{CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3} EMERGENCY RESPONSE PLAN ANNEX

{Calvert Cliffs 3 Nuclear Project, LLC

and

UniStar Nuclear Operating Services, LLC}

Revision 6

Approved by ______________________________________ Date ____________

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Section 1: Introduction

This {Calvert Cliffs Nuclear Power Plant (CCNPP Unit 3)} Emergency Plan Annex provides unit specific details for {CCNPP Unit 3}.

This includes a unit description (type of reactor, relationship to other units, special emergency equipment), shift staffing, Emergency Action Levels (EALs), and any emergency facility locations which differ from those described in the emergency plan to provide a full understanding and representation of the station's emergency response capabilities. The Unit Annex is subject to the same review and audit requirements as the {Calvert Cliffs Nuclear Power Plant Unit 3} Emergency Plan.

1.1 Unit Description

{CCNPP Unit 3} is an AREVA U.S. Evolutionary Power Reactor (EPR) is an evolutionary Pressurized Water Reactor (PWR) designed by Framatome ANP, Inc., a jointly-owned subsidiary of AREVA and Siemens. It is a four-loop plant with a rated thermal power of 4,590 MWt. The primary system design, loop configuration, and main components are similar to those of currently operating PWRs.

The U.S. EPR safety design features include four redundant trains of emergency core cooling, containment and Shield Building, and a core melt retention system for severe accident mitigation, which meet applicable regulatory and commercial requirements.

The safety design of the U.S. EPR is based primarily on deterministic analyses complemented by probabilistic analyses. The deterministic approach is based on the "defense-in-depth" concept which comprises four levels:

1. A combination of conservative design, quality assurance, and surveillance activities to prevent departures from normal operation

2. Detection of deviations from normal operation and protection devices and control systems to cope with them (This level of protection is provided to ensure the integrity of the fuel cladding and of the Reactor Coolant Pressure Boundary (RCPB) in order to prevent accidents.)

3. Engineered safety features and protective systems that are provided to mitigate accidents and consequently to prevent their evolution into severe accidents

4. Measures to preserve the integrity of the containment and enable control / mitigation of severe accidents

Low probability events with multiple failures and coincident occurrences up to the total loss of safety-grade systems are considered in addition to the deterministic design basis. Representative scenarios are defined for preventing both core melt and large releases in order to develop parameters for risk reduction features. A probabilistic approach is used to define these events and assess the specific measures available for their management. Consistent with international and U.S. probabilistic safety objectives, the frequency of core melt is less than 10-5/reactor-year including all events and all reactor states.

Design provisions for the reduction of the residual risk, core melt mitigation, and the prevention of large releases are:

- Prevention of high pressure core melt by high reliability of decay heat removal systems, complemented by primary system Overpressure Protection (OPP)
- Primary system discharge into the containment in the event of a total loss of secondary side cooling
- Features for corium spreading and cooling
- Prevention of hydrogen detonation by reducing the hydrogen concentration in the containment at an early stage with catalytic hydrogen recombiners
- Control of the containment pressure increase by a dedicated Severe Accident Heat Removal System (SAHRS) consisting of a spray system with recirculation through the cooling structure of the melt retention device

External events such as an aircraft hazard, Explosion Pressure Wave (EPW), seismic events, missiles, tornado, and fire have been considered in the design of Safeguard Buildings and the hardening of the Shield Building.

A. Overview of the U.S. EPR Design

The U.S. EPR is furnished with a four-loop, pressurized water, Reactor Coolant System (RCS) composed of a reactor vessel that contains the fuel assemblies, a pressurizer including control systems to maintain system pressure, one Reactor Coolant Pump (RCP) per loop, one SG per loop, associated piping, and related control and protection systems.

The RCS is contained within a concrete containment building. The containment building is enclosed by a Shield Building with an annular space between the two buildings. The post-tensioned concrete shell of the Containment Building is furnished with a steel liner and the Shield Building wall is reinforced concrete. The Containment and Shield Buildings comprise the Reactor Building. The Reactor Building is surrounded by four Safeguard Buildings and a Fuel Building. The internal structures and components within the Reactor Building, Fuel Building, and two Safeguard Buildings (including the plant Control Room) are protected against aircraft hazard and external explosions. The other two Safeguard Buildings are not protected against aircraft hazard or external explosions. However, they are separated by the Reactor Building, which restricts damage from these external events to a single safeguards building.

Redundant capacity safety systems for certain major safety systems are separated into four divisions. With four divisions, one division can be out-of-service for maintenance and one division can fail to operate, while the remaining two divisions are available to perform the necessary safety functions, even if one is ineffective due to the initiating event.

In the event of a loss of off-site power, each safeguard division is powered by a separate Emergency Diesel Generator (EDG). In addition to the four safety-related diesels that power various safeguards, two independent diesel generators are available to power essential equipment during a postulated Station Blackout (SBO) event—loss of off-site AC power with coincident failure of all four EDGs.

Water storage for safety injection is provided by the In-containment Refueling Water Storage Tank (IRWST). Also inside containment, below the Reactor Pressure Vessel (RPV), is a dedicated spreading area for molten core material following a postulated worst-case severe accident.

The fuel pool is located outside the Reactor Building in a dedicated building to simplify access for fuel handling during plant operation and handling of fuel casks. The Fuel Building is protected against aircraft hazard and external explosions. Fuel pool cooling is assured by two redundant, safety-related cooling trains.

Section 2: Organizational Control of Emergencies

Section B of the {CCNPP Unit 3} Emergency Plan describes the station's Emergency Response Organization (ERO). When the ERO is fully activated it will be staffed as described in the plan. This section of the Unit Annex describes the ERO staffing and their responsibilities to implement the emergency plan.

2.1 Normal Station Management Overview

A. Corporate Organization and Functions

The {Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC} is the owner and operator of the {CCNPP Unit 3}. {Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC} is responsible for siting, design, construction and operation of Unit 3 in accordance with its Quality Assurance Program. The President, {Unistar Nuclear Operating Services, LLC}, reports to the Chief Executive Officer, {Calvert Cliffs 3 Nuclear Project, LLC}.

A detailed description of the Organizational Structure of {UniStar Nuclear Operating Services, LLC} can be found in Section 13.1 of the FSAR.

2.2 Normal Shift Staffing

The makeup of the normal shift is controlled by the unit's Technical Specifications and 10 CFR 50.54(m). Section B.1 of the {CCNPP Unit 3} Emergency Response Plan describes the normal responsibilities of shift personnel.

2.3 Shift Emergency Response Positional Responsibilities

Table B-1a outlines Shift ERO positions required to meet minimum staffing and the major tasks assigned to each position

Table B-1a
Shift Emergency Response Organization

Functional Area	Major Tasks	Emergency Positions	Minimum Shift Size
1. Plant Operations and Assessment of Operational Aspects	Control Room Staff	{Shift Manager} (CR) Control Room Supervisor (CR) Reactor Operator (CR) Auxiliary Operator	1 1 2 2
2. Emergency Direction and Control	Command and Control /Emergency Operations	{Shift Manager (Interim Emergency Director)} (CR)	1[(a)]
3. Notification & Communication	Emergency Communications	Shift Communicator [(e)] (CR)	1
4. Radiological Accident Assessment and Support of Operational Accident Assessment	In-plant Surveys Chemistry	RP Technicians Chemistry Personnel	1 1
5. Plant System Engineering, Repair and Corrective Actions	Technical Support Repair and Corrective Actions	Shift Technical Assistant (STA) [(e)] (CR) Mechanical Maintenance Electrical / Instrument & Control	1 1[(b)] 1[(b)]
6. In-Plant Protective Actions	Radiation Protection	RP Personnel	2[(b)]
7. Fire Fighting	--	Fire Brigade	(c)
8. First Aid and Rescue Operations	--	Plant Personnel	2[(b)]
9. Site Access Control and Personnel Accountability	Security & Accountability	Security Team Personnel	(d)
		TOTAL:	**10**

(a) The {Shift Manager} shall function as the {Interim Emergency Director} prior to TSC activation.

(b) May be provided by personnel assigned other functions. Personnel can fulfill multiple functions.

(c) Per Station Fire Protection Plan

(d) Per Station Security Plan

(e) An Individual shall be designated as {Shift Communicator} and an Individual shall be designated as {STA} for a classified event. Once assigned these individuals shall not be assigned other responsibilities.

Section 3: Classification of Emergencies

Section D of the {CCNPP Unit 3} Emergency Plan describes the classification of emergencies into four levels of Emergency Class. They are the UNUSUAL EVENT, ALERT, SITE AREA EMERGENCY, and GENERAL EMERGENCY. These classification levels are entered by meeting the criteria of Emergency Action Levels (EALs) provided in this section of the U.S. EPR Annex.

3.1 Emergency Action Levels (EALs)

An Emergency Action Level scheme based on Revision 5 of NEI 99-01, “Methodology for Development of Emergency Action Levels,” currently approved for use by NRC letter from Christopher G. Miller to NEI dated 02/22/08, is used for {CCNPP Unit 3}. The submittal EALs will be written with no deviations other than those attributable to specific U.S. EPR reactor design considerations.

3.2 Maintenance of Emergency Action Levels

The EALs are documented in an Emergency Action Level Technical Basis Document. Revision of the EAL Technical Basis Document is controlled the same way as the {CCNPP Unit 3} Emergency Plan, requiring the same reviews including a review in accordance with 10 CFR 50.54(q).

Section 4: Emergency Response Facilities and Equipment

4.1 Unit Specific Emergency Response Facilities

A. Control Room

Plant operations are directed from the Control Room. Nuclear plant Instrumentation, Area and Process Radiation Monitoring System Instrumentation, Controls and Instrumentation for Reactor and Turbine Generator operation are provide here. The Control Room is located in Safeguards Building 2 - 53' Elevation. A description of the Control Room is contained in the Final Safety Analysis Report. Emergency equipment available to the Control Room is listed and maintained in accordance with Emergency Response Plan Implementation Procedures and/or Administrative procedures.

B. Technical Support Center

The Technical Support Center (TSC) is located on the Control Rooms floor level outside the Main Control Room and has a separate access. It is located in the fully hardened Safeguards Building. Thus the TSC is protected against radiological hazards, internal and external missiles, and seismic activity. Also, this arrangement ensures suitable ambient environmental conditions.

The TSC is sized to provide:

- Working space, without crowding, for the personnel assigned to the TSC at the maximum level of occupancy;
- Space for the TSC data system equipment needed to acquire, process, and display data used in the TSC;
- Sufficient space to perform repair, maintenance, and service of equipment, displays, and instrument;
- Space for data transmission equipment needed to transmit data originating in the TSC to other locations;
- Space for personnel access to functional displays of TSC data;
- Space for unhindered access to communications equipment by all TSC personnel who need communications capabilities to perform their functions;
- Space for storage of and/ or access to plant records and historical data; and
- A separate room adequate for at least three persons to be used for private NRC consultations.

In summary, the minimum size of working space of the TSC shall be 1875 square feet (174 square meters). This includes space for 25 personnel (5 which are NRC personnel) at 75 square feet (7 square meters)/person.

The TSC has the same protection from radiological hazards, including direct radiation and airborne radioactivity under accident conditions as the Control Room.

The TSC is provided with several means of communications within and outside the plant. Communications shall be established between the Control Room and the TSC, The EOF, the principle state and local EOCs, the monitoring teams and a general line throughout the site in accordance with the requirements of 10 CFR Part 50, Appendix E: Section (E)(9)(d).

Communications will also be established with NRC Headquarters and the appropriate Regional Office Operations Center, from the Control Room, TSC and EOF in accordance with 10 CFR, Appendix E: Section (E)(9)(d).

C. Operations Support Center

The Operations Support Center (OSC) is located in the Access Building within the protected area separate from Control Room and TSC. Both the Control Room and TSC shall have diverse means of communication with various plant locations including the OSC.

D. Onsite Laboratories

Chemistry laboratories located in the Nuclear Auxiliary Building are available for emergency response during an accident. The on-site laboratory sampling system is designed to provide gas and liquid samples of the containment atmosphere following an accident.

All modules, the sampling box and the local control cabinet are located in the Fuel Building. To ensure protection of the operating staff while taking a sample, in the sampling box, all modules and pipes which convey highly contaminated fluids are located behind a biological shield.

E. Decontamination Facilities

The personnel decontamination facility is located the Access Building and contains provisions for radiological decontamination of personnel, their wounds, supplies, instruments and equipment. This facility has extra clothing and decontaminants suitable for the type of contamination expected, including radioiodine skin contamination.

Detailed inventory lists and instructions for the decontamination facility are provided in the implementing procedures. Waste disposal, subsequent to decontamination activities, is according to radiation protection procedures.

F. First Aid

The First Aid station located in the Access Building facilitates medical treatment and initial assessment of radiation exposure and uptake.

4.2 Assessment Resources

A. Onsite Meteorological Monitoring Instrumentation

{CCNPP Unit 3 shares meteorological instrumentation with CCNPP Units 1 & 2. Section H.5 of the Emergency Plan describes the CCNPP Meteorological instrumentation.}

B. Onsite Radiation Monitoring Equipment

The onsite radiation monitoring capability includes an installed process, effluent, and area radiation monitoring system; portable survey instrumentation; counting equipment for radiochemical analysis; and a personnel dosimetry program to record integrated exposure. Some onsite equipment is particularly valuable for accident situations and is described in the following subsections.

1. Radiation Monitoring Systems

a. Area Radiation Monitoring

The area monitoring system provides information of existing radiation levels in various areas of the plant to ensure safe occupancy. It is equipped with Main Control Room and local readout and audible alarms to warn personnel of a raised radiation level.

b. Radiological Noble Gas Effluent Monitoring

The wide range gas monitors are installed on normal station effluent release points. These monitors have the capability to monitor noble gas activity in the range of postulated accidents and in support of emergency response. Each monitor system has a microprocessor which utilizes digital processing techniques to analyze data and control monitor functions. These monitors provide readout and alarm functions to the Main Control Room.

c. Radioiodine and Particulate Effluent Monitoring

The wide range gas monitor includes a sampling rack for collection of the Auxiliary Building Vent Stack particulate and radioiodine samples. Filter holders and valves are provided to allow grab sample collection for isotopic analyses in the station's counting rooms. The sampling rack is shielded to minimize personnel exposure. The sampling media will be analyzed by a gamma ray spectrometer which utilizes a gamma spectrometer system.

d. High Range Containment Radiation Monitors

High range containment radiation monitors are installed for the U.S. EPR. The monitors will detect and measure the radiation level within the reactor containment during and following an accident. The monitors are in the range of postulated accidents and in support of emergency response.

e. In-plant Iodine Instrumentation

Effective monitoring of increasing iodine levels in buildings under accident conditions will include the use of portable instruments using silver zeolite as a sample media. It is expected that a sample can be obtained, purged, and analyzed for iodine content within a two-hour time frame.

f. Onsite Process Monitors

An adequate monitoring capability exists to properly assess the plant status for all modes of operation and is described in the unit’s FSAR. The operability of the post-accident instrumentation ensures information is available on selected plant parameters to monitor and assess important variables following an accident. Instrumentation is available to monitor the parameters given in Technical Specifications.

The unit’s Emergency Operating Procedures assist personnel in recognizing inadequate core cooling using applicable instrumentation.

C. Onsite Fire Detection Instrumentation

The Plant Fire Alarm System (PFAS) is designed to meet the requirements of the applicable National Fire Protection Association (NFPA) Standards (e.g., NFPA 72, 13, 20, etc.) and detection is generally provided in areas containing safety related components/systems as recommended in Regulatory Guide 1.189, "Fire Protection for Operating Nuclear Power Plants." The PFAS is furnished with electrically supervised circuits that monitor field input devices including smoke and heat detection, water supply and suppression supervisory devices and output devices such as suppression releasing and alarm notification devices. Instrumentation is provided in the Main Control Room and at the local fire control panels to alert operators of the location of a detected fire, the release of a suppression system, or the annunciation of a trouble condition within a portion of the system.

In the event that a portion of the PFAS is inoperable, compensatory measures may be required for the affected areas.

Further details on the unit's Plant Fire Alarm system can be found in the unit's FSAR.

D. Unit Specific Station Parameter Monitoring System

A process and information system provides access to all process information needed to monitor the state of the plant in all plant states, including accident conditions. The system displays information on workstations providing selected data to anyone with authorization to access the data. The system displays are used for:

- Reviewing the accident sequence,
- Determining appropriate mitigating actions,
- Evaluating the extent of any damage, and
- Determining plant status during recovery operations.

The ERO shall use the information obtained from the system to monitor plant parameters and provide recommendations to the operators.

Section 5: Emergency Measures

5.1 Unit Assembly Areas

Unit assembly areas have been identified at the Access Building, Radiation Protection Lab area, the clean hallways on the ground level of the Radioactive Waste Processing Building, and the shop areas of the Switchgear Building. Evacuation of non-essential personnel is usually conducted immediately after accountability if a Site Area Emergency or General Emergency has been declared and conditions permit.

If it is determined that the prearranged Assembly Area is unfit for personnel, the {Shift Manager} or the {Emergency Plant Manager} may designate an alternative Assembly Area and direct personnel using appropriate communication systems that are available.

5.2 Unit Evacuation Routes

Unit and Station Evacuation Routes will normally be via normal site egress routes. Alternate egress routes may be considered and are determined based on the event in progress and provided to evacuees over the unit’s public address system. {The CCNPP Unit 3 alternate egress route is through a gate located in the southwest corner of the CCNPP Unit 3 Protected Area where evacuees would proceed onto Camp Conoy Road.}