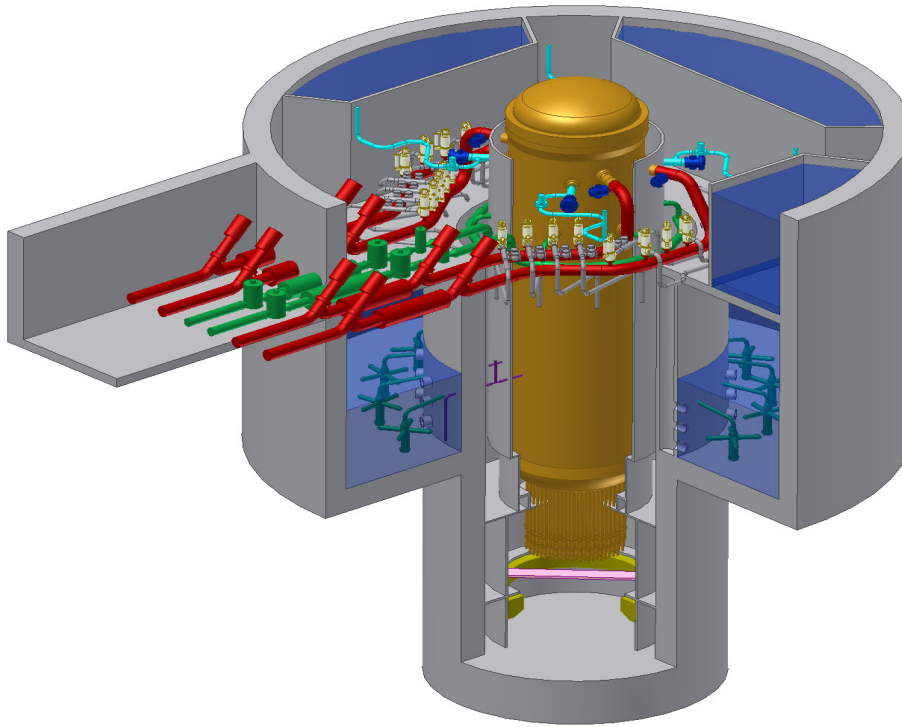




**GE Nuclear Energy**

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# **ESBWR Design Control Document Tier 2 Chapter 13 *Conduct of Operations***

(Conditional Release - pending closure of design verifications)



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## Abbreviations And Acronyms

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                                   |
|--------------------|----------------------------------------------------------------------------|
| 10 CFR             | Title 10, Code of Federal Regulations                                      |
| A/D                | Analog-to-Digital                                                          |
| AASHTO             | American Association of Highway and Transportation Officials               |
| AB                 | Auxiliary Boiler                                                           |
| ABS                | Auxiliary Boiler System                                                    |
| ABWR               | Advanced Boiling Water Reactor                                             |
| ac / AC            | Alternating Current                                                        |
| AC                 | Air Conditioning                                                           |
| ACF                | Automatic Control Function                                                 |
| ACI                | American Concrete Institute                                                |
| ACS                | Atmospheric Control System                                                 |
| AD                 | Administration Building                                                    |
| ADS                | Automatic Depressurization System                                          |
| AEC                | Atomic Energy Commission                                                   |
| AFIP               | Automated Fixed In-Core Probe                                              |
| AGMA               | American Gear Manufacturer's Association                                   |
| AHS                | Auxiliary Heat Sink                                                        |
| AHU                | Air Heating Unit                                                           |
| AISC               | American Institute of Steel Construction                                   |
| AISI               | American Iron and Steel Institute                                          |
| AL                 | Analytical Limit                                                           |
| ALARA              | As Low As Reasonably Achievable                                            |
| ALWR               | Advanced Light Water Reactor                                               |
| ANS                | American Nuclear Society                                                   |
| ANSI               | American National Standards Institute                                      |
| AOO                | Anticipated Operational Occurrence                                         |
| AOV                | Air Operated Valve                                                         |
| API                | American Petroleum Institute                                               |
| APLHGR             | Average Planar Linear Head Generation Rate                                 |
| APRM               | Average Power Range Monitor                                                |
| APR                | Automatic Power Regulator                                                  |
| APRS               | Automatic Power Regulator System                                           |
| ARI                | Alternate Rod Insertion                                                    |
| ARMS               | Area Radiation Monitoring System                                           |
| ASA                | American Standards Association                                             |
| ASD                | Adjustable Speed Drive                                                     |
| ASHRAE             | American Society of Heating, Refrigerating, and Air Conditioning Engineers |
| ASME               | American Society of Mechanical Engineers                                   |
| AST                | Alternate Source Term                                                      |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                          |
|--------------------|-------------------------------------------------------------------|
| ASTM               | American Society of Testing Methods                               |
| AT                 | Unit Auxiliary Transformer                                        |
| ATLM               | Automated Thermal Limit Monitor                                   |
| ATWS               | Anticipated Transients Without Scram                              |
| AV                 | Allowable Value                                                   |
| AWS                | American Welding Society                                          |
| AWWA               | American Water Works Association                                  |
| B&PV               | Boiler and Pressure Vessel                                        |
| BAF                | Bottom of Active Fuel                                             |
| BHP                | Brake Horse Power                                                 |
| BOP                | Balance of Plant                                                  |
| BPU                | Bypass Unit                                                       |
| BPWS               | Banked Position Withdrawal Sequence                               |
| BRE                | Battery Room Exhaust                                              |
| BRL                | Background Radiation Level                                        |
| BTP                | NRC Branch Technical Position                                     |
| BTU                | British Thermal Unit                                              |
| BWR                | Boiling Water Reactor                                             |
| BWROG              | Boiling Water Reactor Owners Group                                |
| CAV                | Cumulative absolute velocity                                      |
| C&FS               | Condensate and Feedwater System                                   |
| C&I                | Control and Instrumentation                                       |
| C/C                | Cooling and Cleanup                                               |
| CB                 | Control Building                                                  |
| CBGAHVS            | Control Building General Area                                     |
| CBHVAC             | Control Building HVAC                                             |
| CBHVS              | Control Building Heating, Ventilation and Air Conditioning System |
| CCI                | Core-Concrete Interaction                                         |
| CDF                | Core Damage Frequency                                             |
| CFR                | Code of Federal Regulations                                       |
| CIRC               | Circulating Water System                                          |
| CIS                | Containment Inerting System                                       |
| CIV                | Combined Intermediate Valve                                       |
| CLAVS              | Clean Area Ventilation Subsystem of Reactor Building HVAC         |
| CM                 | Cold Machine Shop                                                 |
| CMS                | Containment Monitoring System                                     |
| CMU                | Control Room Multiplexing Unit                                    |
| COL                | Combined Operating License                                        |
| COLR               | Core Operating Limits Report                                      |
| CONAVS             | Controlled Area Ventilation Subsystem of Reactor Building HVAC    |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                       |
|--------------------|------------------------------------------------|
| CPR                | Critical Power Ratio                           |
| CPS                | Condensate Purification System                 |
| CPU                | Central Processing Unit                        |
| CR                 | Control Rod                                    |
| CRD                | Control Rod Drive                              |
| CRDA               | Control Rod Drop Accident                      |
| CRDH               | Control Rod Drive Housing                      |
| CRDHS              | Control Rod Drive Hydraulic System             |
| CRGT               | Control Rod Guide Tube                         |
| CRHA               | Control Room Habitability Area                 |
| CRHAHVS            | Control Room Habitability Area HVAC Sub-system |
| CRT                | Cathode Ray Tube                               |
| CS&TS              | Condensate Storage and Transfer System         |
| CSDM               | Cold Shutdown Margin                           |
| CS / CST           | Condensate Storage Tank                        |
| CT                 | Main Cooling Tower                             |
| CTVCF              | Constant Voltage Constant Frequency            |
| CUF                | Cumulative usage factor                        |
| CWS                | Chilled Water System                           |
| D-RAP              | Design Reliability Assurance Program           |
| DAC                | Design Acceptance Criteria                     |
| DAW                | Dry Active Waste                               |
| DBA                | Design Basis Accident                          |
| dc / DC            | Direct Current                                 |
| DCD                | Design Control Document                        |
| DCS                | Drywell Cooling System                         |
| DCIS               | Distributed Control and Information System     |
| DEPSS              | Drywell Equipment and Pipe Support Structure   |
| DF                 | Decontamination Factor                         |
| D/F                | Diaphragm Floor                                |
| DG                 | Diesel-Generator                               |
| DHR                | Decay Heat Removal                             |
| DM&C               | Digital Measurement and Control                |
| DOF                | Degree of freedom                              |
| DOI                | Dedicated Operators Interface                  |
| DOT                | Department of Transportation                   |
| dPT                | Differential Pressure Transmitter              |
| DPS                | Diverse Protection System                      |
| DPV                | Depressurization Valve                         |
| DR&T               | Design Review and Testing                      |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                    |
|--------------------|-------------------------------------------------------------|
| DS                 | Independent Spent Fuel Storage Installation                 |
| DTM                | Digital Trip Module                                         |
| DW                 | Drywell                                                     |
| EB                 | Electrical Building                                         |
| EBAS               | Emergency Breathing Air System                              |
| EBHV               | Electrical Building HVAC                                    |
| ECCS               | Emergency Core Cooling System                               |
| E-DCIS             | Essential DCIS (Distributed Control and Information System) |
| EDO                | Environmental Qualification Document                        |
| EFDS               | Equipment and Floor Drainage System                         |
| EFPY               | Effective full power years                                  |
| EFU                | Emergency Filter Unit                                       |
| EHC                | Electrohydraulic Control (Pressure Regulator)               |
| ENS                | Emergency Notification System                               |
| EOC                | Emergency Operations Center                                 |
| EOC                | End of Cycle                                                |
| EOF                | Emergency Operations Facility                               |
| EOP                | Emergency Operating Procedures                              |
| EPDS               | Electric Power Distribution System                          |
| EPG                | Emergency Procedure Guidelines                              |
| EPRI               | Electric Power Research Institute                           |
| EQ                 | Environmental Qualification                                 |
| ERICP              | Emergency Rod Insertion Control Panel                       |
| ERIP               | Emergency Rod Insertion Panel                               |
| ESF                | Engineered Safety Feature                                   |
| ETS                | Emergency Trip System                                       |
| FAC                | Flow-Accelerated Corrosion                                  |
| FAPCS              | Fuel and Auxiliary Pools Cooling System                     |
| FATT               | Fracture Appearance Transition Temperature                  |
| FB                 | Fuel Building                                               |
| FBHV               | Fuel Building HVAC                                          |
| FCI                | Fuel-Coolant Interaction                                    |
| FCM                | File Control Module                                         |
| FCS                | Flammability Control System                                 |
| FCU                | Fan Cooling Unit                                            |
| FDDI               | Fiber Distributed Data Interface                            |
| FFT                | Fast Fourier Transform                                      |
| FFWTR              | Final Feedwater Temperature Reduction                       |
| FHA                | Fire Hazards Analysis                                       |
| FIV                | Flow-Induced Vibration                                      |



| <b><u>Term</u></b> | <b><u>Definition</u></b>                 |
|--------------------|------------------------------------------|
| FMCRD              | Fine Motion Control Rod Drive            |
| FMEA               | Failure Modes and Effects Analysis       |
| FPS                | Fire Protection System                   |
| FO                 | Diesel Fuel Oil Storage Tank             |
| FOAKE              | First-of-a-Kind Engineering              |
| FPE                | Fire Pump Enclosure                      |
| FTDC               | Fault-Tolerant Digital Controller        |
| FTS                | Fuel Transfer System                     |
| FW                 | Feedwater                                |
| FWCS               | Feedwater Control System                 |
| FWS                | Fire Water Storage Tank                  |
| GCS                | Generator Cooling System                 |
| GDC                | General Design Criteria                  |
| GDCS               | Gravity-Driven Cooling System            |
| GE                 | General Electric Company                 |
| GE-NE              | GE Nuclear Energy                        |
| GEN                | Main Generator System                    |
| GETAB              | General Electric Thermal Analysis Basis  |
| GL                 | Generic Letter                           |
| GM                 | Geiger-Mueller Counter                   |
| GM-B               | Beta-Sensitive GM Detector               |
| GSIC               | Gamma-Sensitive Ion Chamber              |
| GSOS               | Generator Sealing Oil System             |
| GWSR               | Ganged Withdrawal Sequence Restriction   |
| HAZ                | Heat-Affected Zone                       |
| HCU                | Hydraulic Control Unit                   |
| HCW                | High Conductivity Waste                  |
| HDVS               | Heater Drain and Vent System             |
| HEI                | Heat Exchange Institute                  |
| HELB               | High Energy Line Break                   |
| HEP                | Human error probability                  |
| HEPA               | High Efficiency Particulate Air/Absolute |
| HFE                | Human Factors Engineering                |
| HFF                | Hollow Fiber Filter                      |
| HGCS               | Hydrogen Gas Cooling System              |
| HIC                | High Integrity Container                 |
| HID                | High Intensity Discharge                 |
| HIS                | Hydraulic Institute Standards            |
| HM                 | Hot Machine Shop & Storage               |
| HP                 | High Pressure                            |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                              |
|--------------------|-------------------------------------------------------|
| HPNSS              | High Pressure Nitrogen Supply System                  |
| HPT                | High-pressure turbine                                 |
| HRA                | Human Reliability Assessment                          |
| HSI                | Human-System Interface                                |
| HSSS               | Hardware/Software System Specification                |
| HVAC               | Heating, Ventilation and Air Conditioning             |
| HVS                | High Velocity Separator                               |
| HWC                | Hydrogen Water Chemistry                              |
| HWCS               | Hydrogen Water Chemistry System                       |
| HWS                | Hot Water System                                      |
| HX                 | Heat Exchanger                                        |
| I&C                | Instrumentation and Control                           |
| I/O                | Input/Output                                          |
| IAS                | Instrument Air System                                 |
| IASCC              | Irradiation Assisted Stress Corrosion Cracking        |
| IBC                | International Building Code                           |
| IC                 | Ion Chamber                                           |
| IC                 | Isolation Condenser                                   |
| ICD                | Interface Control Diagram                             |
| ICS                | Isolation Condenser System                            |
| IE                 | Inspection and Enforcement                            |
| IEB                | Inspection and Enforcement Bulletin                   |
| IED                | Instrument and Electrical Diagram                     |
| IEEE               | Institute of Electrical and Electronic Engineers      |
| IFTS               | Inclined Fuel Transfer System                         |
| IGSCC              | Intergranular Stress Corrosion Cracking               |
| IIS                | Iron Injection System                                 |
| ILRT               | Integrated Leak Rate Test                             |
| IOP                | Integrated Operating Procedure                        |
| IMC                | Induction Motor Controller                            |
| IMCC               | Induction Motor Controller Cabinet                    |
| IRM                | Intermediate Range Monitor                            |
| ISA                | Instrument Society of America                         |
| ISI                | In-Service Inspection                                 |
| ISLT               | In-Service Leak Test                                  |
| ISM                | Independent Support Motion                            |
| ISMA               | Independent Support Motion Response Spectrum Analysis |
| ISO                | International Standards Organization                  |
| ITA                | Inspections, Tests or Analyses                        |
| ITAAC              | Inspections, Tests, Analyses and Acceptance Criteria  |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                           |
|--------------------|----------------------------------------------------|
| ITA                | Initial Test Program                               |
| LAPP               | Loss of Alternate Preferred Power                  |
| LCO                | Limiting Conditions for Operation                  |
| LCW                | Low Conductivity Waste                             |
| LD                 | Logic Diagram                                      |
| LDA                | Lay down Area                                      |
| LD&IS              | Leak Detection and Isolation System                |
| LERF               | Large early release frequency                      |
| LFCV               | Low Flow Control Valve                             |
| LHGR               | Linear Heat Generation Rate                        |
| LLRT               | Local Leak Rate Test                               |
| LMU                | Local Multiplexer Unit                             |
| LO                 | Dirty/Clean Lube Oil Storage Tank                  |
| LOCA               | Loss-of-Coolant-Accident                           |
| LOFW               | Loss-of-feedwater                                  |
| LOOP               | Loss of Offsite Power                              |
| LOPP               | Loss of Preferred Power                            |
| LP                 | Low Pressure                                       |
| LPCI               | Low Pressure Coolant Injection                     |
| LPCRD              | Locking Piston Control Rod Drive                   |
| LPMS               | Loose Parts Monitoring System                      |
| LPRM               | Local Power Range Monitor                          |
| LPSP               | Low Power Setpoint                                 |
| LWMS               | Liquid Waste Management System                     |
| MAAP               | Modular Accident Analysis Program                  |
| MAPLHGR            | Maximum Average Planar Linear Head Generation Rate |
| MAPRAT             | Maximum Average Planar Ratio                       |
| MBB                | Motor Built-In Brake                               |
| MCC                | Motor Control Center                               |
| MCES               | Main Condenser Evacuation System                   |
| MCPR               | Minimum Critical Power Ratio                       |
| MCR                | Main Control Room                                  |
| MCRP               | Main Control Room Panel                            |
| MELB               | Moderate Energy Line Break                         |
| MLHGR              | Maximum Linear Heat Generation Rate                |
| MMI                | Man-Machine Interface                              |
| MMIS               | Man-Machine Interface Systems                      |
| MOV                | Motor-Operated Valve                               |
| MPC                | Maximum Permissible Concentration                  |
| MPL                | Master Parts List                                  |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                 |
|--------------------|----------------------------------------------------------|
| MS                 | Main Steam                                               |
| MSIV               | Main Steam Isolation Valve                               |
| MSL                | Main Steamline                                           |
| MSLB               | Main Steamline Break                                     |
| MSLBA              | Main Steamline Break Accident                            |
| MSR                | Moisture Separator Reheater                              |
| MSV                | Mean Square Voltage                                      |
| MT                 | Main Transformer                                         |
| MTTR               | Mean Time To Repair                                      |
| MWS                | Makeup Water System                                      |
| NBR                | Nuclear Boiler Rated                                     |
| NBS                | Nuclear Boiler System                                    |
| NCIG               | Nuclear Construction Issues Group                        |
| NDE                | Nondestructive Examination                               |
| NE-DCIS            | Non-Essential Distributed Control and Information System |
| NDRC               | National Defense Research Committee                      |
| NDT                | Nil Ductility Temperature                                |
| NFPA               | National Fire Protection Association                     |
| NIST               | National Institute of Standard Technology                |
| NICWS              | Nuclear Island Chilled Water Subsystem                   |
| NMS                | Neutron Monitoring System                                |
| NOV                | Nitrogen Operated Valve                                  |
| NPHS               | Normal Power Heat Sink                                   |
| NPSH               | Net Positive Suction Head                                |
| NRC                | Nuclear Regulatory Commission                            |
| NRHX               | Non-Regenerative Heat Exchanger                          |
| NS                 | Non-seismic (non-seismic Category I)                     |
| NSSS               | Nuclear Steam Supply System                              |
| NT                 | Nitrogen Storage Tank                                    |
| NTSP               | Nominal Trip Setpoint                                    |
| O&M                | Operation and Maintenance                                |
| O-RAP              | Operational Reliability Assurance Program                |
| OBCV               | Overboard Control Valve                                  |
| OBE                | Operating Basis Earthquake                               |
| OGS                | Offgas System                                            |
| OHLHS              | Overhead Heavy Load Handling System                      |
| OIS                | Oxygen Injection System                                  |
| OLMCPR             | Operating Limit Minimum Critical Power Ratio             |
| OLU                | Output Logic Unit                                        |
| OOS                | Out-of-service                                           |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                          |
|--------------------|-------------------------------------------------------------------|
| ORNL               | Oak Ridge National Laboratory                                     |
| OSC                | Operational Support Center                                        |
| OSHA               | Occupational Safety and Health Administration                     |
| OSI                | Open Systems Interconnect                                         |
| P&ID               | Piping and Instrumentation Diagram                                |
| PA/PL              | Page/Party-Line                                                   |
| PABX               | Private Automatic Branch (Telephone) Exchange                     |
| PAM                | Post Accident Monitoring                                          |
| PAR                | Passive Autocatalytic Recombiner                                  |
| PAS                | Plant Automation System                                           |
| PASS               | Post Accident Sampling Subsystem of Containment Monitoring System |
| PCC                | Passive Containment Cooling                                       |
| PCCS               | Passive Containment Cooling System                                |
| PCT                | Peak cladding temperature                                         |
| PCV                | Primary Containment Vessel                                        |
| PDF                | Process Flow Diagram                                              |
| PGA                | Peak Ground Acceleration                                          |
| PGCS               | Power Generation and Control Subsystem of Plant Automation System |
| PH                 | Pump House                                                        |
| PL                 | Parking Lot                                                       |
| PM                 | Preventive Maintenance                                            |
| PMCS               | Performance Monitoring and Control Subsystem of NE-DCIS           |
| PMF                | Probable Maximum Flood                                            |
| PMP                | Probable Maximum Precipitation                                    |
| PQCL               | Product Quality Check List                                        |
| PRA                | Probabilistic Risk Assessment                                     |
| PRMS               | Process Radiation Monitoring System                               |
| PRNM               | Power Range Neutron Monitoring                                    |
| PS                 | Plant Stack                                                       |
| PSD                | Power Spectra Density                                             |
| PSS                | Process Sampling System                                           |
| PSWS               | Plant Service Water System                                        |
| PT                 | Pressure Transmitter                                              |
| PWR                | Pressurized Water Reactor                                         |
| QA                 | Quality Assurance                                                 |
| RACS               | Rod Action Control Subsystem                                      |
| RAM                | Reliability, Availability and Maintainability                     |
| RAPI               | Rod Action and Position Information                               |
| RAT                | Reserve Auxiliary Transformer                                     |
| RB                 | Reactor Building                                                  |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                            |
|--------------------|---------------------------------------------------------------------|
| RBC                | Rod Brake Controller                                                |
| RBCC               | Rod Brake Controller Cabinet                                        |
| RBCWS              | Reactor Building Chilled Water Subsystem                            |
| RBHV               | Reactor Building HVAC                                               |
| RBS                | Rod Block Setpoint                                                  |
| RBV                | Reactor Building Vibration                                          |
| RC&IS              | Rod Control and Information System                                  |
| RCC                | Remote Communication Cabinet                                        |
| RCCV               | Reinforced Concrete Containment Vessel                              |
| RCCWS              | Reactor Component Cooling Water System                              |
| RCPB               | Reactor Coolant Pressure Boundary                                   |
| RCS                | Reactor Coolant System                                              |
| RDA                | Rod Drop Accident                                                   |
| RDC                | Resolver-to-Digital Converter                                       |
| REPAVS             | Refueling and Pool Area Ventilation Subsystem of Fuel Building HVAC |
| RFP                | Reactor Feed Pump                                                   |
| RG                 | Regulatory Guide                                                    |
| RHR                | Residual heat removal (function)                                    |
| RHX                | Regenerative Heat Exchanger                                         |
| RMS                | Root Mean Square                                                    |
| RMS                | Radiation Monitoring Subsystem                                      |
| RMU                | Remote Multiplexer Unit                                             |
| RO                 | Reverse Osmosis                                                     |
| ROM                | Read-only Memory                                                    |
| RPS                | Reactor Protection System                                           |
| RPV                | Reactor Pressure Vessel                                             |
| RRPS               | Reference Rod Pull Sequence                                         |
| RSM                | Rod Server Module                                                   |
| RSPC               | Rod Server Processing Channel                                       |
| RSS                | Remote Shutdown System                                              |
| RSSM               | Reed Switch Sensor Module                                           |
| RSW                | Reactor Shield Wall                                                 |
| RTIF               | Reactor Trip and Isolation Function(s)                              |
| RT <sub>NDT</sub>  | Reference Temperature of Nil-Ductility Transition                   |
| RTP                | Reactor Thermal Power                                               |
| RW                 | Radwaste Building                                                   |
| RWBCR              | Radwaste Building Control Room                                      |
| RWBGA              | Radwaste Building General Area                                      |
| RWBHVAC            | Radwaste Building HVAC                                              |
| RWCU/SDC           | Reactor Water Cleanup/Shutdown Cooling                              |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                                                           |
|--------------------|------------------------------------------------------------------------------------|
| RWE                | Rod Withdrawal Error                                                               |
| RWM                | Rod Worth Minimizer                                                                |
| SA                 | Severe Accident                                                                    |
| SAR                | Safety Analysis Report                                                             |
| SB                 | Service Building                                                                   |
| S/C                | Digital Gamma-Sensitive GM Detector                                                |
| SC                 | Suppression Chamber                                                                |
| S/D                | Scintillation Detector                                                             |
| S/DRSRO            | Single/Dual Rod Sequence Restriction Override                                      |
| S/N                | Signal-to-Noise                                                                    |
| S/P                | Suppression Pool                                                                   |
| SAS                | Service Air System                                                                 |
| SB&PC              | Steam Bypass and Pressure Control System                                           |
| SBO                | Station Blackout                                                                   |
| SBWR               | Simplified Boiling Water Reactor                                                   |
| SCEW               | System Component Evaluation Work                                                   |
| SCRRI              | Selected Control Rod Run-in                                                        |
| SDC                | Shutdown Cooling                                                                   |
| SDM                | Shutdown Margin                                                                    |
| SDS                | System Design Specification                                                        |
| SEOA               | Sealed Emergency Operating Area                                                    |
| SER                | Safety Evaluation Report                                                           |
| SF                 | Service Water Building                                                             |
| SFP                | Spent fuel pool                                                                    |
| SIL                | Service Information Letter                                                         |
| SIT                | Structural Integrity Test                                                          |
| SIU                | Signal Interface Unit                                                              |
| SJAE               | Steam Jet Air Ejector                                                              |
| SLC                | Standby Liquid Control                                                             |
| SLCS               | Standby Liquid Control System                                                      |
| SLMCPR             | Safety Limit Minimum Critical Power Ratio                                          |
| SMU                | SSLC Multiplexing Unit                                                             |
| SOV                | Solenoid Operated Valve                                                            |
| SP                 | Setpoint                                                                           |
| SPC                | Suppression Pool Cooling                                                           |
| SPDS               | Safety Parameter Display System                                                    |
| SPTMS              | Suppression Pool Temperature Monitoring Subsystem of Containment Monitoring System |
| SR                 | Surveillance Requirement                                                           |
| SRM                | Source Range Monitor                                                               |
| SRNM               | Startup Range Neutron Monitor                                                      |

| <b><u>Term</u></b> | <b><u>Definition</u></b>                     |
|--------------------|----------------------------------------------|
| SRO                | Senior Reactor Operator                      |
| SRP                | Standard Review Plan                         |
| SRS                | Software Requirements Specification          |
| SRSRO              | Single Rod Sequence Restriction Override     |
| SRSS               | Sum of the squares                           |
| SRV                | Safety Relief Valve                          |
| SRVDL              | Safety relief valve discharge line           |
| SSAR               | Standard Safety Analysis Report              |
| SSC(s)             | Structure, System and Component(s)           |
| SSE                | Safe Shutdown Earthquake                     |
| SSLC               | Safety System Logic and Control              |
| SSPC               | Steel Structures Painting Council            |
| ST                 | Spare Transformer                            |
| STP                | Sewage Treatment Plant                       |
| STRAP              | Scram Time Recording and Analysis Panel      |
| STRP               | Scram Time Recording Panel                   |
| SV                 | Safety Valve                                 |
| SWH                | Static water head                            |
| SWMS               | Solid Waste Management System                |
| SY                 | Switch Yard                                  |
| TAF                | Top of Active Fuel                           |
| TASS               | Turbine Auxiliary Steam System               |
| TB                 | Turbine Building                             |
| TBCE               | Turbine Building Compartment Exhaust         |
| TEAS               | Turbine Building Air Supply                  |
| TBE                | Turbine Building Exhaust                     |
| TBLOE              | Turbine Building Lube Oil Area Exhaust       |
| TBS                | Turbine Bypass System                        |
| TBHV               | Turbine Building HVAC                        |
| TBV                | Turbine Bypass Valve                         |
| TC                 | Training Center                              |
| TCCWS              | Turbine Component Cooling Water System       |
| TCS                | Turbine Control System                       |
| TCV                | Turbine Control Valve                        |
| TDH                | Total Developed Head                         |
| TEMA               | Tubular Exchanger Manufacturers' Association |
| TFSP               | Turbine first stage pressure                 |
| TG                 | Turbine Generator                            |
| TGSS               | Turbine Gland Seal System                    |
| THA                | Time-history accelerograph                   |



| <b><u>Term</u></b> | <b><u>Definition</u></b>                          |
|--------------------|---------------------------------------------------|
| TLOS               | Turbine Lubricating Oil System                    |
| TLU                | Trip Logic Unit                                   |
| TMI                | Three Mile Island                                 |
| TMSS               | Turbine Main Steam System                         |
| TRM                | Technical Requirements Manual                     |
| TS                 | Technical Specification(s)                        |
| TSC                | Technical Support Center                          |
| TSI                | Turbine Supervisory Instrument                    |
| TSV                | Turbine Stop Valve                                |
| UBC                | Uniform Building Code                             |
| UHS                | Ultimate heat sink                                |
| UL                 | Underwriter's Laboratories Inc.                   |
| UPS                | Uninterruptible Power Supply                      |
| USE                | Upper Shelf Energy                                |
| USM                | Uniform Support Motion                            |
| USMA               | Uniform support motion response spectrum analysis |
| USNRC              | United States Nuclear Regulatory Commission       |
| USS                | United States Standard                            |
| UV                 | Ultraviolet                                       |
| V&V                | Verification and Validation                       |
| Vac / VAC          | Volts Alternating Current                         |
| Vdc / VDC          | Volts Direct Current                              |
| VDU                | Video Display Unit                                |
| VW                 | Vent Wall                                         |
| VWO                | Valves Wide Open                                  |
| WD                 | Wash Down Bays                                    |
| WH                 | Warehouse                                         |
| WS                 | Water Storage                                     |
| WT                 | Water Treatment                                   |
| WW                 | Wetwell                                           |
| XMFR               | Transformer                                       |
| ZPA                | Zero period acceleration                          |

## **13. CONDUCT OF OPERATIONS**

This chapter provides information relating to the operational plans for the ESBWR. The purpose of this chapter is to provide reasonable assurance that the COL applicant's organization will be able to operate the ESBWR in a manner that protects the public health and safety.

### **13.1 ORGANIZATIONAL STRUCTURE OF APPLICANT**

This section is the responsibility of the COL applicant. The organizational structure must be consistent with the human system interface design assumptions described used in the ESBWR. These assumptions are described in DCD Chapter 18.

#### **13.1.1 COL Information**

COL applicant referencing the ESBWR will submit documentation that demonstrates that their organizational structure is consistent with the ESBWR design.

## **13.2 TRAINING**

### **13.2.1 Reactor Operator Training**

To be provided by the COL applicant.

### **13.2.2 Training for Non-Licensed Plant Staff**

To be provided by the COL applicant.

### **13.2.3 COL Information**

#### ***13.2.3.1 Incorporation of Operating Experience***

The results of reviews of operating experience shall be incorporated into training and retraining programs in accordance with the provisions of TMI Action Item I.C.5, Appendix 1A. The organizational responsibilities for accomplishing this shall be clearly identified.

#### ***13.2.3.2 Training Requirements for Preoperational and Low-Power Testing***

A training program for the plant staff will be developed. The program will include all phases of plant operation including preoperational testing and low-power operation in accordance with the provisions of TMI Action Item I.G.1.

### 13.3 EMERGENCY PLANNING

Emergency planning is not within the scope of the ESBWR design. However, design features, facilities, functions, and equipment necessary for emergency planning are considered in the design bases of the standard plant.

The ESBWR Standard Plant complies with all the TSC design requirements. Specifically, a TSC of sufficient size to support 26 people is located in the electrical building. Display capability in the TSC is described in Subsection 18.4.2.11.

The TSC is environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment.

The room is provided with radiological protection and monitoring equipment necessary to ensure that radiation exposure to any person working in the TSC would not exceed 5 rem whole body, or its equivalent, to any part of the body. The level of protection is similar to the main control room. However, in the event that all off-site and on-site AC power is unavailable, the TSC would be evacuated and the TSC management function would be transferred to the control room operators as described in Section 6.4.

The TSC is provided with reliable voice and data communication with the main control room and EOF and reliable voice communications with the OSC, NRC Operations Centers and state and local operations centers. Control room data communication through the emergency response data system (ERDS) with the NRC Operations Centers will also be provided as appropriate.

#### 13.3.1 Preliminary Planning

Not required.

#### 13.3.2 Emergency Plan

To be provided by the COL applicant.

#### 13.3.3 COL License Information

##### *13.3.3.1 Identification of OSC and Communication Interfaces with Control Room and TSC*

The COL applicant is responsible for identifying the OSC and the communication interfaces for inclusion in the detailed design of the control room and TSC. The detailed requirements are provided in Section 3 of NUREG-0696.

The habitability requirements of the available OSC locations in the ESBWR are not comparable to that of the control room. Thus, the COL applicant's emergency plan shall include provisions for evacuation of OSC personnel in the event of a large radioactive release.

The OSC communications system shall have at least one dedicated telephone extension to the control room, one dedicated telephone extension to the TSC, and one touch-tone telephone capable of reaching on-site and off-site locations, as a minimum. Any portable radio communications are also to be specified by the COL applicant.

The COL applicant will identify the operational support center (OSC) and the communication interfaces for inclusion in the detailed design of the control room and the technical support center (TSC).

#### ***13.3.3.2 Identification of EOF and Communication Interfaces with Control Room and TSC***

The EOF is not within the scope of the ESBWR Standard Plant. It is the responsibility of the COL applicant to identify the EOF and the communication interfaces for inclusion in the detailed design of the TSC and control room. The detailed requirements are provided in Section 4 of NUREG-0696.

The COL applicant will identify the Emergency Operating Facility (EOF) and the communication interfaces for inclusion in the detail design of the TSC and control room.

#### ***13.3.3.3 Decontamination Facilities***

In a building adjacent to the main change rooms, decontamination facilities for use by on-site individuals will be provided. Showers and waste collection equipment will be used to ensure spread of contamination is controlled and disposal cost of waste material is minimized. The central location is convenient to health physics support personnel who will supervise this activity.

The COL applicant will provide decontamination facilities and supplies at the site for decontamination of on-site individuals in the reactor building adjacent to the main change rooms.

## **13.4 REVIEW AND AUDIT**

To be provided by the COL applicant.

### **13.4.1 COL Information**

The COL applicant shall provide a plan for conducting reviews of operating phase activities that are important to safety. The provisions for the plant operations review of operational activities, for the independent review of plant operations and for the independent assessment of activities for safety enhancement shall be provided in accordance with 10 CFR 50.40 (b), TMI Action Item I.B.1.2, and ANSI 18.7/ANS 3.2 or subsequent NRC-approved version of ANSI/ANS 3.2 elected by the COL applicant.

## **13.5 PLANT PROCEDURES**

### **13.5.1 Administrative Procedures**

To be provided by the COL applicant.

### **13.5.2 Operating and Maintenance Procedures**

To be provided by the COL applicant.

### **13.5.3 COL Information**

#### ***13.5.3.1 Plant Operating Procedures Development Plan***

A Plant Operating Procedures Development Plan shall be generated which establishes:

- That the scope encompassed by the procedures development process includes those operating procedures defined in Subsection 13.5.3.4, which direct operator actions during normal, abnormal and emergency operations, including consideration of plant operations during periods when plant systems/equipment are undergoing test, maintenance or inspection.
- The methods and criteria for the development, verification and validation, implementation, maintenance and revision of procedures. The methods and criteria shall be in accordance with TMI Items I.C.1 and I.C.9.

#### ***13.5.3.2 Emergency Procedures Development***

In addition to the above, for Emergency Procedures development, the plan shall establish:

- That a writer's guide shall be developed and implemented which defines the process for developing emergency procedures. The writer's guide will contain objective criteria that require that the emergency procedures developed are consistent in organization, style, content and usage of terms.
- The form and content of the documentation describing the emergency procedure development activity results which includes, but is not limited to:
  - the objectives of the emergency procedure development process,
  - the methods employed during emergency procedure development,
  - deviations from generic technical guidelines approved by the NRC and
  - discussion of any design change recommendations and/or negative implications that the current design may have on safe operation as a result of emergency procedures development plan implementation.

#### ***13.5.3.3 Implementation of the Plan***

Implementation of the Plant Operating Procedures Development Plan shall establish:

- Procedures that are consistent with the requirements of 10 CFR Part 50 and the TMI requirements described in NUREG-0737 and Supplement 1 to NUREG-0737.

- Requirements that the procedures developed shall include, as necessary, the elements described in ANSI 18.7/ANS-3.2 or subsequent NRC-approved version of ANSI/ANS-3.2 elected by the COL applicant.
- That the operator actions identified in the vendors task analysis and PRA efforts in support of the Standardized Design certification, Standardized Plant Design Emergency Procedure Guidelines and consideration of plant-specific equipment selection and site-specific elements such as the service water intake structure and the ultimate heat sink shall be used as a basis for specifying plant operating procedures.
- The definition of the methods through which specific operator skills and training needs, as may be considered necessary for reliable execution of the procedures, will be identified and documented.
- That the procedures specified above shall be made available for the purposes of the Human Factors V&V Implementation Plan described in Article VII of Table 18E-1.
- Procedures for the incorporation of the results of operating experience and the feedback of pertinent information into plant procedures in accordance with the provisions of TMI I.C.5.

#### ***13.5.3.4 Procedures Included In Scope Of Plan***

The following procedures shall be included in the scope of the Plant Operating Procedures Development Plan described above:

##### ***System Procedures***

Procedures as delineated in Section A3 of ANSI/ANS-3.2 shall be prepared as appropriate.

##### ***Procedures For Off-Normal Or Alarm Conditions***

Procedures for off-normal or alarm conditions that require operator action in the MCR and RSS shall be prepared as appropriate.

##### ***General Plant Operating Procedures***

As discussed in Section A5 of ANSI/ANS-3.2, procedures shall be prepared for the integrated operations of the plant.

##### ***Procedures for Combating Emergencies and Other Significant Events***

As discussed in Section A10 of ANSI/ANS-3.2, procedures shall be provided to guide operations in emergencies and other significant events.

##### ***Procedures for Maintenance and Modification***

Maintenance and modification procedures that require operator actions to be taken in the MCR or RSS shall be prepared as appropriate.

##### ***Procedures for Radiation Control***

Procedures for the control of radioactive releases as discussed in Section A7(d) of ANSI/ANS-3.2 shall be prepared as appropriate.



***Procedures for Calibration, Inspection and Testing***

Calibration, inspection and testing procedures that require operator actions to be taken in the MCR or RSS shall be prepared as appropriate.

**13.5.4 References**

None

## **13.6 PHYSICAL SECURITY**

### **13.6.1 Preliminary Planning**

#### ***13.6.1.1 Site Physical Security***

##### **13.6.1.1.1 Security Organization**

##### **13.6.1.1.2 Physical Barriers**

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{{{Sensitive unclassified information provided under separate submittal per 10 CFR 2.390}}}

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#### **13.6.1.1.3 Detection Aids**

#### **13.6.1.1.4 Communications**

#### **13.6.1.1.5 Access Controls**

#### **13.6.1.1.6 Security Lighting**

#### **13.6.1.1.7 Security Power Supply**

#### **13.6.1.1.8 Testing and Maintenance of Security Systems**

{{{Sensitive unclassified information provided under separate submittal per 10 CFR 2.390}}}

***13.6.1.2 Security Policies and Procedures***

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***13.6.1.3 COL Information*****13.6.1.3.1 Physical Security Plan****13.6.1.3.2 Contingency Plan****13.6.1.3.3 Guard Force Training Plan****13.6.1.3.4 Physical Security Systems Design****13.6.1.3.5 Security System Testing and Maintenance*****13.6.1.4 References***

