

APPENDIX A

DESIGN CRITERIA DOCUMENT REQUIREMENTS

RECORD OF REVISIONS

Rev	Date	Description	POC	OIC
0	11/17/03	Initial issue.	Tobin Oruch, FWO-DO	Gurinder Grewal, FWO-DO
1	10/27/06	Administrative changes only. Organization and contract reference updates from LANS transition; 420.1A became 420.1B. IMP and ISD number changes based on new Conduct of Engineering IMP 341. Other administrative changes.	Mel Burnett, FME-PSE	Kirk Christensen, CENG

PLEASE CONTACT THE NUCLEAR ENGINEERING STANDARDS POC
for upkeep, interpretation, and variance issues

Section F1030.3 App A	<u>Nuclear POC/Committee</u>
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Content, outline, and format requirements

NOTE: This document is formatted to aid using it as a template for creating the required design criteria document in a manner similar to editing the LANL Master Specification Manual (LMSM) sections.

As such, some of the instructions and explanatory material for the author (and intended for deletion before issuing document) are set off with lines of asterisks.

Also, as with LMSM sections, authors may add material as needed but shall only delete sections that in no way apply to the project.

Use the DC document to identify the basic processes, operational functions, and design requirements including:

Design Criteria Document

1. General description of the project, scope, and purpose
2. Site location and environmental conditions including topography and geology
3. Project classifications

Determine or obtain and state the various project classifications (on a preliminary basis if need be) including:

- A. Hazard Categories: Identify categorization per hazard analysis (use latest document available among HA, PHA, and DSA iterations). For modifications, identify whether the modification changes current hazard category and reference the basis (*see Section 2.0, Acronyms and Definitions, and ESM Chapter 1 Section Z10*).
- B. Management Level: Identify the management level(s) (MLs) for the project if applicable (*see Section 2.0 Acronyms and Definitions*).
- C. Occupancy Classifications: Include the International Building Code and [NFPA-101](#) (Life Safety Code) use and occupancy classifications for the facility and state the code to be used (e.g., give the editions of IBC and NFPA 101 required by ESM Chapter 1 Section Z10).
- D. Safeguard Classification: Include the safeguards classification for material protection limits (e.g. Cat I, II, III, IV) as defined in latest revision of DOE M 474.1-1, Manual for Control and Accountability of Nuclear Materials.
<https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/474/m4741-1a.pdf>. See also ESM Chapter 9, Security.
- E. PC Category: Identify the natural phenomenon hazard Performance Category from the documented safety analysis (*these are based on DOE-STD-1021, latest revision; see ESM Chapter 5, Structural. For new buildings this can probably be done for the overall structure initially and individual SSCs classified later in the design process.*)
- F. Classify SSCs as safety class (SC), safety significant (SS), important to safety (ITS), or non-safety based on the PDSA (nuclear). Guidance: This is a requirement applicable to LANL nuclear facilities via its LANS Contract App G inclusion of DOE-STD-3009. *When modifying*

existing facilities, ML and SC/SS designations are generally possible at the beginning of design; for new facilities, this designation is often done together by the safety analysis and design personnel as discussed in Section 4.0 of this ESM Chapter 12.

G. Priority Drawing Identification: Identify the priority drawings per LIR240-01-01, Facility Configuration Management and ESM Chapter 1 Section Z10. *Guidance: Do this no later than start of final (detailed/Title II) design phase (NOTE: priority document development, format, and content requirements are contained in other ESM chapters).*

H. Space management program and design use/current use classifications.

4. Preliminary system descriptions including process flow diagrams and/or process & instrumentation diagrams if applicable
5. General design parameters, objectives, and construction features.
6. Broadly applicable DOE Orders, codes, standards, and regulations.
 - A. The LANS contract Appendix G found at <http://www.doeal.gov/laso/NewContract.aspx>
 - B. The LANL Engineering Standards including Engineering Standards Manual, LANL Master Specifications, Standard Drawings and Details, and Drafting Manual.
 - C. The LANL LPRs, LIRs, LIGs, IMPs, and ISDs that are directly applicable to the project design effort.
 - D. National, state and local codes, standards, and regulations.
 - E. Industry, plant, and project-specific standards, and design requirements.
7. Relevant technical reports/data, and trade studies.
8. Safety analysis/authorization basis requirements and engineered controls for the project.
9. Other technical considerations (e.g. special requirements for preferred technologies, major assumptions, ALARA, constructability, energy conservation, life cycle cost considerations, and start-up and commissioning requirements).
10. Additional Requirements/Criteria

Address the following additional conditions and requirements (both as drivers for the design and issues driven by the design) in the design criteria/F&ORs (and in the final design) as applicable. **If generally applicable to the project, address in this section (i.e., near the beginning of the document); if specific to part of the project, address below in the UniFormat outline portion of the document that follows this section.**

- A. Functional and physical interface requirements both between plant equipment and operation and maintenance personnel.
- B. Operational and test requirements under various conditions (e.g., normal, off-normal, upset, and accident).
- C. Redundancy, diversity, and separation requirements of structures, systems, and components when required for safety, reliability, availability, or operational necessity.

- D. Design and performance requirements for SSCs as determined by a failure modes and effects analysis.
- E. Other component and system test requirements (e.g., acceptance, start-up, and periodic maintenance).
- F. Accessibility, maintenance, repairs, and in-service inspection requirements.
- G. Personnel requirements and limitations, including training requirements and start-up and recurring qualification requirements.
- H. Transportability requirements.
- I. Handling, storage, cleaning, and shipping requirements.
- J. Load path requirements for installation, removal, and repair of equipment and replacement of major components.
- K. Special clearances for roads, doors, aisleways, stairways, etc., (beyond standard life safety and ESM Civil chapter requirements).
- L. Any special requirements for construction including existing site and operational hazards.
- M. Material requirements for design or project facilities and equipment.
- N. Fabrication and installation requirements.
- O. Required startup and recurring tests, inspections, and certifications associated with safety items and systems.
- P. Industrial Safety (over and above any design considerations for constructability and construction safety).
- Q. Environmental protection needs/constraints
- R. Special requirements for waste management including minimization/avoidance/handling/storage and permitting (e.g., facility and process systems shall be designed to minimize generation of radiological and mixed (radioactive and hazardous) wastes; if controlled wastes are generated, then appropriate space allocations and design features shall be made for storage areas complying with all federal and state requirements).
- S. Sustainable design goals and requirements (ref ESM Chapter 14, Sustainable Design, and [LANL Sustainable Design Guide, LA-UR 02-6914](#)).
- T. All other required project specific requirements (e.g., LANL site/environmental specific conditions, pollution prevention/waste minimization requirements, special site-specific standards, and requirements of the responsible Facility Management and Operations organizations).

Structure, System, and Component Design Criteria

(also known as UniFormat Design Criteria)

For large projects or criteria that are not project-wide, specify the design criteria in the relevant UniFormat categories below where practical. It is not necessary to repeat LANL Engineering Standards requirements in each section if the Standards are invoked in total elsewhere the design criteria document.

ELEMENT Z	General
Z10	General
Z1010	Administration
Z1020	Quality Requirements
Z1030	Temporary Facilities
Z1040	Project Closeout
Z1050	Permits, Insurance, and Bonds
Z1060	Fee
Z20	Contingencies
Z2010	Design Contingency
Z2020	Escalation Contingency
Z2030	Construction Contingency
ELEMENT A	Substructure
A10	Foundations
A1010	Standard Foundations
A1020	Special Other Foundations
A1030	Slab on Grade
A20	Basement Construction
A2010	Basement Excavation
A2020	Basement Walls
ELEMENT B	Shell
B10	Superstructure
B1010	Floor Construction
B1020	Roof Construction
B20	Exterior Enclosure
B2010	Exterior Walls
B2020	Exterior Windows
B2030	Exterior Doors
B30	Roofing
B3010	Roof Coverings

B3020 Roof Openings

ELEMENT C

Interiors

C10 Interior Construction

C1010 Partitions

C1020 Interior Doors

C1030 Fittings Specialties

C20 Stairs

C2010 Stair Construction

C2020 Stair Finishes

C30 Interior Finishes

C3010 Wall Finishes

C3020 Floor Finishes

C3030 Ceiling Finishes

ELEMENT D

Services

D10 Conveying

D1010 Elevators and Lifts

D1020 Escalators and Moving Walks

D1090 Other Conveying Systems

D20 Plumbing

D2010 Plumbing Fixtures

D2020 Domestic Water Distribution

D2030 Sanitary Waste

D2040 Rain Water Drainage

D2090 Other Plumbing Systems

D30 Heating, Ventilating, and Air Conditioning (HVAC)

D3010 Energy Supply

D3020 Heat Generation

D3030 Refrigeration

D3040 HVAC Distribution

D3050 Terminal and Packaged Units

D3060 HVAC Instrumentation and Controls

D3070 Testing, Adjusting, and Balancing

D3090 Other Special HVAC Systems and Equipment

D40 Fire Protection

D4010 Sprinklers

D4020 Standpipes

D4030 Fire Protection Specialties

D4090 Other Fire Protection Systems

D50 Electrical

D5010 Electrical Service and Distribution

D5020 Lighting and Branch Wiring

D5030 Communications and Security
D5090 Other Electrical Systems

ELEMENT E Equipment and Furnishings

E10 Equipment
E1010 Commercial Equipment
E1020 Institutional Equipment

including process materials handling, production, and storage

E1030 Vehicular Equipment
E1090 Other Equipment

E20 Furnishings
E2010 Fixed Furnishings
E2020 Moveable Furnishings

ELEMENT F Special Construction and Demolition

F10 Special Construction
F1010 Special Structures
F1020 Integrated Construction
F1030 Special Construction Systems
F1030.1 Hazardous Process
F1030.2 Radiological Protection

F1030.3 Nuclear

Refer to:

1. *ESM Chapter 12 and others as applicable; DOE O 420.1B -- Facility Safety*
2. *The design basis accidents (postulated accidents or natural phenomena scenarios) to the extent known and the resulting conditions for which the safety SSC shall be designed in order to meet their nuclear safety functional and performance requirements.*
3. *Operating Conditions (that either warrant or affect nuclear controls or are constrained by them).*

F1033 Safeguards and Security

F1040 Special Facilities
F1050 Special Controls and Instrumentation

including Process Instrumentation and Control Systems

F20 Selective Demolition
F2010 Building Elements Demolition
F2020 Hazardous Components Abatement

ELEMENT G Building Sitework

G10 Site Preparation
G1010 Site Clearing
G1020 Site Demolition and Relocations

G1030 Site Earthwork
G1040 Hazardous Waste Remediation

G20 Site Improvements
G2010 Roadways
G2020 Parking Lots
G2030 Pedestrian Paving
G2040 Site Development
G2050 Landscaping

G30 Site Civil/Mechanical Utilities

include metering requirements for utilities (Note: Electrical addressed by ESM Ch 7, Electrical)

G3010 Water Supply
G3020 Sanitary Sewer
G3030 Storm Sewer
G3040 Heating Distribution
G3050 Cooling Distribution
G3060 Fuel Distribution
G3090 Other Site Mechanical Utilities

G40 Site Electrical Utilities
G4010 Electrical Distribution
G4020 Site Lighting
G4030 Site Communications and Security
G4090 Other Site Electrical Utilities

G90 Other Site Construction
G9010 Service Tunnels
G9090 Other Site Systems