpts, sketches or photos, BDCF, EDP Template, Table of Contents, Review Comment Sheets, and any other generated documents.
- [2] Sign Engineering Order EDP Cover Sheet Form as Designer.
- [3] Obtain concurrence signatures on the EO from Checker and Independent Verifier

Responsible Facility Manager

- [4] Review BDCF for necessary changes to controlled documents, for example, procedures, PMOs, SERs, and process applicable document changes.
- [5] Sign the EO.

Designer

- [6] Ensure the EDP is reviewed for classification.

REM

[7] Sign the EO. This signature indicates the following:

- Review Comments have been resolved, signed, and incorporated into the EDP.
- The EDP is technically and administratively accurate and procedurally compliant.
- The Design Basis for the EDP is documented. An approved ECR updates the EDP Design Basis.

NOTE *The package is approved for use when the REM signs and SDDC assigns an EO number.*

Designer

[8] Submit the final EDP to SDDC using the Engineering Order EDP Cover Sheet.

SDDC

[9] Ensure the signatures are on the Engineering Order EDP Cover Sheet.

[10] Ensure that the package has been reviewed for classification.

[11] Ensure that a Table of Contents is included in the package and that all items on the Table of Contents are in the package.

[12] Ensure that excerpt drawings, specifications, and calculations are listed on the BDCF and are included in the package, and have been processed in accordance with the applicable section of this procedure.

[13] Assign an Engineering Order EDP Cover Sheet number to the package.

[14] Enter the Engineering Order EDP Cover Sheet number in the Engineering Documentation (EDOC) system.

- [15] Ensure the EDP is reproducible.
- [16] Distribute copies as instructed on the Engineering Order EDP Cover Sheet.
- [17] Process, store, and protect the original design package in accordance with Chapter 11, *Records*.

4.4.8 Procurement of EDP Items

Designer

- [1] Determine PL of item to be procured in accordance with *1-W36-APR-111*, (Ref. 5). Each part of an SSC is evaluated individually for its PL based on its Safety Classification/Safety Function. Specify the lowest applicable PL level.
- [2] Gather documentation to be included with the PR, such as specifications, drawings, and BOM:
 - Specifications are developed in accordance with Chapter 7 of this procedure.
 - Drawings are developed in accordance with Chapter 8 of this procedure.
 - The BOM is a list of items to be procured for an activity or a project. (See Appendix 7-3 for a sample *BOM* form.)
- [3] Obtain information from the Customer Service Organization for purchase of closure commodities in accordance with *PRO-492-CCP-001* (Ref. 12).
- [4] Prepare or ensure that a PR is prepared in accordance with requirements of *1-W36-APR-111* (Ref. 5).
- [5] Include applicable specification(s) drawings and BOM with PR.
- [6] Obtain Wadlet Manager approval on the PR.

- [7] Ensure the PR and attachments are received by Procurement.
- [8] Ensure that revisions to specifications, drawings, and BOM are submitted to Procurement with a revised PR.
- [9] Assist in resolving nonconforming items and conditions found during receipt, certification, and inspection in accordance with 1-A65-ADM-15.01, *Control of Non-Conforming Items* (Ref. 24).

4.4.9 Redlined Documents and Drawings (During Construction Phase)

Construction/Maintenance Personnel

- [1] Ensure the documents used during the project work activities are redlined as changes occur. See Chapter 7, *Specifications*, and Chapter 8, *Drawings*, for redlining instructions.
 - [A] Photos and/or videos of changes may be use in lieu of the redline process.

4.4.10 EDP Closeout and Cancellation

This task provides requirements for closeout and for cancellation of an EDP activity/project.

Designer

- [1] Perform a walkdown to verify redlined drawings.
- [2] When a discrepancy between the design document and the actual configuration is identified (whether or not it is inside the scope of the design activity), notify the appropriate REM.

- [3] Ensure changes indicated by redlined documents and ECRs (drawings, specifications, etc.) have been incorporated into affected documents and drawing masters (unless the masters are voided), to create as-built documents and drawings reflecting the actual closeout conditions of the activity/project. Also see Chapter 8, *Drawings*, and *SX-300* (Ref. 15).
- [4] If design attributes cannot be visually observed as part of the walkdown, ensure that sufficient functional and SO Testing is specified to determine or assure the as-built condition conforms to the design.

NOTE *Master Drawings are as-built to reflect the changes that the project work made. The Designer, Checker, Independent Verifier, and REM are responsible only for the revised portion of Master Drawing.*

- [5] Ensure all redlines are completed and submitted to SDDC, prior to engineering sign-off of closure concurrence of the IWCP package.

SDDC

- [6] Log redlines and transmit redlines to the Responsible Facility Manager if the Baseline Design Documents section of the BDCF indicates that a document requires update prior to return to service.
- [7] Ensure redlines are transferred to master drawings and are processed in accordance with the instructions in Chapter 8, *Drawings*.
- [8] Obtain initials and date for each line item on the Baseline Design Documents section of the BDCF from the following:
 - Engineering – initials indicate that a walkdown has been performed to verify the redlined drawings.
 - SDDC – initials indicate that redlined Baseline Design Documents have been received by SDDC.
 - Responsible Facility Manager – initials indicate that redlined Baseline Design Documents have been received.

- [9] Obtain Responsible Facility Manager signature indicating that all Baseline Design Documents have been received and indicating that he/she is aware of other baseline documents that may be impacted.
- [10] Sign closure on the BDCF when all Baseline Design Documents have been updated and all initials and signatures have been obtained.

Designer

- [11] If the activity is cancelled, refer to Chapter 7, *Specifications*, and Chapter 8, *Drawings*, for documentation disposition instructions. Also see *MAN-071-IWCP* (Ref. 3).

4.4.11 Lessons Learned

REM

- [1] Review the EDP development effort for Design Process Lessons Learned value and submit to the Kaiser-Hill (K-H) Site Chief Engineer (SCE) for action in accordance with *1-MAN-017-LLGI-RM* (Ref. 9).

4.4.12 Temporary Modifications (TMs)

Designer

- [1] If the design involves application of a TM in accordance with *MAN-066-COOP* (Ref. 11), perform the following:
 - [A] Obtain a TM number in accordance with *MAN-066-COOP* (Ref. 11).
 - [B] Identify changes to affected Design Output Documents by completing the EDP Template.
 - [C] Change all associated drawings or create new drawings, if drawings do not exist.

[D] Record TM changes on the affected Design Output Documents as follows:

[a] Cloud the affected area.

[b] Document the TM Number in the description area of the title block.

[E] Provide a copy of the EDP to the Responsible Facility Manager and follow the requirements of *MAN-066-COOP* (Ref. 11).

[2] If the IWCP package installs or removes a TM, submit a copy of redline drawings to Building Operations to update the TM Log.

4.4.13 Engineering Analysis For Long Term Abandonment or Significant Delay of a Project/Activity or Process

Significant material, chemical, environmental, and AB concerns can develop over time when halting processes, abandonment, or significant delay for in-progress activities or projects. Under these special circumstances, an engineering analysis will be performed to determine if:

- Any configuration/material changes are needed to the SSC in question prior to the project/activity being halted.
- Any materials/chemicals need to be drained, added, moved or otherwise changed to ensure safe as-left conditions.
- Periodic monitoring needs to be established to ensure as-left conditions are not degrading.
- Explosive or toxic gases/chemicals do not develop, or if they do, actions are established to eliminate or stabilize the condition.
- Technical procedure changes need to be made for activities such as operations, surveillance, or preventive maintenance.
- Redlined drawings of the partial completion need to be completed in accordance with Chapter 8, *Drawings*.
- Special containers are needed for any materials in question.
- Environmental effects are a concern.
- Radiation conditions are a concern.

- Fire protection issues have been considered.
- Training changes have been considered.
- Security issues are a concern.

Project Manager/IWCP Activity Performer

- [1] Notify the REM of the abandonment or significant delay of a project or activity.

REM

- [2] Assign a Designer to perform the analysis.

Designer

- [3] Perform the engineering method using Chapter 6, *Calculations*.
- [4] Ensure the critical attributes identified in the list above have been considered in the analysis.
- [5] Ensure that reviews are performed, as a minimum, by the following organizations:
 - Nuclear Safety
 - Fire Protection
 - Environmental
 - Radiation Protection
 - Other organizations as determined by the Designer, depending on the nature of the project/activity.

REM

- [6] Determine if further engineering, such as an EDP, needs to be completed as a result of the analysis.
- [7] Communicate the results of the analysis and recommended actions to the affected Project Manager/Responsible Maintenance Manager.

This page intentionally left blank

APPENDIX 4-1
Page 1 of 6

ENGINEERING DESIGN PACKAGE TEMPLATE

Complete all sections in accordance with the direction provided in the main body of 1-V51-COEM-DES-210. If any sections are not applicable to a specific EDP, provide a brief statement of non-applicability in each affected section.

1. Designer Name(s):

Designate lead, if multiple Designers.

2. WCF/Authorization Project Number:

Specify the WCF or Authorization Project number.

3. Title:

Specify the project title.

4. Description and Scope:

Provide a summary description of the desired final constructed/completed product.

5. Objective(s):

- Reasons the design is necessary, and
- Design accomplishments.

6. Design Inputs:

6.1 Document that the ASF and JHIT have been completed.

6.2 Identify and document necessary interfacing disciplines/programs.

6.3 For Radiological Engineering, also identify and document the question(s) answered "yes" from ALARA Design Review Screen and follow the guidance in RFETS Radiological Control Manual (Ref. 7):

APPENDIX 4-1
Page 2 of 6

6.4 Identify and Document Functional Criteria:

Specify applicable functional criteria for the SSC. Examples include:

- User system/process functional performance criteria/expectations
- Technical requirements
 - Interlocks/protection
 - Interfacing systems/functions requirements
- Operational requirements
 - Interface requirements
 - Bypass indications
- Post-event accessibility
- System support requirements
- Maintainability requirements
- Reliability requirements
- Constructability considerations
- ALARA considerations
- Health, Safety & Environment requirements
- Lessons Learned input
- D&D Requirements

6.5 Identify and Document Design Performance Criteria:

Specify SSC performance requirements. Examples include:

- SSC electrical, I&C, civil/structural, nuclear, and mechanical requirements, e.g.:
flowrate, pressure, temperature, set points, impedance, duty cycle
- Required or preferred failure modes
- Reliability/availability goals
- Testability
- Separation/independence/diversity requirements

APPENDIX 4-1
Page 3 of 6

- Normal service environment
- Loss of HVAC
- Site hazards [seismic, tornado, missile, flood freeze, lightning in accordance with *Site Engineering Standard SC-206* (Ref. 10),
- Fire/Safe shutdown
- Vibration

6.6 Identify and Document Applicable Design Standards (title and number):

Specify applicable design standards. Examples include:

- Site Engineering Standards
- Site Master Specifications
- American Society of Mechanical Engineers (ASME)
- American National Standards Institute (ANSI)
- American Society of Civil Engineers (ASCE)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Concrete Institute (ACI)
- American Institute of Steel Construction (AISC)
- Hydraulics Institute (HI)
- Instrument Society of America (ISA)
- Standards from DOE Orders, commitments, etc.

6.7 Identify and Document Applicable Drawings:

List:

- All applicable design related drawings
- Reference drawings

APPENDIX 4-1
Page 4 of 6

6.8 Identify and Document applicable AB and AB-Related Design Related Documents and Requirements:

Specify the AB documents and AB related documents that will be impacted by the design and describe the impacts to the SSC.

- See the Authorization Basis Document List
- SER

7. Walkdown Results/Conclusions:

Document the walkdown results and conclusions or refer to walkdown results documented elsewhere.

8. Design Analysis and Calculations:

8.1 If Design Analysis and/or Calculations were developed in accordance with the requirements of Chapter 6, include the completed and approved Calculation Template with Cover Sheet as an attachment to the EDP Template.

8.2 If the Design Analysis was not documented in accordance with Chapter 6, document the following:

[A] Purpose:

Provide a statement of the purpose of the analysis or model. It shall identify any constraints, limitations, etc., associated with the analysis or model.

[B] Computer Software and Model Usage:

List the software and models used to support the analysis or modeling activity that are subject to the requirements of the *Site Quality Assurance Manual* (Ref. 25) and *MAN-027-SERM* (Ref. 6). Computer programs used in the design process shall be used in accordance with the *I-MAN-004-CSMM* (Ref. 18).

[C] Inputs:

Inputs and their sources shall be identified and documented. Data must be identified in a manner that facilitates traceability to associated documentation and its qualification status.

APPENDIX 4-1
Page 5 of 6

8.3 Assumptions:

Document the assumptions, with a basis for those assumptions made to perform the analysis or to develop the model. Identify the subsections where assumptions requiring confirmation are used and how confirmed. For frequently used assumptions, the comment "used throughout" may be substituted instead of individual references.

8.4 Analysis Discussion:

This section shall include a brief description of the system, process, or phenomenon that is analyzed and as applicable, the scientific, engineering, and mathematical concepts and principles on which the analysis is based. Results of literature searches or applicable background data may be discussed. Document the analysis in sufficient detail, including units of measurement, so that any qualified individual may review the documentation independently without recourse to the analysis originator. Applicable codes and standards satisfaction shall be demonstrated in the analyses.

8.5 Conclusions:

Provide a summary of the analysis activity, specify the analysis conclusions, and any decisions or recommendations based on the analysis activity. Include any uncertainties and restrictions for subsequent use.

8.6 References:

The source of inputs, software, and cited references shall be listed in this section. Inputs and references include material that supports the conclusions of the analysis. These may include published reports, technical papers, scientific notebooks, literature searches, or other background information.

8.7 Attachments

9. Design Output Documents:

9.1 Design, Approved Master Drawings, and Excerpts (title and number):

Document new or revised drawing titles and numbers in this section. Prepare drawings in accordance with *SX-300* (Ref. 15), and Chapter 8.

APPENDIX 4-1
Page 6 of 6

9.2 Output Specifications (title and number):

List output specifications by title and number. Refer to Chapter 7 for specification development instructions.

9.3 Work Instruction Recommendations:

Provide a construction work sequence when appropriate, responsibilities interfaces between all parties ensuring construction is completed safely and efficiently while maintaining SO and minimizing downtime. Identify activities to be performed by operations personnel or other subcontractors before the contractor initiates the work.

9.4 Inspection/Testing Requirements:

List pertinent inspection/testing requirements including:

- Code requirements
- Acceptance criteria

9.5 Post-Installation Testing Requirements:

List required testing requirements for design verification or to demonstrate system or component operability/functionality. Provide acceptance criteria.

9.6 Other Output Documents (title and number):

List any other output documents that apply. Refer to Appendix 4-2, *Examples of Design Documents and Information*.

9.7 List of Required Materials (or attach a BOM):

List needed materials for construction, including:

- Description
- Manufacturer Part Number
- Quantity
- PL
- Procurement Specification Number

APPENDIX 4-2

Page 1 of 6

EXAMPLES OF DESIGN DOCUMENTS AND INFORMATION

This appendix provides examples of design documents at various stages of the design process. It should not be assumed to be the total population of design information for design development and is provided for information.

Design Input Documents

- Specific functional requirements - Interfacing systems/functions
 - Safety/quality class
 - Load purpose/function
 - Load sequence
 - Interlocks/protection requirements
 - Operator interface requirements
 - Bypass indications
 - Post-event accessibility
 - System support requirements
 - Facility layout
 - Equipment arrangement
 - Normal service environment
 - Loss of HVAC
 - Site hazards (seismic, tornado, missile, flood freeze, lightning)
 - Fire/safe shutdown
 - Vibration
 - Ergonomics

- Specific performance requirements
 - System flow requirements
 - Preferred failure modes
 - Reliability/availability goals
 - System/component impedance
 - Load duty cycle
 - Load electrical characteristics
 - Testability
 - Separation/independence/diversity requirements
 - Effluent control
 - Radioactive material handling
 - D&D considerations
 - Environmental/Radiation Material Vulnerabilities (heat, moisture, radiation)

- Specific standards
 - ASME
 - ANSI
 - ASCE
 - IEEE
 - ACI
 - AISC
 - HI
 - ISA
 - Standards from DOE Orders, commitments, etc.
 - Applicable NRC Standards (10CFR, *Standard Review Plan* (Ref. 26), Reg. Guides)
 - NFPA

APPENDIX 4-2

Page 2 of 6

- Specific regulatory requirements
 - DOE Rules
 - DOE Orders
 - DOE Safety Guides
- DOE correspondence and commitments
 - DOE Safety Evaluation Reports
 - FSARs

Design Analysis and Calculations

- Engineering, evaluation and documents used to implement designs and design changes
- Calculations or analyses that verify that the design inputs and constraints are met
 - Component classification evaluations
 - Load sequencing and electrical supply sizing calculations
 - Setpoint calculations and methodologies
 - Equipment sizing calculations
 - Motor-operated valve calculations, analyses, or test results that establish switch setting/tolerances
 - Material selection for process environment
- Design baseline analysis and calculations to establish effects of postulated accidents
 - Site hazards analysis
 - Seismic site specific criteria
 - Flooding site specific criteria
- Instrument and Electrical
 - Diesel generator sizing
 - Power and instrument cable sizing
 - System voltage profiles
 - System short circuit analysis
 - Diesel generator performance
 - Bus transfer analysis
 - System protection and coordination analysis - battery sizing - instrument accuracy calculations
 - Instrument setpoint calculations
 - Current loop response time calculations
 - Electrical separation analysis
 - Raceway fill and loading
 - Failure modes and effects analysis
 - Thermal form evaluation
 - Electromagnetic compatibility
 - Surge withstand capability
 - Control room design review
 - Setpoint tolerance
 - Calibration and scaling calculations
 - Lightning protection analyses
 - Emergency lighting calculations
 - Motor starting calculations
 - Station blackout analysis
 - Offsite/onsite independence
 - Operator response time calculations
 - Component modularity

APPENDIX 4-2

Page 3 of 6

- Instrument and Electrical (continued)
 - Communications system diagnostics
 - Failure mode recovery
 - Data History
 - Alarm Managers
 - Electrical noise and wiring practices
 - Freeze protection
- Nuclear
 - Control room habitability analysis
 - Tornado loadings and external missile
 - External flooding analysis
 - Pipe break effects
 - Equipment environmental qualification
 - Radiation source term identification
 - Containment analytical model
 - Radioactivity transport analysis
 - Post accident conditions
 - Offsite dose analysis
 - Onsite personnel dose analysis
 - Heat load determination analysis
 - HVAC failure modes and effects analysis
 - HVAC instrumentation setpoints
 - HVAC design analysis
 - Pipe flow hydrodynamic loads analysis
 - Piping network dynamic flow analysis
 - Valve operability analysis
 - ASME code of record calculations
 - Computer code validations and certifications
 - Thermal analysis of components, supports, and structures
 - Component minimum wall thickness calculations
- Civil/Structural
 - Concrete structures analysis
 - Steel structures analysis
 - Civil structure dynamic/earthquake analysis
 - Dynamic/stress analysis of substructures
 - Tornado analysis of structures
 - Weld evaluations
 - Block wall evaluations
 - Component seismic/structural qualification
 - Pipe rupture restraints
 - Bolt anchorage analysis
 - Probable maximum flood analysis
 - Platform steel, cranes, monorails, doors, ladders
 - Heavy loads analysis
 - Piping analysis
 - Generically qualified piping and supports
 - Rigorously analyzed piping and supports
 - Seismic analysis of electrical conduit
 - Instrument line analysis
 - Supports analysis (pipe, duct, conduit, instrumentation, etc.)
 - Foundation analysis
 - Seismic category evaluation
 - Differential building settlement
 - Buried piping
 - Supplemental steel, building steel load tracking program

APPENDIX 4-2

Page 4 of 6

- Civil/Structural (continued)
 - Equipment anchorage qualification
 - Anchor bolt load capacities
 - Creep and shrinkage
- Mechanical
 - Piping minimum wall thickness
 - Pump minimum positive suction
 - Pump total system head
 - Valve pressure drops
 - Tank nozzle/branch line reinforcement
 - Heat transfer analysis
 - Pump/system performance analysis
 - Pressure/vacuum relief valve sizing
 - Sump capacity
 - Cooling water flow rates
 - Equipment performance calculations
 - Corrosion/erosion allowances
 - Tank sizing/flow analysis
 - Pipe sizing/flow analysis
 - System design/operating pressures and temperatures
 - Pump brake horsepower requirements
 - Valve actuation and check valve closure times
 - Vibration data
 - Thermal expansion data
 - Design cycles for equipment and systems
 - System resistance
 - Water hammer
 - Steam and condensate
- Identification and Consideration of Vendor Information
 - Vendor equipment allowable loads
 - Vendor equipment functional, seismic, and environmental qualification
 - Vendor equipment installation and maintenance requirements
 - Vendor standard component load capacities
 - Pressure ratings
- Correspondence, meeting minutes, and other documents pertaining to design evaluations and considerations

Design Output Documents

- Specifications
 - Component
 - Material
 - Design
 - Installation procurement
 - Piping classification list
 - Valve mark number list
- Facility Component Lists
 - Valve Lists
 - Equipment Lists (Q-Lists)
 - Electrical Load Lists
 - Setpoint Lists
 - Fuse and Breakers Lists
 - Instrument and Controls
 - Environmental Qualification

APPENDIX 4-2

Page 5 of 6

- Safety Analysis
 - BIO
 - FSAR
 - BFO
 - Unreviewed Safety Question Determination (USQD)
 - Site SAR
- Safety Evaluations and Technical Review Checklists/Results
 - Technical review checklists
 - Unreviewed Safety Question (USQ) safety evaluations and checklist
- Process Software (or Firmware) Requirements Specifications
- Instrument and Control Setpoints
- Mechanical Outputs
 - Basic flow diagrams
 - Heat balance diagrams
 - Piping and Instrument drawings
 - Layout and arrangement
 - HVAC (area drawings)
 - Isometric drawings
 - Equipment location drawings
 - Typical support detail for field routed pipe
 - Design cycles for equipment and systems
- Electrical Outputs
 - One line diagrams
 - Elementary diagrams
 - Wiring diagrams
 - Equipment requirements and arrangements
 - Diesel generator load sequencing
 - Logic for electrical system
 - Fire and safety
 - Grounding
 - Conduit and tray
 - Communication and lighting
 - Underground conduit
 - Breaker coordination

APPENDIX 4-2

Page 6 of 6

- Control Systems Outputs
 - Field locations and arrangement
 - Logic diagrams
 - Loop diagrams
 - Panel and console diagrams
 - User's guides
- Maintenance Requirements
 - Preventive maintenance
 - Vendor requirements
- Testing Requirements
 - Post-modification testing
 - Surveillance testing
 - In-service inspection and testing
- Construction and Installation Specifications
 - Inspection requirement

APPENDIX 4-3
Page 1 of 2
REVIEW COMMENT SHEET

Time Spent on Review Hrs. _____
Return to: _____

If questions on content, please call the SME:

Fax _____ Name _____ Ext. _____ Location _____ Name _____ Ext. _____ Page 1 of _____

Please review the attached document: _____ Title _____ Rev. _____

Comment Due Date: _____

General (G) comments require resolution but do not require resolution acceptance. Mandatory (M) comments require resolution and resolution acceptance.

TYPE G or M	PAGE	SECTION OR LINE #	COMMENT	DISPOSITION	Disposition Accepted INIT/DATE

POC/Reviewer: (Comments not signed by POC/Reviewer will be considered unofficial and not subject to resolution)

- No Comments
- This EDP has no impact or relevance to our discipline or organization and we waive need to concur.

Name
Signature

Ext./Pager/Fax
Signature

Bldg./Organization
Signature

Date
Date

APPENDIX 4-3
Page 2 of 2
REVIEW COMMENT SHEET (continued)

Page 2 of

Review comments for document: _____ Title _____ Rev. _____					
TYPE G or M	PAGE	SECTION OR LINE #	COMMENT	DISPOSITION	Disposition Accepted INIT/DATE
POC Reviewer: (Comments not signed by POC/Reviewer will be considered unofficial and not subject to resolution)				Concurrence	Date
Name _____				Signature _____	Date _____

(03/00)

This page intentionally left blank

APPENDIX 4-5
Page 1 of 1
ENGINEERING ORDER EDP COVER SHEET

Section 1: DOCUMENT IDENTIFICATION			
1. IWCP/Authorization Project Number	2. Building	3. Date	4. Page 1 of
5. Modification Description Title			
Section 2: DOCUMENT DESCRIPTION			
6A. Package Description ----- <input type="checkbox"/> Engineering Design Package <input type="checkbox"/> Temporary; TM Number: _____ <input type="checkbox"/> Engineering Change Request (ECR) ECR Type <input type="checkbox"/> 1 <input type="checkbox"/> 2 ECR Number: _____ ECR total pages of text: _____ ECR total drawings attached _____	7. Have any of these documents been in an RCA/RMMA? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, were they self-monitored? <input type="checkbox"/> Yes <input type="checkbox"/> No Verified by: _____ Print/ Sign/ Date	Reviewed for Classification By: _____ Date: _____	
Section 3: DISTRIBUTION			
ATTACH TO THIS FORM A SEPARATE SHEET OF PAPER THAT PROVIDES THE FOLLOWING:			
9. Name/Organization	10. Building	11. Number of Copies	
NOTE: Ensure that one (1) copy is distributed to DOE Safety Health Assessment (Final Only), Building 460.			
Section 4: CONCURRENCE			
Organization/Title	Name: Print / Sign / Date	Company	Phone / Page
12. Designer			-----
13. Checker			-----
14. Independent Verifier			-----
15. Responsible Facility Manager			-----

Section 5: APPROVAL			
Organization/Title	Name: Print / Sign / Date	Company	Phone / Page
16. Responsible Engineering Manager			
Section 6: TRACKING INFORMATION			
17. Requestor Name (Print)	18. Phone/Pager	19. Charge Number	
20. Res. Facility Manager Company	21. Company Authorizing Design	22. Company Performing Design	
23. SDDC Coordinator (Print)	24. Date	25. EO Number	26. Distribution Date

This page intentionally left blank

CHAPTER 5 – ENGINEERING CHANGE REQUESTS

5.1

Purpose

This chapter provides requirements for changing an Engineering Design Package (EDP) that has been submitted to Site Design Document Control (SDDC). An Engineering Change Request (ECR) is the mechanism to change an EDP that has been submitted to SDDC.

Two basic types of ECRs are used, Type 1 is for administrative clarification or corrections and Type 2 is for all other EDP changes. A graded approach for required ECR documentation and reviews is applied.

During the construction phase, ECRs may be sent directly to SDDC or maintained in the field. If ECRs are maintained in the field, an accurate and auditable file and log of all ECRs, drawings, excerpts, and drawing revisions is maintained. This file is to be turned in to SDDC to be incorporated into the EDP file at or prior to closeout. If SDDC is used, all ECRs, drawing revision, drawings, excerpts changes, specifications, and specification revisions must be processed through SDDC using Engineering Orders (EOs) and ECRs.

5.2

Applicability

This chapter applies when an EDP is changed. This includes changes to EDPs made by Architect-Engineers (A-E) and subcontractors.

5.3

Type 1 ECR (Administrative Clarification or Corrections)

Designer/Construction Coordinator

- [1] Prior to EDP issued by SDDC for implementation:
- Cloud, pen-and-ink the correction, initial, and date on the affected design output document.
 - Obtain Responsible Engineering Manager (REM) approval signature on the Engineering Order (EO).
 - Submit completed ECR with the EO to SDDC.

SDDC

- [2] Process ECR as part of the closeout package.
- [3] Assign an EO Tracking number.
- [4] Ensure that signatures are on the Engineering Order EDP Cover Sheet.
- [5] Ensure the package has been reviewed for classification
- [6] Enter the Engineering Order EDP Cover Sheet number in the Engineering Documentation (EDOC) system.
- [7] Distribute copies as instructed on the Engineering Order EDP Cover Sheet.
- [8] Process, store, and protect the original ECR in accordance with Chapter 11, *Records*.

Designer/Construction Coordinator

- [9] After EDP issue by SDDC for implementation:
- Cloud, pen-and-ink the correction, initial, and date the affected design output document.
 - Submit ECR to SDDC if Project is cancelled or at Project closeout.

SDDC

- [10] Process ECR as part of the cancellation or closeout package.

5.4

Type 2 ECR (Non-Administrative Changes)

Designer

- [1] Develop the applicable Type 2 ECR design output documents by applying an appropriate level of engineering analysis and technical justification. Document in the EDP Template. Apply the applicable direction in Chapter 4, section entitled, *Design Output*.

REM

- [2] Select qualified Checker and/or Independent Verifier and/or Peer Reviewer if a calculation is part of the ECR.

Designer

- [3] Submit ECR package to Checker.

Checker

- [4] Check the ECR. ECR may require checks of Calculations, Specifications, Design Analyses, and/or Drawings. See specific chapters for checking requirements.
- [5] Return comments to the Designer.

Designer

- [6] Resolve comments.
- [7] Elevate unresolved comments to the REM.

REM

- [8] Resolve comments.

Designer

- [9] Submit the ECR to the Independent Verifier and/or the Peer Reviewer.

Independent Verifier and/or Peer Reviewer

- [10] Review Calculations, Specifications, Design Analysis, and/or Drawings.
See specific chapters for review requirements.

- [11] Return comments to the Designer.

Designer

- [12] Resolve comments.
[13] Escalate any unresolved comments to the REM.

REM

- [14] Resolve comments between Checker, Independent Verifier, Peer Reviewer, and/or Designer.

Designer

- [15] Route Type 2 ECRs to the required reviewers in accordance with the applicable direction in Chapter 4, section entitled *Engineering Design Package Reviews*, and section entitled *Engineering Design Package Approval*.

NOTE *For Waste Isolation Pilot Plant (WIPP)-related ECRs, ECR reviewers are the same as original EDP.*

- [16] Consolidate and disposition review comments.
[17] Obtain concurrence signatures on Engineering Order EDP Cover Sheet by Checker and Independent Verifier.

- [18] Obtain REM approval signature on the Engineering Order EDP Cover Sheet form for Type 2 ECRs. The REM signs the Engineering Order EDP Cover Sheet indicating that the ECR is correct, complete, and approved.

PRIOR TO START OF CONSTRUCTION

Designer

- [19] Send ECR to SDDC.
- [20] If ECR requires changes to the Purchase Requisition (PR), submit ECR to Procurement organization.

SDDC

- [21] Ensure the required signatures are on the Engineering Order EDP Cover Sheet.
- [22] Ensure the package has been reviewed for classification.
- [23] Ensure the Baseline Document Change Form (BDCF) is included in the package.
- [24] Ensure excerpt drawings, approved drawings, master drawings, specifications, and calculations listed on the BDCF are included in the package.
- [25] Assign an Engineering Order EDP Cover Sheet number to the package and log in the EDOC system.
- [26] Distribute copies as instructed on the Engineering Order EDP Cover Sheet.

- [27] Process, store, and protect the original ECR in accordance with Chapter 11, *Records*.

DURING THE CONSTRUCTION PHASE

NOTE *ECRs may either be sent to SDDC or kept in the project files until closeout or cancellation of the Project. If the ECR adds to or deletes from the Baseline Design Documents section (Section 2) of the BDCF, it must be sent to SDDC.*

REM

- [28] Determine if the file will be maintained by SDDC or maintained in the field.
- [29] Assign the responsibility to either maintain the file in the field or submit each ECR to SDDC to the Construction Coordinator, or equivalent.

Field Engineer or Equivalent

- [30] If the ECR is not submitted to SDDC, maintain an accurate and auditable file and log of all ECRs, drawings, excerpts to master drawings, revisions to approved drawings, specifications, and specification revisions and submit to SDDC at Closeout.
- [31] Ensure the ECR is complete and meets the requirements of Chapter 4 including Checking/Independent Verification/Peer Review, Review, and Approval.
- [32] If ECR requires changes to the PR, submit changes to the Procurement organization.

Field Engineer or Equivalent

- [33] Either submit the ECR to SDDC or add ECR to log and file.
- [34] If the ECR is submitted to SDDC prior to closeout, SDDC does the following:

SDDC

- [35] Ensure that signatures are on the Cover Sheet.
- [36] Ensure the ECR has been reviewed for classification.
- [37] Ensure the BDCF has been updated.
- [38] Ensure that excerpt drawings, specifications and calculations listed on the BDCF are included in the package.
- [39] Assign an Engineering Order EDP Cover Sheet number to the package.
- [40] Enter the Engineering Order EDP Cover Sheet number in the EDOC system.
- [41] Distribute copies as instructed on the Engineering Order EDP Cover Sheet.
- [42] Process, store, and protect the original ECR in accordance with Chapter 11, *Records*.

5.5

Revisions to ECRs

An ECR cannot be revised. A new ECR must be initiated and completed in accordance with the requirements of this chapter.

This page intentionally left blank

CHAPTER 6 – CALCULATIONS

6.1

Purpose

This chapter establishes requirements for all engineering calculations that support the technical basis and design rationale for projects/activities, studies, reconstitutions of design basis, and for the design of structures, systems, and components (SSCs). These requirements ensure that all calculations are prepared, reviewed, approved, and controlled. Control is established through Site Design Document Control (SDDC).

6.2

Applicability

This chapter applies to all engineering calculations including those made by Architect-Engineers (A-E) and subcontractors; however, it does not apply to calculations performed by the Nuclear Safety Engineering Department personnel, who are governed by 3-91000-NSPM-5A-07, *Nuclear Safety Engineering Department Calculations* (Ref. 27).

The Calculation Template is the primary tool to document the contents of the Calculation. The *Calculation Template* provided in Appendix 6-1 includes examples that should be considered by the Designer.

The methodology and/or document control used for calculations may be used for other applications, such as Design Analysis, studies, technical basis, design criteria and technical information. With minimal revision the template in Appendix 6-1 may be used as a guide for any of the above types of documents.

6.3

Instructions

6.3.1 Preparation of Calculations

Designer

- [1] Initiate the *Calculation Template* (see Appendix 6-1).
 - [A] Specify Integrated Work Control Program (IWCP)/Authorization Project Number, if applicable.
 - [B] Specify Calculation Title.
 - [C] Specify Description and Scope of Calculation including:
 - Reasons the calculation is necessary, and
 - Calculation accomplishments.
 - [D] Specify Natural Phenomena Hazard (NPH) Performance Category (PC) in accordance with *SC-206* (Ref. 10).

Calculations for NPH PC-1 through PC-3 include a statement by the Designer regarding NPHs design basis. This statement should include, if applicable:

- Description of the lateral force resisting system.
 - Definition of the NPH loadings used for design or evaluation.
 - For PC-0 calculations, a statement regarding the reason(s) PC-0 was selected.
- [2] Determine calculation objectives.
 - [3] Determine method(s) to be used for calculation.

[A] List methods.

- Methods may include computer programs or manual calculations based on guidance from industry standards.

Examples are:

- *American Institute of Steel Construction Steel Construction Manual* (Ref. 28)
- Computer Software and Model Usage. List the software and models used to support the calculation or modeling activity that are subject to the requirements of the *Site Quality Assurance Manual* (Ref. 25) and *MAN-027-SERM* (Ref. 6). Computer programs used in the calculation process shall be used in accordance with *1-MAN-004-CSMM* (Ref. 18).

[4] Document the assumptions:

- Document the assumption(s) and technical basis when engineering judgement is used to support the assumption(s).
- Assumptions are based on sound engineering principles and should be adequately identified and documented.

[5] Identify references.

Identify and document all applicable references. Include: 1) name of reference, 2) section title and number, 3) regulatory guides, 4) industry codes and standards, and 5) vendor information. Examples include:

- Site Engineering Standards
- Site Standard specifications
- Site Master Drawings
- Standards from Department of Energy (DOE) Orders and commitments
- American Society of Mechanical Engineers (ASME)
- American National Standards Institute (ANSI)
- American Society of Civil Engineers (ASCE)

- Institute of Electrical and Electronics Engineers (IEEE)
 - American Concrete Institute (ACI)
 - American Institute of Steel Construction (AISC)
 - Hydraulics Institute (HI)
 - Instrument Society of America (ISA)
- [6] Identify and document related authorization basis (AB) documents. AB documents for consideration include those listed on the:
- Authorization Basis Document List, and
 - System Evaluation Report (SER)
- [7] Perform calculations.
- Ensure applicable operating and maintenance experience, and feedback are considered.
 - Ensure adequate system performance and safety margins are considered.
 - Show the design iteration process for Structural Design Calculation and Hydraulic Calculations.
- [8] State calculation conclusions, briefly and to the point, and including any impacts to AB documents resulting from the calculation outcome.
- [9] Complete *Calculation Cover Sheet* (Appendix 6-2).
- [10] Consecutively number all calculation sheets starting with Cover Sheet.

6.3.2 Check and Peer Review of Calculations

This task addresses the technical check by the Calculation Checker and the peer review by the Peer Reviewer.

For NPH PC-2 and PC-3, NPH calculations must include peer review.

The calculation check provides a detailed technical and administrative check. The peer review provides a review to identify calculation oversights, errors, conceptual deficiencies, and other potential problems.

Responsible Engineering Manager (REM)

- [1] Assign a qualified calculation Checker and a qualified Peer Reviewer.

Designer

- [2] Submit the calculation package to the calculation Checker.

Checker

- [3] Perform a technical check of the calculation to ensure that:
 - The calculation template has been followed.
 - A calculation control number has been obtained from SDDC and has been added to each sheet of the calculation and the attachments.
 - The IWCP/Authorization Project Number is correct.
 - The Calculation Title and Description are correct.
 - The NPH PC is correct.
 - The assumptions are realistic and justifiable.
 - The objectives are realistic.
 - The methods used for calculation are adequate.
 - Correct references are provided.
 - The design-related AB documents and impacts are correct.
 - The appropriate codes and standards are used.
 - The calculation was developed according to applicable procedures.
 - The calculation package Cover Sheet is administratively correct.
 - The calculation sheets are consecutively numbered from #1 on the Cover Sheet to the last page of the last attachment.

[4] Document all comments in the calculation document and indicate Checker name and date.

[5] Submit comments to the Designer.

Designer

[6] Resolve comments with the Checker.

[7] Elevate unresolved comments to the REM.

REM

[8] Resolve the comments with Designer and Checker.

Designer

[9] For PC-2 and PC-3, submit the design package for review to the Peer Reviewer.

Peer Reviewer

[10] Ensure that:

- The calculation is correct.
- The calculation is technically adequate.
- The design assumptions are realistic.
- Verifications supporting design decisions are adequate.
- The methods applied in the calculations are appropriate.
- References are provided for inputs, assumptions, and equation sources.
- The calculation has made use of proper design input.
- The calculation was developed according to applicable procedures.

[11] Document all comments in the calculation document and indicate Peer Reviewer name and date.

Designer

[12] Resolve Peer Reviewer comments.

- [13] Escalate unresolved comments to the REM.

REM

- [14] Resolve the comments with the Designer and Peer Reviewer.
- [15] Review the calculation package to verify it is technically correct both in substance and format.

Designer

- [16] Indicate the revision number of the calculation on the Calculation Cover Sheet.
- [17] Obtain the REM, Checker, Peer Reviewer (if applicable), and Responsible Facility Manager signature on the Calculation Cover Sheet.
- [18] Have the calculation reviewed for classification.
- [19] Obtain calculation control number from SDDC and add to each sheet of the calculation.
- [20] Submit to SDDC using SDDC Request Form.

6.3.3 Document Control

SDDC

- [1] Ensure the signatures are on the Calculation Cover Sheet.
- [2] Ensure that the calculation has been reviewed for classification.
- [3] Enter the calculation number in the Engineering Documentation (EDOC) system.
- [4] Copy and distribute the calculation, when requested.
- [5] Process, store, and protect the original calculation in accordance with Chapter 11, *Records*.

6.3.4 Revisions to Calculations

REM/Designer

- [1] Obtain latest revision of calculation from SDDC.

Designer

- [2] Revise information within the calculation package, as required in accordance with the requirements in the section entitled, *Preparation of Calculations*.
- [3] Add vertical line to margin of calculation to identify area of revision.
 - [A] To indicate number of revision, add triangle containing revision number near the vertical line on the margin.

REM

- [4] Assign a qualified calculation Checker and, if required, a qualified Peer Reviewer.

Designer

- [5] Submit revised calculation package to Checker.

Checker

- [6] Perform a check in accordance with requirements in the section entitled, *Check and Peer Review of Calculation*.
- [7] Document all comments in the calculation document and indicate Checker name and date.

Designer

- [8] Submit revised calculation package to Peer Reviewer, if required.

Peer Reviewer

- [9] Perform peer review in accordance with requirements in the section entitled, *Check and Peer Review of Calculations*.

- [10] Document all comments in the Calculation document and indicate Peer Reviewer name and date.

Designer

- [11] Resolve Checker and Peer Reviewer comments.

REM

- [12] Verify that comments from Checker and Peer Reviewer have been resolved.
- [13] Review revised Calculation Package to verify it is technically correct both in substance and format.

Designer

- [14] Complete new *Calculation Cover Sheet* (Appendix 6-2).
- Attach the new Cover Sheet and all Cover Sheets from previous revisions to the Calculation Package.
- [15] Obtain required revision signatures on Calculation Cover Sheet.
- [16] Have calculation reviewed for classification.

REM

- [17] Verify content of Calculation Template, required signatures, and Cover Sheet are correct.

Designer

- [18] Submit revised calculation to SDDC using SDDC Request Form.

SDDC

- [19] Ensure that signatures are on the Calculation Cover Sheet.
- [20] Ensure that the calculation has been reviewed for classification.
- [21] Enter the revised calculation into the EDOC system.

[22] Copy and distribute the calculation, when requested.

[23] Process, store, and protect the original calculation in accordance with Chapter 11, *Records*.

6.3.5 Canceling a Calculation

REM/Designer

[1] Obtain latest revision of the calculation from SDDC.

Designer

[2] Complete a new Calculation Cover Sheet and specify calculation is being canceled.

[3] Sign Calculation Cover Sheet.

REM

[4] Verify Cover Sheet is correct.

[5] Sign Calculation Cover Sheet.

Designer

[6] Submit canceled calculation with Cover Sheet to SDDC using SDDC Request Form.

SDDC

[7] Ensure the Designer and REM signatures are on the Calculation Cover Sheet.

[8] Copy and distribute the Cover Sheet, when requested.

[9] Process, store, and protect the canceled calculation in accordance with Chapter 11, *Records*.

APPENDIX 6-1
Page 1 of 1
CALCULATION TEMPLATE

CALCULATION CONTROL NUMBER: _____

Complete all sections in accordance with the directions in this chapter. Mark as not applicable any section(s) of this template that are not applicable,.

1. **IWCP/Authorization Project Number:**
2. **Calculation Title:**
3. **Calculation Description:**
4. **Natural Phenomena Hazard Performance Category:**
5. **Calculation Objectives (List):**
6. **List Methods used for Calculation:**
7. **List Assumptions used:**
8. **Identify References:**
9. **Identify Applicable Design Related AB Documents:**
10. **Body of Calculation:**
11. **Calculation Conclusion:**

This page intentionally left blank

APPENDIX 6-2
 Page 1 of 1
CALCULATION COVER SHEET

CALCULATION NUMBER _____ **Rev.** _____

Section 1: IDENTIFICATION				
1. WCF/Authorization Project Number		2. Project Title		3. Page of
4. System Identification (See SX-164, <i>Plant System and Component Identification and Labeling</i>)			5. Other (Studies, Conceptual Design Report, Design Criteria, etc.)	
6. Natural Phenomena Hazard Performance Category (PC) Number <input type="checkbox"/> PC-0 <input type="checkbox"/> PC-1 <input type="checkbox"/> PC-2 <input type="checkbox"/> PC-3				
7. Engineering Discipline(s) Involved with Calculation:				
Section 2: SIGNATURES				
	Discipline	Print Name	Sign	Date
8. Designer(s)				
9. Checker(s)				
10. Peer Reviewer				
11. Responsible Engineering Manager				
12. Responsible Facility Manager (if applicable)				
13. Classification Review				
Section 3: REVISION SUMMARY				
14. Description			15. Affected Pages	

This page intentionally left blank

CHAPTER 7 – SPECIFICATIONS

7.1

Purpose

The purpose of this chapter is to establish requirements for preparing, reviewing, approving, issuing, and controlling specifications at the Rocky Flats Environmental Technology Site (Site). Control of approved specifications is established through the Site Design Document Control (SDDC).

7.2

Applicability

This chapter applies to all design and procurement specifications used at the Site. This includes specifications written by Architect-Engineers (A-E) and subcontractors.

7.3

Overview

7.3.1 General

All specifications used at the Site shall follow the format established by the *Construction Specification Institute (CSI) Manual of Practice* (Ref. 29). CSI Division 1 specifies the general requirements of a project such as scope, safety, and submittals. CSI Divisions 2 through 16 are used to specify specific requirements such as civil, electrical, and mechanical. The *CSI Manual of Practice* defines the information that should be contained in Division 1 through 16. When using CSI specifications, it is mandatory that the CSI section number and corresponding title be used.

Types of specifications used at the Site are:

- Engineering Design Package (EDP) Specifications
- Site Standard Specifications
- Procurement Specifications

Each of these specifications has a significant role as defined below. In certain instances the different types may be combined.

Parts and Equipment Management System (PEMS) I-Specs are available as a read-only resource and are not to be used as specifications. If the information contained in an I-Spec is required for a specification, a new CSI formatted specification is created which contains the I-Spec information.

7.3.2 EDP Specifications

EDP Specifications are written to specify safety requirements, equipment, materials, or other items that are part of a Project or EDP. These specifications may include CSI Divisions 1 through 16, and must include the CSI Divisions that are applicable to the Project or EDP.

If a Procurement Level (PL)-1 or PL-2 item is to be procured that is associated with an EDP, the EDP specification is written to provide the specifics for the procurement.

7.3.3 Site Standard Specifications

Site Standard Specifications are stand-alone specifications written when the specifications will be used throughout the Site on numerous projects or activities. The Site Chief Engineer (SCE) is the approval authority as detailed in the *SERM*. Use of these specifications is mandatory unless specifically waived in accordance with the *SERM*.

These specifications are written using the CSI format as contained in the *CSI Manual of Practice* (Ref. 29).

If a PL-1 or PL-2 item is to be procured that is associated with a Site Standard Specification, the Site Standard Specification is written to provide the specifics for the procurement.

7.3.4 Procurement Specifications

A Procurement Specification is a stand-alone specification that is used to procure an item or service from a subcontractor. Procurement Specifications as defined by this procedure are written and used to provide procurement specifics for an item that is outside the jurisdiction of an EDP or Site Standard Specification. Items that require a Procurement Specification will include non-engineered PL-1 and PL-2 items and Integrated Work Control Program (IWCP) Type 1 package items which are classified as PL-1 or PL-2. The Procurement Specifications supercede the requirements of Standing Order 63.

All specifications written for a Procurement Specification are required to use the template in Appendix 7-1.

7.4

General Instructions

- Use the *CSI Manual of Practice* (Ref. 29) as a guide in determining the CSI Divisions that will be required for project specifications.
- Use MasterSpec, which is located on the Site intranet, as a guide to produce the required project specifications. MasterSpec is a purchased computer data base which contains numerous prepared specifications.
- Specifications are to be written using the CSI format.
 - CSI specifications are divided into PARTs, Articles and Paragraphs. The three PARTs of a CSI specification are:
 1. PART 1 (GENERAL),
 2. PART 2 (PRODUCTS),
 3. PART 3 (EXECUTION).
 - PARTs contain Articles (1.01, 2.01, etc.) and Paragraphs (A, B, C, etc.).
- Specification Writer(s) are to use the CSI numbering system and corresponding titles as shown in the *CSI Manual of Practice, Master Format* (Ref. 29). Procurement specifications (Section 7.7) may add a subtitle in parentheses after the CSI title. An example of this is “Section 13090, Radiation Protection (Supplied Air Suits)”.
- Procurement Specifications are to be written and documented on the *Procurement Specifications Template* (Appendix 7-1). All headers (PART, Article, Paragraph) contained in the template must appear on every applicable specification and in the order shown. Should an additional article or paragraph header(s) be required within a PART, they are added after the last paragraph of an existing article or as the last article under a PART. If one of the headers shown on the template is not required, a “not applicable” or “NA” is inserted to indicate the header was not required.

- Any specification(s) used for procuring items shall have the Receipt Inspection Requirements included in PART 3 (Execution) of the specification. These requirements are included on the last page of the specification(s) and need to be complete to facilitate the receipt inspectors determination of requirements for the specification. References to the purchase documents for receipt inspection requirements is allowed.
- Item quantity, color, size, right-hand/left-hand, and non-essential technical elements are not generally included in a specification. These elements are included on a Bill of Material (BOM) or Purchase Requisition.
- Upper case and lower case letters are used with respect to PART, Article and Paragraph titles as shown by the template in Appendix 7-1.
- Sentences shall be complete and lower case letters used, except where the rules of grammar dictate that capital letters be used.
- Section numbers, title, revision number, date of latest specification issue, and page numbers appear on every specification, as indicated on the template.
- It is recommended that the font be New Times Roman and font size not be less than 10 pt.
- PEMS I-Specs are not used for specifications.
- Item descriptors contained on the BOM are not reiterated in specifications.
- Procurement quality assurance (QA) quality requirements are specified in the specification.

- Specifications which require drawings, sketches, and/or technical information are generally EDP Specifications and are developed in conjunction with the responsible engineering organization and the requirements of Chapter 4.

- For submittals that may be required in a Specification, see *PRO-572-PQR-001* (Ref. 13) for examples.

7.5

Instructions for Developing Specification(s)

Responsible Engineering Manager (REM)/Designer/Subject-Matter Expert (SME)

- [1] Identify the need for and type of specification(s) required.
 - Use an EDP Specification if the specification will be used in conjunction with an EDP. These specifications are used as design/construction specifications and are used as a specification for a PL-1 or PL-2 procurement of an item that is part of the EDP. The EDP specification is a stand-alone specification. The SDDC control number is referenced in the EDP template and included on the EDP Baseline Document Change Form (BDCF).
 - Use a Site Standard Specification(s) if the specification will be used throughout the Site on numerous projects or activities. These specifications are stand-alone specifications, controlled by SDDC and are approved by the SCE. If used as part of an EDP the SDDC control number is referenced in the EDP template and included on the EDP BDCF.
 - Use a Procurement Specification for a PL1 or PL-2 procurement of an item that does not fall within the requirements of an EDP.
- [2] If a Site Standard Specification is required, contact the SCE for approval to develop the specification.

SCE

- [3] Determine if a Site Standard Specification is required.

REM/SME/SCE

- [4] Assign a Designer, Specification Writer or an SME to write the specification.
 - EDP specifications must be written by a Qualified Designer or a Qualified Specification Writer assigned by the REM. The Designer is responsible for the technical content of the specification.

- Procurement Specification(s) must be written by the Designated SME if qualified as a Specification Writer or a Qualified Specification Writer assigned by the SME. The SME is responsible for the technical content of the specification. Designated SMEs are identified on a list kept by the SCE. The list may be accessed through the Engineering homepage on the Site Intranet.
- Site Standard Specification(s) must be written by a Qualified Designer or a Qualified Specification Writer assigned by the SCE.

Designer/Specification Writer/SME

- [5] Write the specification(s) using the requirements and qualifications of the section entitled, *General Instructions*.

NOTE *All specifications must have a Specification Cover Sheet.*

- [6] Complete Appendix 7-2, *Specification Cover Sheet*.

- Specify the type of specification.
- Fill in the specification CSI number and corresponding title from the *CSI Manual of Practice*.
- Fill in appropriate Work Control Form (WCF)/Authorization number if the specification is part of an EDP or IWCP Type 1 package.
- Fill in appropriate project title if specification is part of an EDP or IWCP Type 1 package.
- Indicate if specification is original issue or revision. Original issue is always 0. Revisions start with 1.
- Give application of specification. (Examples include: Bldg. 707 heating, venting, and air conditioning (HVAC), procured for warehouse stock, etc.)
- If the specification is being revised give description and reason for revision.
- If specification will be used to procure an item(s) describe the PL. This applies to a Procurement Specification and/or an EDP Specification that is used for procurement.

REM/SME

- [7] Assign a qualified Checker to check the Specification.
- If the specification is an EDP Specification, the checker must be a Qualified Checker.
 - If the specification is a Procurement Specification, the checker must possess the technical expertise to check the technical content of the specification.
 - If the specification is a Site Standard Specification, the checker must possess the technical expertise to check the technical content of the specification.

Designer/Specification Writer/SME

- [8] Give copy of specification to Checker.

Specification Checker/Design Checker

- [9] Check specification(s) to ensure CSI format and technical information are correct.
- [10] Return checked specification with comments to Specification Writer, Designer or SME.

Designer/Specification Writer/SME

- [11] Resolve comments.
- [12] Elevate unresolved comments to the REM/SME/SCE.
- REM resolves comments on EDP Specifications.
 - SME resolves comments on Procurement Specifications.
 - SCE resolves comments on Site Standard Specifications.

REM/SME/SCE

- [13] Resolve unresolved comments

Designer, Specification Writer, Checker, and Customer Service Organization Representative

- [14] Sign the *Specification Cover Sheet*, (Appendix 7-2), in the designated location.

REM/SME/SCE

- [15] Approve the specification.
- REM approves all EDP Specifications.
 - Designated SME approves Procurement Specification.
 - SCE approves all Site Standard Specifications.

Designer, Specification Writer

- [16] Have the specification reviewed for classification.
- [17] Submit the specification to SDDC using the SDDC Request Form.

SDDC

- [18] Add the SDDC control number to the Specification Cover Sheet and to all pages.
- [19] Number each page starting with the Cover Page and ending with the last page of the last appendix.
- [20] Ensure the revision number is on the Specification Cover Sheet.
- [21] Ensure signatures are on the Specification Cover Sheet.
- [22] Ensure the specification has been reviewed for classification.
- [23] Enter the specification in the Engineering Documentation (EDOC) system.
- [24] Copy and distribute the specification, as requested.
- [25] Process, store, and protect the specification in accordance with Chapter 11, *Records*.

7.6

Instructions for Revising Specification(s)

Designer/REM/SME/SCE

- [1] Determine need for specification to be revised.
- Designer/REM determine need for EDP Specification to be revised.
 - SCE determine need for Site Standard Specification to be revised.
 - SME determine need for Procurement Specification to be revised.

REM/SME/SCE

- [2] Assign a Designer, Specification Writer or an SME to revise the specification.
- EDP specifications must be revised by a Qualified Designer or a Qualified Specification Writer assigned by the REM. The Designer is responsible for the technical content of the specification.
 - Stand-alone specifications associated with an EDP must be revised by a Qualified Designer or a Qualified Specification Writer assigned by the REM. The Designer is responsible for the technical content of the specification.
 - Procurement Specification(s) must be revised by the Designated SME if qualified as a Specification Writer or a Qualified Specification Writer assigned by the SME. The SME is responsible for the technical content of the specification. Designated SMEs are identified on a list kept by the SCE. The list may be accessed through the Engineering homepage on the Site Intranet.
 - Site Standard Specification(s) must be revised by a Qualified Designer or a Qualified Specification Writer assigned by the SCE.

NOTE *All specifications must have a Specification Cover Sheet. Revised specifications require a new Specification Cover Sheet.*

Designer/Specification Writer/SME

- [3] Revise the specification(s) using the requirements and qualifications of the section entitled, *General Instructions*.
- Specification Cover Sheets which are superceded by a new revision are kept in the specification file which is controlled by SDDC.
- [4] Complete a new Specification Cover Sheet (Appendix 7-2) for the revised specification.
- Specify the type of specification.
 - Fill in the specification CSI number and corresponding title from original specification that is being revised.
 - Fill in appropriate WCF/Authorization number if the specification is part of an EDP or IWCP Type 1 package.
 - Fill in appropriate project title if specification is part of an EDP or IWCP Type 1 package.
 - Indicate the revision number. Original issues are always 0. Revisions start with 1.
 - Give description and reason for revision.
 - Give application of specification. If application is different than previous release, give new application. (Examples include: Bldg. 707 HVAC; Procured for warehouse stock, etc)
 - If specification will be used to procure an item(s) establish the PL. This applies to a Procurement Specification and/or an EDP Specification that is used for procurement.

REM/ SME

- [5] Assign a qualified Checker to check the revised specification.
- If the specification is an EDP Specification, the checker must be a Qualified Design Checker.

- If the specification is a Procurement Specification, the checker must possess the technical expertise to check the technical content of the revised specification.
- If the specification is a Site Standard Specification, the checker must possess the technical expertise to check the technical content of the specification.

Designer/Specification Writer/SME

- [6] Give copy of specification to checker.

Checker

- [7] Check specification(s) to ensure CSI format and technical information are correct.
- [8] Return checked specification to Specification Writer, Designer or SME with comments.

Designer/Specification Writer/SME

- [9] Resolve comments.
- [10] Elevate unresolved comments to the REM/SME/SCE.
- REM resolves comments on EDP Specifications.
 - SME resolves comments on Procurement Specifications.
 - SCE resolves comments on Site Standard Specifications.

REM/SME/SCE

- [11] Resolve unresolved comments.

Designer, Specification Writer, Checker, and Customer Service Organization Representative

- [12] Sign the *Specification Cover Sheet*, (Appendix 7-2), in the designated location.

REM/SME/SCE

[13] Approve the specification.

- REM approves all revised EDP Specifications.
- Designated SME approves revised Procurement Specification.
- SCE approves all revised Site Standard Specifications.

Designer/Specification Writer

[14] Have the revised specification reviewed for classification.

[15] Submit the revised specification to SDDC using the SDDC Request Form.

SDDC

[16] Add the SDDC control number to the Specification Cover Sheet and to all pages.

[17] Number each page starting with the Cover Page and ending with the last page of the last appendix.

[18] Ensure the revision number is on the Specification Cover Sheet.

[19] Ensure signatures are on the Specification Cover Sheet.

[20] Ensure the revised specification has been reviewed for classification.

[21] Enter the revised specification in the EDOC system.

[22] Remove superceded specification from EDOC system.

[23] Copy and distribute the revised specification, as requested.

[24] Keep all superceded specifications and revised specifications, including Specification Cover Sheets, in specification file.

[25] Process, store, and protect the revised specification in accordance with Chapter 11, *Records*.

7.7

Instructions for Canceling Specification(s)

Cancelled specifications follow the same process used to revise a specification. The cancelled specification requires a new cover sheet and the reason for revision is noted on the cover sheet as "Specification Cancelled".

APPENDIX 7-1
Page 1 of 9
PROCUREMENT SPECIFICATIONS TEMPLATE

PART 1 GENERAL

Articles below shall include administrative and procedural requirements specific to the procurement specification.

1.01 SECTION INCLUDES

Write a short phrase about what the item is and describe its use.

Example: Supplied Air Suit to be used for radiological purposes.

1.02 REFERENCES

Lists standards, codes, specifications and/or drawings. Include latest edition/revision numbers. Standards shall be complete with the agency title, section number(s) and paragraph(s) that is/are applicable.

Example: A36/A36M-97ae1 Standard Specification for Carbon Structural Steel

1.03 SUBMITTALS

In the paragraphs below include requests for data to be furnished by the subcontractor before or after receipt of items at RFETS. Number of required copies shall be specified.

A. Product Data

Describe specific types of product data to be submitted to the Buyer/subcontract administrator for review. Buyer/subcontract administrator requirements of when submittal should be received at RFETS should also be included.

Example: Subcontractor shall submit three copies each of Instruction manuals, Operating manuals, and Maintenance manuals with shipment of item.

B. Shop Drawings

Describe specific types of shop drawings to be submitted for review. Buyer/subcontract administrator requirements of when submittal should be received at RFETS should also be included.

Example: Subcontractor shall submit three copies of shop drawings for review and approval by Buyer/subcontract administrator prior to fabrication of item.

APPENDIX 7-1
Page 2 of 9

C. Samples

Describe specific types of samples to be submitted to the Buyer/subcontract administrator for review. Buyer/subcontract administrator requirements of when submittal should be received at RFETS should also be included.

Example: Subcontractor shall submit three samples of item for review and approval of Buyer/subcontract administrator within 14 days after receipt of Purchase Order.

D. Testing and Certifications

Include test result(s), environmental certification(s), Certificate(s) of Conformance, Certified Material Report Tests (CMTR), welding examination reports or other documentation that will be required by RFETS Receipt Certification and Inspection personnel to verify item upon arrival at RFETS. Buyer/subcontract administrator requirements of when submittal should be received at RFETS should also be included.

Example:1. Subcontractor shall submit copy of vacuum testing procedures and results with shipment of item.
2. Subcontractor shall submit copy of welder qualifications to Buyer/subcontract administrator for review and approval prior to commencement of welding.

1.04 QUALITY ASSURANCE

In the paragraphs below include criteria/requirements that define the quality of the item being purchased. The cognizant QA organization should be consulted to determine QA requirements. The specification shall contain the necessary QA program, item, inspection, and documentation requirements to assure that the procured item(s) can meet critical performance parameters. Select from *PRO-572-PQR-001* (Ref. 13) and other appropriate documents the QA requirements that apply to the procurement.

A. Qualifications

Include qualification requirements for subcontractors, manufacturers, fabricators, and welders, of item to be purchased. Additional requirements for specific projects shall be included in accordance with *1-W36-APR-111*, (Ref. 5).

Example: 1. Welders shall be qualified in accordance with ASME BPV Code Section IX.
2. All items shall be provided in accordance with the subcontractor's QA program previously evaluated and approved by the RFETS Quality Organization.

APPENDIX 7-1
Page 3 of 9

B. Substitutions

State whether substitutions are allowed by the subcontractor.

Example: No substitutions are authorized. Should the subcontractor be unable to meet the specifications exactly as written and in compliance with the referenced specifications, codes, and drawings, the subcontractor shall promptly notify the Buyer/subcontract administrator prior to processing the Purchase Order. The notification shall include description of the suggested changes and justification attesting to the functionally equivalency of the item as originally ordered. Changes to this specification can only be authorized by the RFETS SME.

SME approved changes require a new or revised specification. All specification revisions which affect the contract must be issued by authorized RFETS buyers/subcontract administrators as specified in the contract to the subcontractor.

C. Certificate of Conformance

For PL1 procurements, a Certificate of Conformance (C of C) is required with each shipment unless otherwise specified in this section. The C of C states that each item supplied is in accordance with the applicable manufacturer's standards, and/or appropriate general requirements stated in the Purchase Order. The C of C shall reference the RFETS Purchase Order and item number. The C of C shall include the subcontractor's name, address, address, and date, and be signed by the authorized subcontractors' representative. If a Certified Material Test Report (CMTR) is required, it should be included under this article, also.

Example: 1. A C of C shall accompany each shipment. The certificate shall state that each item supplied is in accordance with the applicable ANSI, manufacturer's specifications, and appropriate requirements stated in this specification. The C of C shall reference the Site Purchase Order and item number(s). The C of C shall include the subcontractor's name, address, date, and be signed by an authorized subcontractor's representative.

2. A CMTR shall accompany each shipment for each item specified.

APPENDIX 7-1
Page 4 of 9

D. Rights of Access

Include Buyer/subcontract administrator rights of access to subcontractors facilities/records.

Example: The Buyer/subcontract administrator shall have rights of access to the subcontractor's facility and records for inspection or audit by the Buyer/subcontract administrator, their designated representatives and/or other parties authorized by the buyer/subcontract administrator. This shall include, but not be limited to: the right to audit material tests, inspection services, and quality records; make surveillance visits during manufacturing; and witnessing of tests to the extent the Buyer/subcontract administrator deems necessary to assure that work is being performed in accordance with all product design and manufacturing requirements.

1.05 SOURCE QUALITY CONTROL

In the paragraphs below, indicate requirements for quality control at off-site fabrication plants.

A. Tests, Inspections

Describe tests and inspections of products that are required at the source, i.e., plant, mill, factory, or shop. Include appropriate standards, codes, specifications and/or drawings (include revisions numbers).

Example: Filters shall be sampled and tested for flow rate and hydrogen diffusivity by the subcontractor in accordance with ANSI/ASQC Z1.4-1993, Special Inspection Level S-2, Table 1, AQL = 2.5 and shall meet the specified performance criteria.

B. Source Inspections

Include source inspection requirements in this paragraph.

Example: Acceptance of items in accordance with this specification is based on a QA source surveillance. The Buyer/subcontract administrator shall be advised five working days prior to shipping date so Site inspectors can visit subcontractor fabrication shop for source inspection.

APPENDIX 7-1
Page 5 of 9

1.06 DELIVERY, STORAGE, AND HANDLING/PROTECTION

State delivery, storage, and handling requirements to which the subcontractor must adhere and which are particular to item being procured. Include appropriate standards, codes, specifications and/or drawings (include revisions numbers).

A. Storage

State storage requirements such as Storage Level A, B, C, or D.

Example: The storage area shall meet Level B Storage requirements of ASME NQA-1,(applicable edition), Subpart 2.2, *Quality Assurance Requirements* (Ref. 30).

B. Delivery

State any specific Site delivery requirements that apply to the item being procured.

Example: Delivery of items shall be made in an enclosed vehicle and only after confirmation of agreeable scheduled time of acceptance with the Site's Receiving, Certification, and Inspection personnel.

C. Handling

State any handling requirements that apply to the item being procured.

Example: All items shall be handled with forklift.

1.07 PACKAGING

Describe packaging requirements.

Example: Items shall be packaged with a barrier so that water vapor, salt, spray, dust, dirt, and other forms of contamination do not penetrate the package. Items that can be damaged by condensation trapped within the package shall be packaged with an approved desiccant.

1.08 MARKING REQUIREMENTS

State Buyer/subcontract administrator marking requirements for the procured item. Identify how, where and what items are to be marked. If the purchased item is to be stocked in the Site's warehouse, this paragraph shall include the Site's warehouse stock code number and instructions to the subcontractor on where the number is to appear on the item being procured or its packaging.

APPENDIX 7-1
Page 6 of 9

Example: Each carton and each liner shall be legibly and permanently marked in black ink within 6-inches of the open end of the liner using letters at least ½" high with the following:

- 1.) Buyer/subcontract administrator's purchase order number
- 2.) Item size
- 3.) Date of manufacture.
- 4.) Stock Code Number

1.09 RFETS ENVIRONMENTAL REQUIREMENTS

State any RFETS physical or environmental limitations or criteria. Such conditions include temperature, weather, humidity, ventilation, and illumination required for proper storage.

Example: Item shall be stored with temporary preservatives left intact. Desiccant humidity indicators shall be monitored, and desiccants shall be changed monthly.

1.10 TRAINING REQUIREMENTS

State training required from subcontractor and specifics. This includes course description, who is required to take training, expected knowledge to be attained (e.g. operation, maintenance, testing), retraining requirements, and when training should be given.

Example: Subcontractor shall provide necessary training to RFETS personnel including operating theory of equipment and step-by-step instructions for preventive and corrective maintenance. These instructions shall include schematics and maintenance schedules.

1.11 SPARE PARTS

Include spare parts information and extra materials required.

A. Extra Materials/Spare Parts

List items parts to be supplied for future maintenance/repair. Include parts that might be difficult to obtain later.

Example: Subcontractor shall submit spare parts in accordance with purchase order.

APPENDIX 7-1
Page 7 of 9

PART 2 PRODUCTS

Articles below shall include information about items such as RFETS drawings, systems, materials, manufactured units, equipment, components, and accessories. This PART may also include items such as software programs used in conjunction with the procured item.

2.01 DESCRIPTION OF ITEM

Describe the item to be purchased. Include description, applicable catalog number, and appropriate standards, codes, specifications and/or drawings (include revisions numbers). Materials of construction are described in Article 2.03 and finishes are described in Article 2.05.

NOTE *Size, color, quantity and/or other non-specific information should not be called out in the procurement specification. This information should be included on a BOM and/or on the PR.*

Example: Cartridge shall be MSA P/N814922, manufactured in compliance with NIOSH TC-86B-0322 and RFETS drawing 33481-0165, Rev. B.

2.02 MATERIALS

If needed, describe in detail the materials from which the procured item is to be constructed.

Example: Liner base material shall be 0.005-inch thick, polyethylene tubing or sheet manufactured to Federal Specification L-P-378, Grade A, B, or C, Type II (high impact strength), Class 1 (non-food application).

2.03 FABRICATION

Describe manufacturing, shop fabrication, and shop assembly of items, which the Buyer/subcontract administrator requires the subcontractor to use.

A. Shop Assembly

Describe specific shop assembly procedures the Buyer/subcontract administrator requires the subcontractor to use. Fabrication may include trial or permanent assembly of equipment and components.

Example: Subcontractor shall assemble the item for inspection by Buyer/subcontract administrator prior to shipping at Subcontractor's facility.

B. Fabrication Tolerances

State allowable variations from specified requirements. Allowable variations in product or system attributes from stated criteria should be specified here. If tolerances are called out on an accompanying drawing, they should not be duplicated in the specification.

Example: Length of cart shall be 29-inches + ¼, -0.

APPENDIX 7-1
Page 8 of 9

2.0.4 FINISHES

If needed, describe shop or factory finishing requirements.

Example: Liner base material shall be Finish 1 (untreated) and natural color.

PART 3 EXECUTION

Articles below **SHALL** state RFETS requirements **after item has been received at RFETS**. These requirements **SHALL** include RFETS Receipt Inspection requirements, and may include Handling, Storage, etc.

3.01 RFETS HANDLING AND STORAGE

State provisions for handling and storage of item after receipt at RFETS in the following paragraphs. Include appropriate standards, codes, specifications and/or drawings (include revisions numbers).

A. Handling

State any RFETS handling requirements that apply to the item being procured.

Example: Forklifts shall be used to transport item within B551 warehouse.

B. Storage

State storage requirements such as Storage Level A, B,C or D. Also, state whether item will be warehoused or sent to RFETS requisitioner.

Example: 1. The storage area shall meet Level B Storage requirements in accordance with *ASME NQA-1- (applicable edition), Subpart 2.2, (Ref. 30)*.
2. Items shall be stored in original containers in Bldg. 551 until use is required at B444.

3.02 FIELD QUALITY CONTROL

Include tests and inspections to be performed by RFETS after receipt and prior to or during installation of item.

Example: RFETS personnel to have item calibrated in accordance with 1-HHH-3456-Caltest after receipt in B551.

MANDATORY PAGE BREAK HERE.

APPENDIX 7-1
Page 9 of 9

3.03 RFETS RECEIVING/INSPECTION CRITERIA

Acceptance at RFETS is as determined by the SME for the item being procured. This article shall describe the conditions of acceptance of items at RFETS.

These conditions of acceptance may be catalog number, part number verification, tests, inspections, or sampling by RC&I, and/or review of subcontractor inspections, etc. Sampling shall follow the requirements of ANSI/ASQC Z1.4-1993. Specific sampling instructions shall be included.

This article shall always be the last article of the specification and shall be on an isolated page. Receiving/inspection criteria shall be precise and complete, but may reference the material description as shown on the PR, if applicable. References to other portions of this specification shall not be included on this page.

- Example:**
1. Documentation:
Verify subcontractor provided C of C.
 2. Verify each liner is free from defects such as foreign material, imbedded particles, pinholes, tears, blisters, sharp creases, wrinkles or other imperfections, which might impair its function.
 3. Verify material thickness as stated on the PR. The tolerance +/- .5-inch applies.
 4. Marking: Verify cartons and items are appropriately marked as in accordance with the following:
 - a. Manufacturer/Subcontractor name
 - b. Length and Diameter
 - c. P.O. Number
 - d. Material type/scheduleIf appropriate, this identification may be by use of a tag, provided the tag is securely attached to the item or package/container.
 5. Sampling: Sample in accordance with ANSI/ASQC Z1.4-1993, Special Inspection Level S-2, single normal, AQL = 10.

END OF SECTION

This page intentionally left blank

APPENDIX 7-2
 Page 1 of 1
SPECIFICATION COVER SHEET

Section 1: IDENTIFICATION			
1. SDDC Control Number		2. Date Submitted to SDDC	
3. Project Title		4. WCF/Authorization Project Number	
5. <input type="checkbox"/> EDP Specification	6. <input type="checkbox"/> Site Standard Specification	7. <input type="checkbox"/> Procurement Specification	
8. CSI Number	9. CSI Title		10. PL Level
11. <input type="checkbox"/> Original Issue	12. <input type="checkbox"/> Revision	13. Revision Number:	
14. Specification Application:			
15. Description/Reason for Revision			
Section 2: SIGNATURES (N/A signatures that are not required for the type of specification)			
	PRINT NAME	SIGN	DATE
16. Designer (For EDP Spec. & Site Std. Spec.)			
17. Checker (For EDP Spec. & Site Std. Spec.)			
18. Specification Writer (For Proc. Specs)			
19. Checker (For Proc. Specs)			
20. Subject-Matter Expert (For Proc. Specs)			
21. Customer Service Org (CSO) (If applicable)			
22. Responsible Eng. Manager (For EDP Specs)			
23. Site Chief Engineer (For Site Std. Specs)			
		Reviewed for Classification/UCNI	
		BY: _____	
		DATE: _____	

141

This page intentionally left blank

This page intentionally left blank.

CHAPTER 8 – DRAWINGS

8.1

Purpose

This chapter, in conjunction with *SX-300* (Ref. 15), provides requirements for drawings at the Rocky Flats Environmental Technology Site (Site).

8.2

Applicability

This chapter applies to all personnel who develop, revise, cancel, void, and process design drawings at the Site. This includes drawings produced by Architect-Engineers (A-E) and subcontractors.

SX-300 (Ref. 15) defines three types of drawings. The type is determined by the activity phase in which the drawing is being used.

- Design Drawing – Any drawing developed during the design phase of a project or activity.
- Approved Drawing – A drawing that has been fully approved, issued to Site Design Document Control (SDDC) and is used during the construction phase of an activity.
- Master Drawing – A drawing that reflects the post-construction configuration of a structure, system or component (SSC).

Additional drawings addressed in this chapter are as follows:

- Site Standard Drawing – A Master Drawing that has been prescribed for Site use by the Site Chief Engineer (SCE). Site Standard Drawings are listed in an appendix to *MAN-027-SERM* (Ref. 6).

8.3

Instructions for Creating a New Drawing

Designer/Subject-Matter Expert (SME)

- [1] Provide information necessary for preparation of a drawing, such as sketches or calculations.
- [2] Obtain a new drawing series number, or if part of an existing series, the next numbers available from SDDC.
- [3] Assign a discipline subnumber in accordance with *SX-300* (Ref 15).
- [4] Obtain a Drafter.

Drafter

- [5] Complete the drawing using information provided by the Designer/SME and the standards set forth in *SX-300* (Ref. 15).
- [6] Return the completed drawing to Designer/SME.

Responsible Engineering Manager (REM)

- [7] Assign a Qualified Checker.

Checker

- [8] Check the drawing for technical accuracy and for adherence to the standards set forth in *SX-300* (Ref. 15).
- [9] Check interdiscipline drawings for conflicts, and notify designer if conflicts are identified.
- [10] Provide comments to Designer/SME.

Designer/SME

- [11] Resolve interdiscipline conflicts.

[12] Resolve comments.

[13] Elevate unresolved comments to the REM/SME.

REM/SME

[14] Resolve comments.

Designer/SME

[15] Obtain signatures in the drawing title block.

[16] Have drawing reviewed for classification.

REM/SME

[17] If the drawing is part of an Engineering Design Package (EDP), ensure that the following personnel signing the title block are on the appropriate qualified list:

- Designed By – Must be on the list of Qualified Designers.
- Checked By – Must be on the list of Qualified Checkers.
- Approved By – Must be on the list of Qualified REM list or on the SME list.

[18] Sign title block denoting approval of the technical content.

Designer

[19] For a drawing that is a part of an EDP, place the drawing into the EDP in accordance with Chapter 4,

OR

[20] For a drawing that is independent of an EDP, submit the drawing to SDDC using the *SDDC Request Form* (Appendix 9-1).

SDDC

- [21] Ensure the signatures are on the title block and all blocks are filled in accordance with SX-300 (Ref. 15).
- [22] Ensure the drawing has been reviewed for classification.
- [23] Ensure the correct revision number is on the drawing.
- [24] Enter the drawing into the Engineering Documentation (EDOC) system.
- [25] Microfilm the drawing.
- [26] Process, store, and protect the original drawing and film in accordance with Chapter 11, *Records*.

8.4

Instructions for Using the Drawing Excerpt Process

The drawing Excerpt Process is a method for revising only the portion of a Master Drawing that is needed for the performance of a project or activity. Work can be performed to a drawing excerpt. An excerpt is created when a sketch, photograph, a portion of a drawing, or an entire drawing is placed on the *Drawing Excerpt Form*, Appendix 8-1. An excerpt tracking number is placed on the Baseline Document Change Form (BDCF) next to its associated Master Drawing number and on the excerpt.

During construction, a new excerpt will be identified on the BDCF using the Engineering Change Request (ECR) process. However, redlines to a previously identified excerpt does not require an ECR or additional identification on the BDCF. The drawing excerpt is incorporated into the appropriate Master Drawing during the closeout phase of a project. The drawing excerpt receives approval by the signature process on the Engineering Order EDP Cover Sheet.

Designer

- [1] Place the applicable drawing excerpt on the *Drawing Excerpt Form* (Appendix 9-1).

- [2] If the drawing excerpt is larger than the Drawing Excerpt Form, attach the Title Block from the Drawing Excerpt Form to the created excerpt. (A generic title block may be used providing it contains all the information on the Drawing Excerpt Form.)
- [3] Submit the excerpt to SDDC as part of an EDP/ECR. If the excerpt is not part of an EDP/ECR, submit it to SDDC with the SDDC Request Form.

SDDC

- [4] Ensure that the revision number, drawing number, job number, and excerpt number in the excerpt title block are complete.
- [5] Log the excerpt into the EDOC system (the excerpt number is automatically generated by SDDC).
- [6] Place the excerpt tracking number on the BDCF next to the associated Master Drawing number and on the excerpt.

8.5

Instructions for Revising an Approved or a Master Drawing

Designer

- [1] Check-out the Master Drawing from SDDC, prepare, or have prepared, the revision to the Master Drawing using hand-drawn or Computer-Aided-Design changes.

REM

- [2] Assign a Drafter or request SDDC assistance.

Drafter

- [3] Complete the drawing using the standards set forth in *SX-300* (Ref. 15).

REM

- [4] Assign a Checker.

Checker

- [5] Check the drawing for technical accuracy and for adherence to the standards set forth in *SX-300* (Ref. 15).

- [6] Notify Designer if conflicts are identified.

Designer

- [7] Resolve interdiscipline conflicts.
[8] Obtain required signatures on the drawing.

NOTE *When the Master Drawing is revised, the approval signature on the drawing indicates approval only for the technical accuracy of the portion of the drawing that was changed.*

REM

- [9] Signs the revision block indicating approval of the drawing.
[10] Submit drawings to SDDC using the *SDDC Request Form* (Appendix 10-1).

SDDC

- [11] Ensure drawing title block is complete in accordance with *SX-300* (Ref. 15).
[12] Ensure the drawing has been reviewed for classification.
[13] Ensure the correct revision number is on the drawing.
[14] Enter the drawing into the EDOC system.
[15] Microfilm the drawing.
[16] Process, store, and protect the original drawing and film, in accordance with Chapter 11, *Records*.

8.6

Redlining a Drawing for Closeout

Approved, Excerpt, and Master Drawings that are redlined during a project are voided or revised, as appropriate, as part of project closeout.

If Master Drawings will be voided at closeout, redline changes must be retained during construction phase. If the project is completed, redline changes do not have to be incorporated into the master.

Project Manager/Responsible Facility Manager/Facility Manager

- [1] Upon closeout of a project, ensure all drawings are returned to SDDC either as an Approved Drawing that has been redlined, or an as-built Master Drawing.

Designer

- [2] Perform the following tasks, as appropriate, at closeout:
 - Revise a Master Drawing.
 - Void a Master Drawing.
 - Convert an Approved Drawing to a Master Drawing.
 - Incorporate applicable excerpts, and any residual interim drawings, into the Master Drawing.
 - Revise a vendor drawing.

SDDC

- [3] Ensure that the redline changes are incorporated.
- [4] Return the drawings to the Designer for approval.

Designer

- [5] Obtain required signatures in the drawing title block.
- [6] Submit the drawing to SDDC.

SDDC

- [7] Process the drawing in accordance with the appropriate sections of this chapter.

8.7

Voiding a Drawing

An Approved Drawing, a Master Drawing, or an Excerpt can be voided when there is no longer a need for the drawing to exist.

REM or SME

- [1] Notify SDDC in writing of the Master Drawing to be voided.

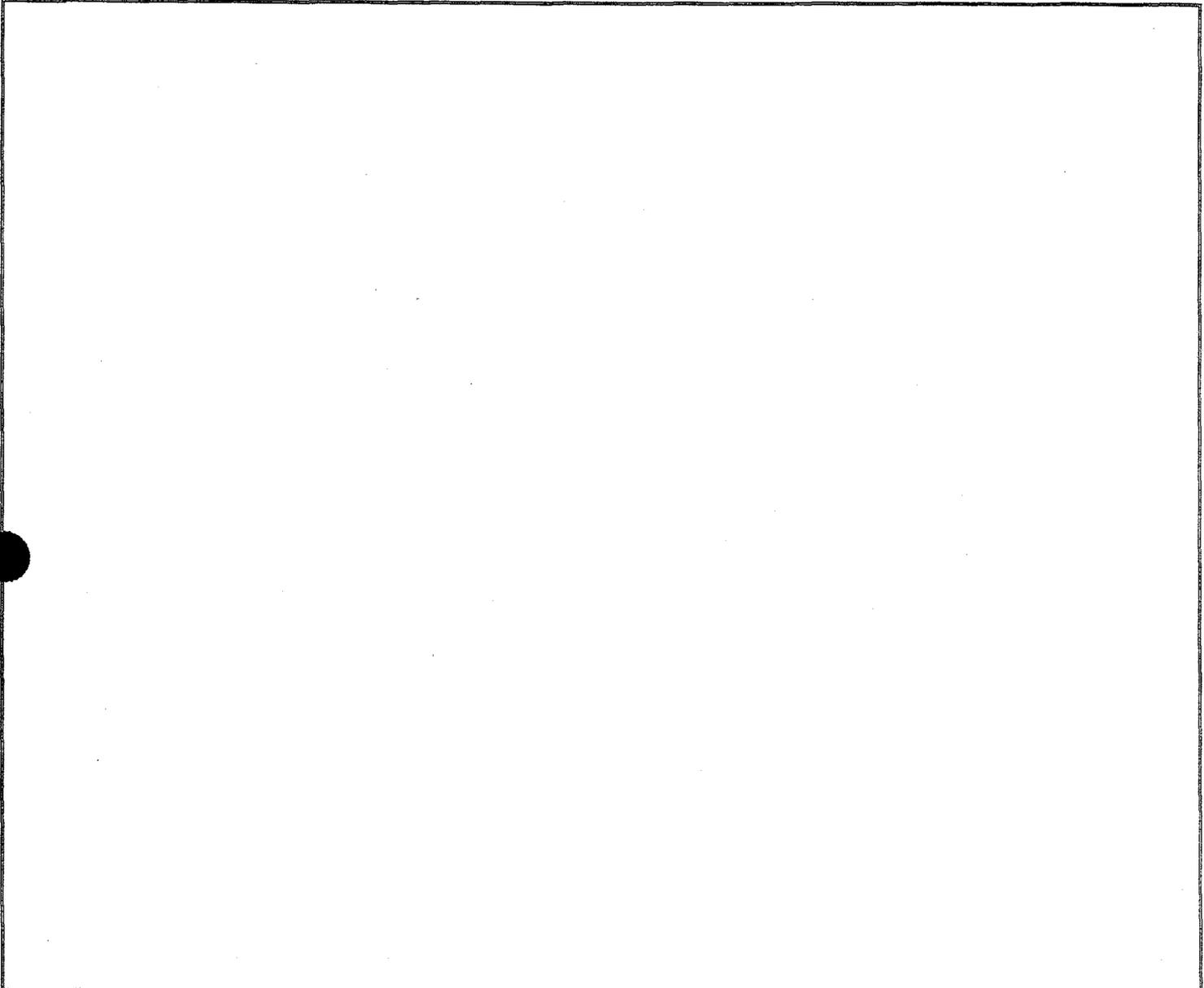
SCE

- [2] If the Master is a Site Standard Drawing, determine the need to void the drawing.
- [3] Ensure that SDDC is notified, in writing, to void the Site Standard Drawing.
- [4] Ensure that the *SERM* is updated to reflect that the Site Standard Drawing is no longer needed.

SDDC

- [5] Void the drawing, or as indicated on the BDCF in an EDP closeout package.
- [6] Void a Site Standard Drawing as requested in writing by the SCE.
- [7] Process, store, and protect the aperture card in accordance with Chapter 11, *Records*.

APPENDIX 8-1
Page 1 of 1
DRAWING EXCERPT FORM



Title Block	Sheet ___ of ___	If the drawing excerpt is too large, remove the Title Block section from this form and attach it to the drawing excerpt. Cross out existing Title Block, if showing.
Excerpt of Master Drawing Number: _____	Revision/Issue _____	
Approved for use with IWCP/Authorization Project Number: _____		

SDDC Tracking Number _____

This page intentionally left blank.

CHAPTER 9 – SITE DESIGN DOCUMENT CONTROL

9.1

Purpose

This chapter provides the requirements for submitting engineering design documents to Site Design Document Control (SDDC).

9.2

Applicability

An Engineering Design Package (EDP) and its associated drawings and excerpts are issued to SDDC using an *Engineering Order EDP Cover Sheet* (Appendix 4-5).

All other documents are issued to SDDC using the *SDDC Request Form* (Appendix 9-1). The SDDC Request Form is also used to request any action regarding controlled distribution of an engineering document, such as addition or deletion of a controlled distribution list or change of custodian.

NOTE *It is the responsibility of the user to verify that any document obtained by electronic means is the current approved revision.*

9.3

Instructions

Requestor

- [1] Complete appropriate sections of the SDDC Request Form
- [2] Submit the SDDC Request Form with the appropriate document to SDDC.

SDDC

- [3] Ensure that all necessary information is included on the SDDC Request Form.
- [4] Process the following documents in accordance with the instructions set forth in the associated chapters of this document:
 - Calculations Chapter 6
 - Specifications Chapter 7
 - Drawings Chapter 8
- [5] If the document cannot be processed in accordance with the requirements set forth in previous sections of this procedure, notify the approval authority.
- [6] Process, store, and protect the original and all revisions of submitted documents, in accordance with Chapter 11, *Records*.

APPENDIX 9-1
Page 1 of 1
SITE DESIGN DOCUMENT CONTROL REQUEST FORM

Section 1: REQUESTOR IDENTIFICATION			
1. Requestor Name:		2. Requestor Signature	
3. Company	4. Department	5. Building	6. Extension/Pager
Section 2: FUNDING INFORMATION			
7. Charge Number		8. Funding Source Company	
Section 3: REQUESTED ACTIONS			
A. Request for Document Release:			
Document Number:		Document Title:	
If you need more room, attach a separate sheet.			
B. Request for Controlled Distribution:		Date Needed:	
Requested Action:			
<input type="checkbox"/> Addition to Controlled Distribution <input type="checkbox"/> Deletion from Controlled Distribution <input type="checkbox"/> Change of Custodian			
Document Number:		Document Title:	
If you need more room, attach a separate sheet.			
Section 4: SDDC PROCESSING INFORMATION			
9. Received By:		10. Date Received:	11. Time Received:

(03/00)

This page intentionally left blank.

CHAPTER 10 – SITE ENGINEERING STANDARDS

10.1

Site Engineering Standards

Site Engineering Standards are described and controlled in *MAN-027-SERM*, Section 3.3 (Ref. 6). Approval authority is the Site Chief Engineer (SCE) as detailed in the *SERM*. Usage of these standards is mandatory unless specifically waived in accordance with the *SERM*, Section 3.4.1.

Site Engineering Standards SHALL be written using MAN-001-SDRM, *Site Document Requirements Manual (SDRM)* (Ref. 31) for guidance. The creation of new Site Engineering Standards and revisions to Site Engineering Standards shall be approved by the SCE. An example of a Site Engineering Standard is *SX-300* (Ref. 15).

Configuration control of Site Engineering Standards is provided by Document Records, the Document Control Division of Records & Management.

Use of cancelled Site Engineering Standards or Rocky Flats Plant Standards (the predecessor to the Site Engineering Standards) is prohibited.

This page intentionally left blank.

CHAPTER 11 – RECORDS

11.1 Engineering Design Package (EDP) Forms

Electronic copies of all forms in this procedure are on the Rocky Flats Environmental Technology Site (Site) intranet engineering organization web page. Hardcopy forms in this procedure may be obtained from Site Design Document Control (SDDC). All forms initiated as a result of this procedure should be completed in a legible and indelible medium.

11.2 Records Processing Instructions

The following documents are initiated, processed or maintained as a result of this procedure and shall be processed as follows:

Table 2 - Records Processing

RECORD IDENTIFICATION	RECORD TYPE DETERMINATION	PROTECTION / STORAGE METHODS	PROCESSING INSTRUCTIONS
1) EDP 2) Drawings (stand-alone) 3) Calculations (stand-alone) 4) Specifications (stand-alone) 5) Personnel Qualification Cards	Quality Assurance (QA) Record when the closure process is completed.	All design/planning records associated with the final EDP are submitted to SDDC for interim storage until the closure process is complete. Responsible managers shall implement a reasonable level of protection to prevent loss and or degradation.	When Inactive (as defined in 1-V41-RM-001, <i>Records Management Guidance for Records Sources</i> (Ref. 32) transfer to Site Records Management in accordance with 1-V41-RM-001.
1) EDP 2) Drawings (stand-alone) 3) Calculations (stand-alone) 4) Specifications (stand-alone) 5) Personnel Qualification Cards	Waste Isolation Pilot Plant (WIPP)/LL/LLM QA Record when the closure process is completed. NOTE: <i>An EDP Final Record is a WIPP/LL/LLM QA Record if the design process supports the design of TRU or Low Level Waste items as identified on the Engineering Order EDP Cover Sheet.</i>	Completed (authenticated) WIPP/LL/LLM QA records shall be transmitted to the WIPP Waste Records Center within one (1) working day of completion. During this one (1) working day period, Responsible Managers shall continue to implement a reasonable level of protection to prevent loss and or degradation. Completed (authenticated) WIPP/LL/LLM QA records that are not transmitted within the one (1) working day time period, shall be stored in one (1) hour fire-rated cabinets for a period not to exceed six (6) months.	Transmit copy of record package to WIPP Waste Records Center in accordance with 1- PRO-077-WIPP-005, <i>Management of Waste Isolation Pilot Plant (WIPP)</i> (Ref. 33). Information prior to transmittal to WIPP Waste Records Center.

This page intentionally left blank.

CHAPTER 12 – REFERENCES

Developmental Reference Documents:

- Department of Energy Handbook DOE-HDBK-1132-99, *Design Considerations*, dated April 1999
- DOE Contractor Requirements Document C 420.1, *Facility Safety*
- DOE Order O 430.1A, *Life Cycle Asset Management*
- 10 CFR 830.120, *Quality Assurance Requirements*
- DOE Order O414.1A, *Quality Assurance*
- SX-164, *Plant System and Component Identification and Labeling*
-
1. 1-W56-COEM-AMN-101, *Site Design Document Control (SDDC)*
 2. 2-C93-COEM-DES-273, *Engineering Standards for Procurement*
 3. MAN-071-IWCP, *Integrated Work Control Program Manual (IWCP)*
 4. 1-MAN-008-WM-001, *Transuranic (TRU) Waste Management Manual*
 5. 1-W36-APR-111, *Acquisition Procedure for Requisitioning Commodities and Services*
 6. MAN-027-SERM, *Site Engineering Requirements Manual*
 7. *Rocky Flats Environmental Technology Site Radiological Control Manual*
 8. 1-MAN-018-NSM, *Nuclear Safety Manual*
 9. 1-MAN-017-LLGI-RM, *Site Lessons Learned/Generic Implications Requirements Manual*
 10. Site Engineering Standard SC-206, *Natural Phenomena Hazard Analysis of Structures, Systems, and Components*
 11. MAN-066-COOP, *Site Conduct of Operations Manual*
 12. PRO-492-CCP-001, *Closure Commodity Procurement*
 13. PRO-572-PQR-001, *Procurement Quality Assurance Requirements*
 14. 1-PRO-453, *Master Agreement Subcontract Procurement*
 15. Site Engineering Standard SX-300, *General Drafting Standard*
 16. MAN-094-TUM, *Training Users Manual*
 17. 4-J44-RC&I-6600, *Procured Item Acceptance and Certification*
 18. 1-MAN-004-CSMM, *Computer Software Management Manual*
 19. *Radiological Safety Practices (RSP) 08.02*
 20. Department of Energy (DOE) M 440.1-1, *DOE Explosives Safety Manual*

21. TM5-1300, *Structures to Resist the Effects of Accidental Explosions*
 22. DOE/TIC-11268, *Matrix for a Manual for the Prediction of Blast and Fragment Loading of Structures*
 23. 1-PRO-072-001, *Inspection and Acceptance Test Process*
 24. 1-A65-ADM-15.01, *Control of Non-Conforming Items*
 25. *Site Quality Assurance Manual*
 26. 10 CFR, *Standard Review Plan*
 27. 3-91000-NSPM-5A-07, *Nuclear Safety Engineering Department Calculations*
 28. *American Institute of Steel Construction Manual*
 29. *Construction Specifications Institute (CSI) Manual of Practice*
 30. ASME NQA-1, (applicable edition), Subpart 2.2, *Quality Assurance Requirements*
 31. MAN-001-SDRM, *Site Document Requirements Manual (SDRM)*
 32. 1-V41-RM-001, *Records Management Guidance for Records Sources*
 33. 1-PRO-077-WIPP-005, *Management of Waste Isolation Pilot Plant (WIPP)*
 34. Standing Order 63, *Interim Measures for Procurement Specification Application*
-

164/164