

Attachment C

CODES & STANDARDS

(Page 1 of 6)

Code	Title	Date
Code of Federal Regulations		
10 CFR 50.2	Definitions	1999
10 CFR 830.120	Quality Assurance Requirements	2001
10 CFR 834	Radiation Protection of Public and the Environment (Proposed Rule), Federal Register	3/25/1993
10 CFR 835	Occupational Radiation Protection	1999
29 CFR 1910	Occupational Safety and Health Standards: Subpart G, Occupational Health and Environmental Control; Subpart H, Hazardous Materials; and Subpart Z, Toxic and Hazardous Substances	1994
29 CFR 1910.134	Respiratory Protection	1999
29 CFR 1926	Safety and Health Regulations for Construction	1999
American Conference of Governmental Industrial Hygienists		
ACGIH 2092-1998	Industrial Ventilation: A Manual of Recommended Practices	1998
American National Standards Institute/American Concrete Institute		
ACI-318-99	Building Code Requirements for Reinforced Concrete with Commentary	1999
ANSI/ACI 349-06	Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-85) and Commentary (ACI 349R-85)	2007
American National Standards Institute/American Institute of Steel Construction		
AISC M011-1980	Manual of Steel Construction Allowable Stress Design	Latest Ed.
ANSI/AISC N690-1994	Specifications for the Design, Fabrication, and Erection of Steel Safety- Related Structures for Nuclear Facilities	2006
American National Standards Institute/American Nuclear Society		
ANSI C2-1997	National Electrical Safety Code	1997
ANSI N14.6-1993	Radioactive Materials—Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More	1993
ANSI N43.2-1989	Radiation Safety for X-ray Diffraction and Fluorescence Analysis Equipment	1989
ANSI N278.1-1975	Self-Operated and Power-Operated Safety-Related Valves Functional Specification Standard	1992
ANSI N320-1979	Performance Specifications for Reactor Emergency Radiological Monitoring Instrumentation	1993
ANSI N323-1978	Radiation Protection Instrumentation Test and Calibration	1993
ANSI Z9.2-1979	Fundamentals Governing the Design and Operation of Local Exhaust Systems	1991
ANSI Z124.2-1995	Plastic Shower Receptors and Shower Stalls	1995
ANSI Z358.1-1998	Emergency Eyewash and Shower Equipment	1998
ANSI/ANS 11.16	Design Guides for Radioactive Material Handling Facilities and Equipment	1988
ANSI/ANS 6.4.2-1985	Specification for Radiation Shielding Materials	1997
ANSI/ANS 8.3-1997	Criticality Accident Alarm Systems	1997
ANSI/ANS 59.2-1985	Safety Criteria for Nuclear Power Plants—HVAC Systems Located Outside Primary Containment	1985

Attachment C

CODES & STANDARDS

(Page 2 of 6)

Code	Title	Date
ANSI/ANS N2.3-1979	Immediate Evacuation Signal for Use in Industrial Installations	1979
ANSI/ANS N13.1-1969	Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities	1999
ANSI/ANS N42.18	Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents	1991
American National Standards Institute/American Petroleum Institute		
ANSI/API-620-1998	Rules for Design and Construction of Large, Welded, Low- Pressure Storage Tanks	1998
ANSI/API-650-1998	Welded Steel Tanks for Oil Storage	1998
American National Standards Institute/American Society of Mechanical Engineers		
ASME F00230	Boiler and Pressure Vessel Code	1986
ANSI/ASME B16.5-1998	Pipe Flanges and Flanged Fittings (Includes Revision Service)	1998
ANSI/ASME B30.2-1996	Overhead and Gantry Cranes	1998
ANSI/ASME B31.3-1996	Process Piping	1996
ANSI/ASME B73.1M-1991	Horizontal End Suction Centrifugal Pumps for Chemical Process	1992
ANSI/ASME B73.2M-1991	Specifications for Vertical In-Line Centrifugal Pumps for Chemical Process	1991
ANSI/ASME B96.1-1993	Welded Aluminum-Alloy Storage Tanks	1993
ANSI/ASME N509	Nuclear Power Plant Air-Cleaning Units and Components	1996
ANSI/ASME N510-1995	Testing of Nuclear Air-Cleaning Systems	1995
ANSI/ASME NOG-1-1998	Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)	1998
American National Standards Institute/American Society for Testing and Materials		
ANSI/ASTM C852-93	Standard Guide for Design Criteria for Plutonium Gloveboxes	1997
American Society of Civil Engineers		
ASCE 4-98	Seismic Analysis of Safety-Related Nuclear Structures	1998
American National Standards Institute/Institute of Electrical and Electronic Engineers		
ANSI/IEEE C37 series	Circuit Breakers, Switchgears, Substations, and Fuses (standards on switchgear as required)	1998
ANSI/IEEE C37.98	Standard Seismic Testing of Relays	1987
ANSI/IEEE 7-4.3.2	Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations	2010
ANSI/IEEE 80-1986	Safety in AC Substation Grounding	1991
ANSI/IEEE 141-1993	Recommended Practice for Electric Power Distribution for Industrial Plants (Red Book)	1993
ANSI/IEEE 142-1991	Recommended Practice for Grounding of Industrial and Commercial Power Systems	1991

Attachment C

CODES & STANDARDS

(Page 3 of 6)

Code	Title	Date
ANSI/IEEE 242-1986	Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems	2001
ANSI/IEEE 308-1980	Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations	1991
ANSI/IEEE 323-1990	Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations	2003
ANSI/IEEE 334-1994	Standard for Qualifying Continuous Duty Class 1E Motors for Nuclear Power Generating Stations	1994
ANSI/IEEE 336-1985	Standard for Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities	1991
ANSI/IEEE 338-1987	Standard for Criteria for the Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems	1993
ANSI/IEEE 344-1987	Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations	2004
ANSI/IEEE 379-1994	Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems	2000
ANSI/IEEE-381-1977	Standard Criteria for Tests of Class 1E Modules Used in Nuclear Power Generating Stations	1977
ANSI/IEEE 382-1985	Standard for Qualification of Actuators for Power-Operated Valve Assemblies with Safety-Related Functions for Nuclear Power Plants	2006
ANSI/IEEE 383-1974	Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations	2003
ANSI/IEEE 384-1992	Standard for Criteria for Independence of Class 1E Equipment and Circuits	2008
ANSI/IEEE 399-1997	Recommended Practice for Power Systems Analysis (IEEE Brown Book)	1997
ANSI/IEEE-420-2001	Standard for the Design and Qualification of Class 1E Control Boards and Racks Used in Nuclear Generating Stations	2001
ANSI/IEEE 450-1987	Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications	1995
ANSI/IEEE 484-1987	Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications	1996
ANSI/IEEE 493-1997	Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems (IEEE Gold Book)	1997
ANSI/IEEE 535-1986	Standard for Qualification of Class 1E Lead Storage Batteries for Nuclear Power Generating Stations	1994
ANSI/IEEE 577-1976	Standard Requirements for Reliability Analysis in the Design and Operation of Safety Systems for Nuclear Power Generating Stations	2004
ANSI/IEEE 603-1998	Standard Criteria for Safety Systems for Nuclear Power Generating Stations	2009
ANSI/IEEE 628-1987	Standard Criteria for the Design, Installation, and Qualification of Raceway Systems for Class 1E Circuits for Nuclear Power Generating Stations	2001
ANSI/IEEE 649-1991	Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations	1991
ANSI/IEEE 650-1991	Standard for Qualification of Class 1E Static Battery Chargers and Inverters for Nuclear Power Generating Stations	1991

Attachment C

CODES & STANDARDS

(Page 4 of 6)

Code	Title	Date
ANSI/IEEE 833-1988	Recommended Practice for the Protection of Electric Equipment in Nuclear Power Generating Stations from Water Hazards	2005
ANSI/IEEE 934-1987	Requirements for Replacement Parts for Class 1E Equipment in Nuclear Power Generating Stations	1993
ANSI/IEEE 944-1986	Recommended Practice for the Application and Testing of Uninterruptible Power Supplies for Power Generating Stations	1996
ANSI/IEEE 946-1993	Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations	1993
ANSI/IEEE 1023-1988	Guide for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations	1995
ANSI/IEEE 1050-1989	Guide for Instrumentation and Control Equipment Grounding in Generating Stations	2004
ANSI/IEEE 1205-2000	Guide for Assessing, Monitoring, and Mitigating Aging Effects of Class 1E Equipment Used in Nuclear Power Generating Stations	2000
American Society of Heating, Refrigerating and Air Conditioning Engineers		
ASHRAE Handbook	Fundamentals (Inch-Pound Edition), R.A. Parsons, ed.	1997
ASHRAE Standard 52.1-1992	Gravimetric and Dust-Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter	1992
ASHRAE Standard 62-99	Ventilation for Acceptable Indoor Air Quality (Includes Supplement ANSI/ASHRAE 62A-1991)	1999
American Water Works Association		
AWWA D100-84	Welded Steel Tanks for Water Storage	1984
AWWA D100a-89	Welded Steel Tanks for Water Storage (Supplement to ANSI/AWWA D100-84)	1989
AWWA D100-96	Welded Steel Tanks for Water Storage (Includes Supplement to ANSI/AWWA D100a-89)	1996
AWWA standards on pumps	As Required	Latest Ed.
Crane Manufacturers Association of America		
CMAA standards as required	As Required	Latest Ed.
TM 5-1300, NAVFAC P-397, AFM 22	Structures to Resist the Effects of Accidental Explosions, Departments of the Army, the Navy, and the Air Force, Chairman, Department of Defense Explosives Safety Board	Latest Ed.
Department of Energy		
DOE	RELIABILITY, AVAILABILITY, AND MAINTAINABILITY GUIDELINES (Draft)	Mar-88
DOE O 151.1	COMPREHENSIVE EMERGENCY MANAGEMENT SYSTEMS	8/21/1996
DOE O 414.1D	Quality Assurance	2011
DOE O 420.1	FACILITY SAFETY	10/13/1995
DOE G 420.1-2	Guide for the Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities	2000

Attachment C

CODES & STANDARDS

(Page 5 of 6)

Code	Title	Date
DOE G 420.1.3	Implementation Guide for DOE Fire Protection and Emergency Services Programs for Use with DOE O 421.1B, Facility Safety	2007
DOE O 420.1B	Facility Safety, Change 1	2010
DOE O 430.1A	LIFE CYCLE ASSET MANAGEMENT	10/14/1998
DOE O 433.1A	Maintenance Management Program for DOE Nuclear Facilities	2007
DOE O 435.1	RADIOACTIVE WASTE MANAGEMENT	7/9/1999
DOE 5480.23	NUCLEAR SAFETY ANALYSIS REPORTS, Change 1	3/10/1994
DOE 5480.30	NUCLEAR REACTOR SAFETY DESIGN CRITERIA	1/19/1993
DOE/EH-0256T	Radiological Control Manual	Apr-94
DOE-HDBK-3010-94	Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities	Dec-94
DOE-STD-1090-99	Hoisting and Rigging (Formerly Hoisting and Rigging Manual)	Mar-99
DOE M 440.1-1	DOE EXPLOSIVES SAFETY MANUAL	9/30/1995
DOE-STD-3020-97	Specifications for HEPA Filters Used by DOE Contractors	Jan-97
DOE-STD-1020-94	Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities	2002
DOE-STD-1021-93	Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components, Revision 1	Jul-93
DOE-STD-1022-94	Natural Phenomena Hazards Characterization Criteria	2002
DOE-STD-1023-95	Natural Phenomena Hazards Assessment Criteria	Sep-95
DOE-STD-1024-92	Guidelines for Use of Probabilistic Seismic Hazard Curves at Department of Energy Sites for Department of Energy Facilities	Dec-92
DOE-STD-1027-92	Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports	Dec-92
DOE-STD-1066-99	Fire Protection Design Criteria	Jul-99
DOE-STD-1075-94	Standard for Developing and Issuing DOE Safety Guides and Implementation Guides	Jul-94
DOE-STD-3009-94	Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports	Jul-94
DOE-STD-3024-98	Content of System Design Descriptions	1998
DOE/TIC-11268	A Manual for the Prediction of Blast and Fragment Loading of Structures	Nov-80
Electronic Industries Association		
EIA/IS-632	Systems Engineering	Dec-94
Energy Research and Development Administration		
ERDA 76-21	Burchsted, C.A., Nuclear Air Cleaning Handbook: Design, Construction, and Testing of High-Efficiency Air-Cleaning Systems for Nuclear Application (Oak Ridge National Laboratory, Oak Ridge, Tenn.), 2nd ed.	1976

Attachment C
CODES & STANDARDS
(Page 6 of 6)

Code	Title	Date
Faust		
Faust, L.G., et al.	Health Physics Manual of Good Practices for Plutonium Facilities, PNL-6534, Pacific Northwest Laboratories, Richland, Wash.	May-88
Hydraulic Institute Standards		
HIS Standards as required	As Required	Latest Ed.
Illuminating Engineering Society		
Rea, M.S.	Lighting Handbook: Reference and Application	1993
International Atomic Energy Agency		
IAEA Safety Series 30	Manual on the Safety Aspects of the Design and Equipment of Hot Laboratories	1981
IAEA Safety Series 50-P-1	Application of Single Failure Criterion: Safety Practice	1990
Instrument Society of America		
ISA Standards as required	As Required	Latest Ed.
National Council on Radiation Protection and Measurements		
NCRP Report 49	Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies Up to 10 MeV	1976
National Environmental Policy Act		
NEPA	National Environmental Policy Act, Public Law 89-753, 43 U.S.C. 431, et seq.	Latest Ed.
National Fire Protection Association		
NFPA 13	Standard for the Installation of Sprinkler Systems	2010
NFPA 30	Flammable and Combustible Liquids Code	1996
NFPA 70	National Electrical Code	2008
NFPA 72	National Fire Alarm Code	2010
NFPA 110	Emergency and Standby Power Systems	1996
NFPA 750	Standard on Water Mist Fire Protection Systems	2010
ANSI/NFPA 780	Installation of Lightning Protection Systems (Revision and Redesignation of ANSI/NFPA 780-1989)	1995
NFPA 2001	Standard on Clean Agent Fire Extinguishing Systems	2008
Nuclear Regulatory Commission		
NUREG-0700	Guidelines for Control Room Design Reviews	Sep-81
Resource Conservation and Recovery Act		
RCRA	Resource Conservation and Recovery Act of 1976 (41 U.S.C., Sec. 6901, et seq.), as amended	Latest Ed.
Sheet Metal and Air Conditioning Contractors National Association		
SMACNA Manuals as required	As Required	Latest Ed.
Tubular Exchanger Manufacturers Association		
TEMA Standards	Standards on heat exchangers Classes B, C, and R	Latest Ed.

Attachment D

HAZARDS IDENTIFICATION

(Page 1 of 2)

The following list provides a set of hazards that might be associated with a system, structure or component. This list is to be used as a guide in identifying hazards that must be considered during the development of designs.

Acceleration/Deceleration (uncontrolled—too much, too little)

- Inadvertent motion
- Sloshing of liquids
- Translation of loose objects
- Impacts (sudden stops)
- Failures of brakes, wheels, tires, etc.
- Falling objects
- Fragments or missiles

Chemical Reaction (nonfire, can be subtle over time)

- Disassociation, product reverts to separate components
- Combination, new product formed from mixture
- Corrosion, rust, etc.
- Impurities/unanticipated reactions or precipitates

Electrical

- Shock
- Burns
- Overheating
- Ignition of combustibles
- Inadvertent activation/deactivation
- Explosion, electrical

Ergonomics

- Heat Stress
- Wind Chill
- Fatigue
- Elevated Work Locations
- Cramped Work Locations

Explosions

- Explosive gas
- Explosive liquid
- Explosive dust

Flammability and Fires

- Presence of fuel – solid, liquid, gas
- Presence of strong oxidizer—oxygen, peroxide, etc.
- Presence of strong ignition force – welding torch, heaters

Mechanical

- Sharp edges or points
- Rotating equipment
 - Pinch points

Reciprocating equipment

- Weights to be lifted
- Stability/topping tendency
- Ejected parts or fragments

Pressure & Fluid Flow

- Compressed/high pressure gas
- High Temperature Gas/Steam
- Compressed air tool
- Pressure system exhaust
- Accidental release
- Objects propelled by pressure
- Water hammer
- Flex hose whipping
- erosion

Heat and Temperature

- Source of heat, nonelectrical
- Hot surface
- Very cold surface burns
- Increased gas pressure caused by heat
- Increased flammability caused by heat
- Increased volatility caused by heat
- Increased activity caused by heat

Static

- Container rupture
- Overpressurization
- Negative pressure effects

Leak of Material

- Flammable
- Toxic
- Corrosive
- Slippery
- Radioactive
- Critically

Radiation

- Ionizing radiation
- Ultraviolet light
- High intensity visible light
- Infrared radiation
- Electromagnetic radiation/interference
- Microwave
- Laser radiation

Attachment D

HAZARDS IDENTIFICATION (cont.)

(Page 2 of 2)

Toxicity

- Gas or liquid
 - Asphyxiant
 - Irritant
 - Systemic poison
 - Carcinogen
 - Mutagen

- Biological
- Combination product
- Combustion product
- Radioactive material

Vibration

- Vibrating tools
- High noise level
- Metal fatigue
- Flow or jet vibration
- Supersonics
- Cavitation

Waste Minimization/Pollution Prevention

- Solid Waste Prevention/Minimization
- Liquid Waste Prevention/Minimization
- Gas Waste Prevention/Minimization
- Energy Utilization and Minimization

Attachment E

DESIGN BASIS - CONSIDERATIONS

(Page 1 of 1)

- 1.0 Each section of the Summary Design Basis Form FPSG-0101 may be expanded as required to provide adequate space for required input.
- 2.0 Addition Design input requirements that the system, structure or component must satisfy are to be added, as appropriate, considering but not limited to the following:
 - Environmental Conditions
 - Maintenance Requirements
 - Structural Requirements
 - Process Requirements
 - Hoisting and Rigging Requirements
 - Emergency Preparedness Requirements
 - Geotechnical Requirements
 - Hydrologic Requirements
 - Engineering Mechanics Requirements
 - Industrial Safety & Hygiene Requirements
 - Interfaces with new or existing structures
 - Radiological Monitoring Requirements
 - Radioactive Material Handling Requirements
 - Hazardous Material Handling/Packaging/Storage/Transportation Requirements
 - Electrical Requirements
 - Heating and Cooling Requirements
 - Utility Services
 - Communication Requirements
 - Alarm Requirements
 - Waste Minimization Requirements
 - Recycled Products Usage Requirements
 - Contaminated Soil Disposal Requirements (Contact Waste Characterization Services for an evaluation of soil disposal alternative)