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RECORD OF REVISION

Rev	Date	Description	POC	RM
0	06/28/99	Rewritten to support LIR220-03-01, FEM, superseding Facilities Eng Standards Index and Procedures, Vol 1, Rev 7, dated 7/17/98.	Mike Nicolini, <i>FWO-FE</i>	Dennis McLain, <i>FWO-FE</i>
1	04/26/00	Added ESB to approval process, I&C Chapter; addressed SC/SS design requirements. Admin requirements changed to address the FEM and Construction Specs but not Drafting Manual.	Tobin H. Oruch, <i>FWO-SEM</i>	Mitch Harris, <i>FWO-SEM</i>
2	09/26/01	FEM now LEM; POCs now Tech Committee Chairs and AHJs; Ch 1 Tech Comm created; periodic review changed from 2 years to 3; Drafting Manual applicability restored; other minor clarifications throughout.	Tobin H. Oruch, <i>FWO-SEM</i>	Mitch Harris, <i>FWO-SEM</i>
3	05/22/02	Stds Mgr approval of specs, std details, and quals vice OIC; added AE and other non-voting committee members; clarified Ch. 1 oversight by POCs and Tech Committee; QA Rep as non-voting ESB member; org name changes.	Tobin H. Oruch, <i>FWO-SEM</i>	Kurt Beckman, <i>FWO-SEM</i>
4	11/05/03	LEM to ESM, TRB to ESB per LIR Rev 2. OIC now Chief Engineer per LIR r3. Gave AEs and contractors voting status in committees.	Tobin H. Oruch, <i>FWO-DO</i>	Gurinder Grewal, <i>FWO-DO</i>
5	2/1/06	Made a purely Stds Team doc by moving user info like NCR/variance details to Z10; no substitution in spec/dwg requires sole source; IMP and org name changes, other minor changes throughout.	Tobin H. Oruch, <i>ENG-CE</i>	Mitch Harris, <i>ENG-DO</i>
6	10/27/06	ISD was 342-1. Organization and directive changes.	Tobin H. Oruch, <i>CENG-OFF</i>	Kirk Christensen, <i>CENG-OFF</i>

PURPOSE

This section defines the responsibilities of the personnel who maintain the LANL Engineering Standards – the Standards Team – per the requirements of [IMP 341](#), *Conduct of Engineering*.

Standards user information and requirements are contained in the ESM Introduction and Chapter 1 Section Z10, *General Requirements for All Disciplines*.

1.0 INTRODUCTION

1.1 Purpose

This section implements a formal system to address LANL-specific engineering requirements relative to the national codes, standards, and directives listed in Appendix G of the LANL contract and unique site-specific engineering requirements. This section is to be maintained as part of the ESM. Use of this section ensures that:

- Site-specific engineering requirements relative to the national codes and standards listed in the LANL contract are addressed;
- Suitable national codes and standards are adopted to support safety class and safety significant design requirements;
- A formal process is implemented to control the initiation, interpretation, preparation, revision and approval of engineering requirements;
- Authority and responsibilities for the ESM are established;
- Personnel who participate in the development of ESM requirements are qualified;
- An Engineering Standards Board is established for the final acceptance of changes;
- The Master Specs are revised commensurate with the revisions made to the ESM;
- Standard drawings and details are maintained;
- A Drafting Manual is maintained;
- Revisions are posted on the Standards website;
- Notification and issuance of ESM revisions are made;
- Reaffirmation reviews of the ESM take place within 3 years of last revision; and
- Appropriate records are identified and retained.

1.2 Scope

1.2.1 The scope of this section includes the administrative controls for the ISDs.

- The ESM defines the minimum engineering design requirements for structures, systems, and components at LANL.
- The LMSM, as a minimum, implements and communicates the ESM technical requirements in the form of Construction Specification Institute (CSI) MasterFormat-

numbered, SectionFormat (three-part) specifications for project use.

- The Drafting Manual provides requirements for facility drawings.

2.0 ACRONYMS AND DEFINITIONS

2.1 Acronyms

A/E	Architect/Engineer
AHJ	Authority Having Jurisdiction
CENG	Conduct of Engineering Program Office in the Engineering Directorate (ADE); the Responsible Office for Engineering Standards
CSI	Construction Specifications Institute
DES	Design Engineering Services, an FM&E Group
DOE	Department of Energy
ES	Engineering Standards
ESH&Q	Environment, Safety, Health, and Quality Assurance Directorate
FM&E	Facility Management & Engineering Division
LMSM	LANL Master Specifications Manual
ESB	Engineering Standards Board
ESM	LANL Engineering Standards Manual
POC	Point of Contact (ESM discipline-specific unless otherwise noted as LANL-wide)
PMS	Project Management Services Directorate
PSE	Plant Systems Engineering, an FME Group
SSC	structures, systems, and components
SME	Subject Matter Expert

2.2 Definitions

Approval Authority. Approval authority refers to the person who holds a title, position, or office that can approve engineering requirement issues.

Architect Engineer (A/E). The design service supplier responsible for producing design documents, often outside of the LANL organization but need not be.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, an installation, or procedure. (Ref: NFPA Fire Prevention Code Handbook, Chapter 2, First Edition, 1998). By the CENG Office Director's approval of this section of the Engineering Standards Manual, authority is hereby delegated to the POCs for their disciplines of the Engineering Standards (exceptions: Fire Marshal and Electrical Safety Committee are AHJs for those matters, Building Official for IBC administration).

Discipline Point of Contact (ESM POC). The LANL subject matter expert responsible for a discipline-specific chapter of the ESM and all associated specs and drawings. There is also a POC/AHJ for the Drafting Manual.

Institutional Standards. The LANL Institutional Standards include those in or referenced by the LANL contract, especially [Appendix G](#); the LANL policy documents that implement the App G.

[LANL Drafting Standards Manual.](#) A manual that sets the criteria for drafting (graphic) conventions for creating or modifying drawings for LANL facilities construction projects and revision of those drawings.

[LANL Engineering Standards Manual \(ESM\).](#) A manual, arranged by discipline-specific chapters, that includes engineering requirements relative to national codes and standards listed in Appendix G of the LANL contract and justifiable unique site-specific engineering requirements.

[LANL Master Specifications Manual \(LMSM\).](#) A manual that prescribes the supply, installation, and performance requirements for construction and modification projects.

[LANL Standard Drawings and Details.](#) A compilation of example drawings and repeatable details.

Record. Recorded information of any kind in any form maintained because it furnishes evidence of quality of items and/or activities affecting safety or compliance to specified requirements.

Subject Matter Expert. Any individual with acknowledged expertise in a given subject.

3.0 RESPONSIBILITIES

3.1 Division Leaders, Program Directors, Office Directors, or their Designees

- Ensures participation by selected personnel implementing this section.

3.2 CENG Office Leader

- Approves revisions of the ESM as the Responsible Manager.

3.3 CENG Engineering Standards Manager

- Manages overall standards program including schedule, budget, and resource loading, normally under a Project Management Plan.
- Collects and distributes comments and recommendations for ESM technical requirement changes to the respective POC.
- Coordinates ESM issues affecting more than one discipline.

- Serves as ESB Secretary and documents ESB decisions.
- Handles project-specific standards identification inquiries.
- Serves as POC for ESM Chapter 1, General.
- Oversees webposting and recordkeeping of approved documents.
- Maintains a Quality Assurance Plan for the program/process.

3.4 Discipline Point of Contact (POC)

- Functions as the technical committee Chair.
- Sets the technical committees agenda and meeting schedules.
- Performs as the senior technical lead within the respective technical committee.
- Secures the necessary SME involvement when such needs are identified.
- Responds to requests for clarification, interpretation, alternate method, variance, and exception to ISD requirements.
- Identifies cross-references between ESM requirements that could be affected by the proposed technical requirement changes.
- Identifies and prepares changes to the other ES documents resulting from ESM technical requirement changes.
- Documents the technical committee recommendations.
- Prepares ESM technical requirement changes for ESM incorporation.
- Presents proposed ESM changes to the ESB.
- In most cases, the POC will also be the AHJ (see definition of AHJ above).

3.5 Technical Committee Members and Alternates

- Participates in technical committee meetings.
- Ensures that recommended changes to the ES are technically reviewed in a prompt manner when requested.
- Interacts with other technical committee members and Subject Matter Experts (SMEs) for determination of ESM requirements/guidance.
- Documents comments, recommendations, and technical bases regarding ESM requirements.

3.6 Subject Matter Expert (SME)

- Advises POC in specific areas of expertise.
- If requested, provides independent review of proposed technical requirement changes.
- Provides technical recommendation for or against proposed technical requirement changes.

- Supports and participates in the technical committee meetings as requested by the POC.

3.7 Engineering Standards Board (ESB) Members and Alternates

- Serve as a subcommittee of the Engineering Practices Council (ref. IMP 341)
- Considers the overall potential impact of ESM technical requirement changes on LANL mission and performance goals.
- Performs final approval of proposed technical requirement changes to the ESM.

3.8 Quality Assurance Representative

- Performs QA reviews of any material promulgated for or affecting safety-related work (ML-1, ML-2, SC, SS) (*typically the ESM and glovebox-related specs but not drawings, other specifications, or the Drafting Manual*) and any program documents addressing quality such as the QA and Project Management Plans. A non-voting member of the ESB.

3.9 Administrative Assistant/Program Admin/Doc Control & Records Management

- Performs editing and assists with review, archiving, and webposting processes.

4.0 PROCEDURAL STEPS

4.1 Background

- 4.1.1** This section provides for the selection, review and revision of technical requirements to be applied in the development of new LANL systems and the maintenance and modification of existing systems.
- 4.1.2** These requirements are consolidated, by discipline, into respective chapters of the ESM. The sources for these requirements include Appendix G of the LANL contract, existing codes and standards from previous project baselines, proposed codes and standards from new projects, and requested changes resulting from maintenance and modification activities. The establishment of the ESM thus provides a method for LANL's compliance to the contract and a consistent level of quality in the design, construction and maintenance of LANL SSCs.
- 4.1.3** The Master Specs are developed following the latest CSI MasterFormat formats for project and maintenance use and, along with the Standard Drawings and Details, promulgate the ESM technical requirements and provides a consistent and uniform means to develop project specifications.
- 4.1.4** The LANL Drafting Standards Manual is maintained by a POC in a manner similar to the ESM Discipline chapters.

4.2 Methodology

- 4.2.1** The process of selection, review, and approval of technical requirements for inclusion into the ESM utilizes the concepts of:

- a Standards Manager for overall program management and coordination
- single-point contacts (POCs) for each discipline (e.g., Civil, Drafting, etc.)
- technical committees of technically competent individuals assigned per discipline representing experience and diverse backgrounds (e.g., PMS, QA, and FM&E)
- subject matter experts on an as-needed basis
- an ESB to conduct a final review and approval of changes to the ESM

4.2.2 This section ensures that appropriate technical requirements are identified and integrated into the Standards as they are needed. This section also requires formal change control for controlling revisions.

4.2.3 The process is summarized as follows:

- Technical requirement inputs, such as specified by App G, capture of existing facility codes and standards, new facility project requirements, and requested changes resulting from facility maintenance and/or modification activity requirements are collected by the Standards Manager and forwarded to the respective POC.
- Furthermore, when technical requirements are recognized to support compliance with safety class and safety significant design requirements, these relationships are documented in the ESM.
- The POC initiates action by the technical committees as appropriate to review proposed changes to the ES and documents those recommendations.
- As necessary, the POC may request input from one or more SMEs to aid in preparation of the ES.
- Broader review by the Lab (e.g., via PPC@lanl.gov listserv) is required when requirements on programs (vs. facilities) are involved; recommended at all times.

4.2.4 When requested by the POC, the Standards Manager arranges for the presentation of the recommended ESM changes to the ESB for consideration. The ESB, upon completion of the review, may vote to accept or reject the recommendation. If rejected, the technical requirement recommendation is returned to the responsible technical committee for resolution. If accepted, the Standards Mgr prepares the section for CENG Office Leader approval and incorporation into the ESM.

4.2.5 Issues such as clarifications and interpretations may be directly responded to by the POC.

4.2.6 Revisions to the three non-ESM ES documents and specifically-self-exempted ESM listings such as the labeling acronym listings are administratively controlled in an identical fashion to the ESM with the exception that their revisions do not require ESB approval; Standards Manager approval is sufficient for these implementing documents. Similarly, administrative changes that do not increase the cost or impact or requirements can be made with the approval of the Standards Manager. Examples include grammatical and other error corrections, clarifications, reference and organizational name changes, etc. These can be issued as a new revision, as a Change (e.g., Chg 1) to a revision, or made online if very minor (e.g., typo or URL update).

4.2.7 The non-ESM ISDs should never be revised to conflict or take exception to the ESM.

4.3 Selection of Key Standards Program Personnel

4.3.1 The technical committees, ESB, POCs, and SMEs are selected by the Standards Manager, with CENG Office Leader oversight, such that the composition of individuals and requisite expertise results in a broad representation of technical disciplines and subject areas. The technical committees are to be composed of knowledgeable individuals from the various stakeholder organizations. The following membership is recommended, as a minimum:

- **Point of Contact (ESM Discipline POC)**

The Stds Mgr appoints a POC (and alternate normally) knowledgeable in the respective discipline area. The POC is the senior technical expert on the technical committee. The POC is ideally a prime contractor (e.g., LANS) employee with a minimum of 10 years experience. A registered professional engineer or architect is preferred (exceptions include General, Security, Welding, Radiation Protection, and IBC Building Safety Program, Drafting). The qualifications of each POC should be documented by resume on file or using Appendix B, “ESM Personnel Qualification Record.”

- **Technical Committee and Alternates**

Nominally has broad representation (e.g., FM&E including DES and PSE; PMS, QA, ESH) knowledgeable in the respective discipline area. Membership is subject to approval by the POC. AE firms are encouraged to participate. Each technical committee is organized and run by the Discipline POC. *The Chapter 1-General Configuration Management (Section 200 series) committee should include field personnel with CM experience and POCs for equipment-related disciplines (Mechanical, Electrical, and I&C). Chapter 1 Sections 100 and Z10 revisions should be reviewed by the POCs and other stakeholders such as PMS.*

- **ESB and Alternates**

The ESB is chaired by the CENG Office Director and nominally includes Group and Division Leaders from the following organizations: FME-DES, FME-PSE, RDL organizations, ESH&Q, PMS, Utilities, and the Fire Marshal. They are assumed qualified by virtue of their positions. The QA Representative is a non-voting member of the ESB, appointed by QA-IQ. The ESB members and alternates shall be independent of the technical committees and SMEs to the extent possible; Tech Committee personnel acting as an ESB member/alternate shall abstain from voting on that committee’s recommendations to avoid a conflict of interest. The Standards Manager serves as ESB Secretary.

- **Standards Manager**

The CENG Office Director appoints a Standards Manager, typically an engineer or architect having over 15 years experience in the use of codes and standards. The qualifications of the Standards Manager are documented by resume or using the format in Appendix B. The Manager may be assisted by a Standards Engineer, Architect, or Coordinator who, if delegated authority, shall meet the same qualifications.

- **SMEs**

SMEs are called upon by POCs for their expertise on a particular subject.

4.4 Review, Acceptance, and Approval of Proposed ESM Requirement Changes

4.4.1 Technical change requests may be presented as

1. Contract-driven,
2. New project-related requirements,
3. Capture of existing facility requirements,
4. Proposed alternate methods, and/or
5. Industry events and lessons learned.

4.4.2 *Input from industry events should be evaluated periodically for impact to the ESM. LANL Occurrence Reports, DOE Lesson Learned, and Issues Tracking I-Track system should be reviewed by the Standards Manager or POCs on a quarterly basis for potential input into the maintenance of the ESM.*

4.4.3 The technical committee activity is initiated by the POC (*should also involve the Standards Manager*) and reviews the changes provided by the POC for consideration into the ESM. The POC documents their review and provides a technical evaluation and recommendation for incorporation into the ESM or basis for rejection. This review is to:

1. Determine if incorporation of the technical requirement is necessary and prudent to achieve compliance to the WSS;
2. Ensure a level of quality and consistency in the design, construction and maintenance of LANL SSCs; and
3. Capture existing facility technical requirements not presently in the ESM but, based on the review, should be.

Additional factors such as life-cycle costs associated with a technical requirement change, associated impacts to other disciplines, environmental impact, and compliance issues pertaining to nuclear safety class and safety significant requirements should also be considered.

The basis (justification) for all new or revised requirements and guidance in the ESM and Drafting Manual not immediately obvious to the untrained should be captured in an endnote, especially those technical requirements implementing federal/state mandates or commitments made to regulatory agencies as the result of inspections, audits, or accident investigations. *Bases for LMSM and Standard Detail requirements should be filed in the respective files. Spec bases can also be captured in author notes throughout the document or at the end.*

Appendix C, ESM Change Proposal, should be used to document the technical committee review, evaluation, and technical requirement change recommendation.

4.4.4 The consensus of active technical committee members or alternates is desirable to proceed with an ESM technical requirement change.

- 4.4.5** Programmatic requirements should receive consensus approval of LANL POCs prior to issuance (they should also be specifically identified in the Manuals as programmatic or identified with a matrix of applicability). *Such labwide review is recommended for all substantial ESM changes regardless of programmatic impact. This is normally accomplished by posting drafts on the Standards Homepage and then notifying of the review opportunity Lab POCs via PPC@lanl.gov.*
- 4.4.6** Based on the review outcome, the POC presents the draft revised ESM section to the ESB for approval in coordination with the Standards Manager.
- 4.4.7** The ESB, as requested by the respective POC via the Standards Manager, convenes to consider the technical requirement recommendations. The ESB decision is documented on Appendix D, *ESB Meeting Attendance and Voting Record*. The quorum for the ESB to convene is a minimum of 5 members. The ESB decision for acceptance/rejection is by simple majority rule and is to be based on the same factors given above, along with any considerations for long-term, broad-based impact to LANL mission and performance goals. Rejections are to be returned to the respective POC for resolution.
- 4.4.8** If accepted by the ESB, the Standards Manager prepares the change into the proper format for incorporation into the ESM, and submits the ESM revision to the CENG Office Director for approval signature via Appendix A.
- 4.4.9** Changes to the non-ESM ES documents shall also be identified by the POC. *Revised specs should be forwarded to the respective technical committee for review prior to optional, broader review.* For non-ESM changes, CENG Office Director delegates approval to Standards Manager; approval is documented on Appendix A and filed.
- 4.4.10** Changes to documents that could affect nuclear safety or other ML-1/2 work shall also receive both a QA and an independent technical review (see QA Plan for Program).
- 4.4.11** No substitution: Use of this concept requires written sole source justification. For the ESM and DM, this should be via endnote. For the other ES documents, this is to be via a separate written document which is to be accepted by Standards Manager and filed in a folder in the spec or drawing file.

4.5 Interpretation, Clarification, Alternate Method, Variance, and Exception

- 4.5.1** See ESM Chapter 1 Section Z10 for requirements for these processes.

4.6 Manual Distribution and Control

- 4.6.1** The Standards Manager ensures that the revised ES material is posted on the Standards webpage within 10 working days of approval and then issues an electronic memo notifying all organization users of the revised manuals within 30 days of webposting. *This is typically done monthly via a “Engineering Standards Update” e-mail to PPC@lanl.gov, FME, PMS, SSS (e.g., KSL), and an additional list of those specifically requested such notification.*

4.7 Assessments

- 4.7.1** Assessments shall be performed as scheduled by the Standards Manager, the CENG Office Director, and/or the applicable auditing group.

5.0 REQUIRED RECORDS

5.1 Responsibilities

5.1.1 The Standards Manager shall ensure electronic, back up, and hardcopy files of the ES are maintained.

5.1.2 The following documents shall be maintained:

- Personnel qualification records
- ESM Change Proposals
- ESB Meeting Attendance and Voting Record

6.0 REFERENCES

- IMP 341, Conduct of Engineering
- IMP 311, Institutional Policies, Implementation Procedures, and Related Documents
- ISD 311-1, Manual for Preparing Policies, Procedures and Related Documents

APPENDICES

Appendix A:	Approval Form
Appendix B:	ESM Personnel Qualification Record
Appendix C:	ESM Change Proposal
Appendix D:	ESB Meeting Attendance and Voting Record