



# **GDC 17 Exemption Request**

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**[Not Export Controlled]**

# Meeting Agenda



- Introductions
- Purpose & Outcome
- Overview of Electrical Design and Application to Safe Shutdown
- Discussion on GDC 17 Exemption Request
- Additional GDCs included in Exemption Request
- Open Forum

# Purpose & Outcome

## ■ Purpose:

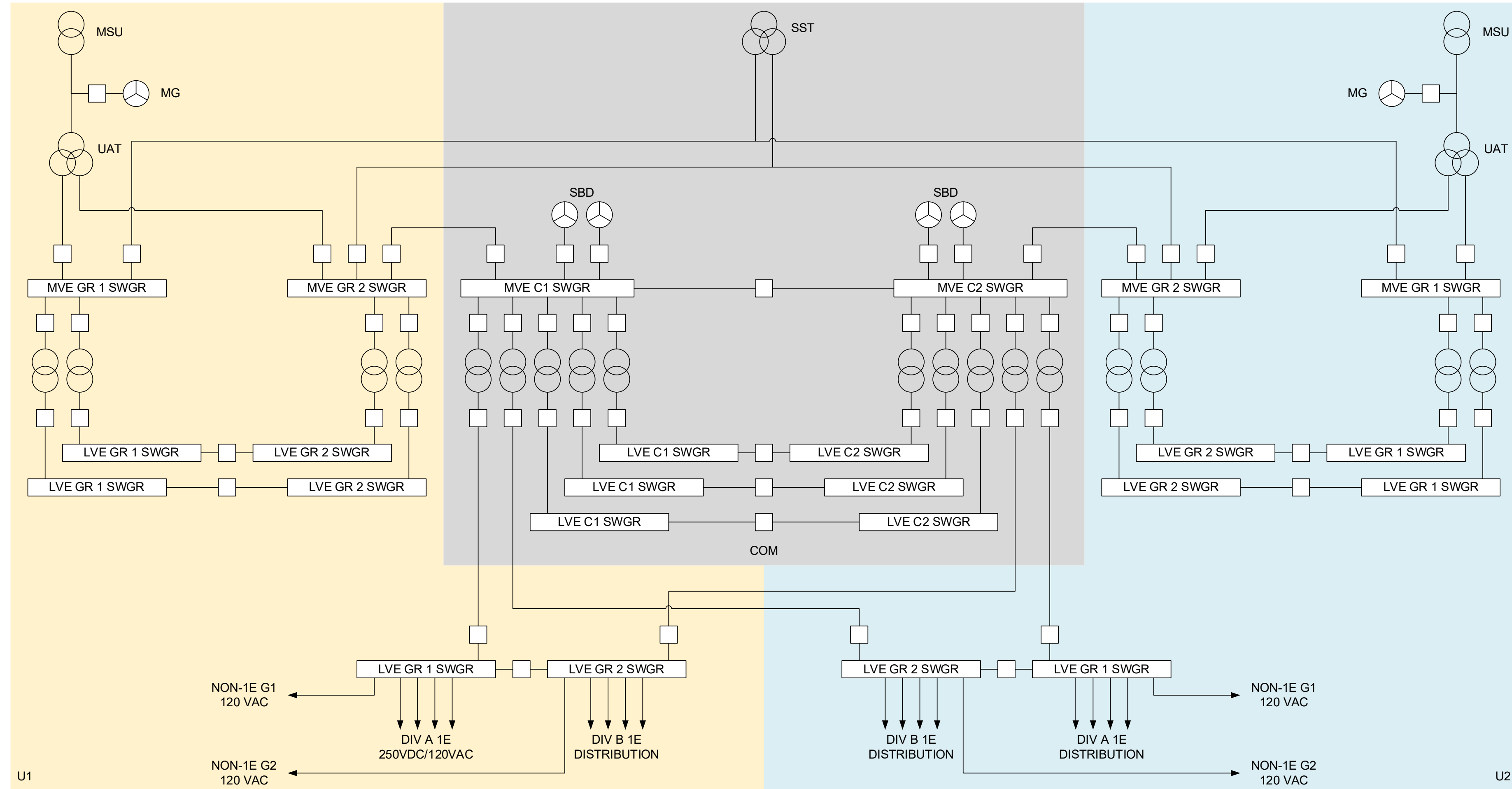
- ✓ Provide an overview of the SMR-300 electrical design and its application to achieving and maintaining safe shutdown
- ✓ Discuss implications for GDCs requiring offsite power

## ■ Outcome:

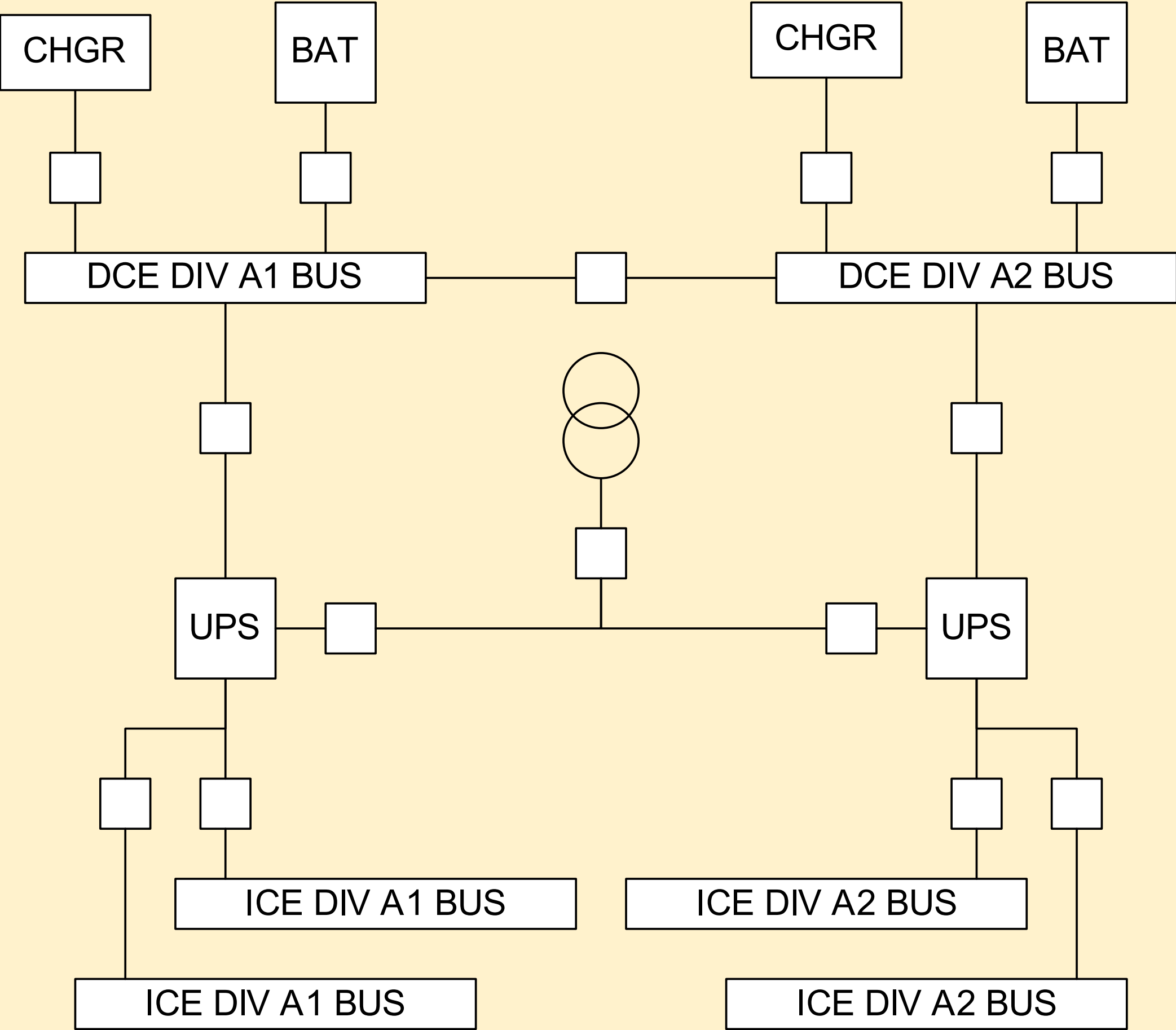
- ✓ Gain alignment on proposed exemption request covering GDC 17, 33, 34, 35, 38, 41, and 44

# Dual Unit Approach

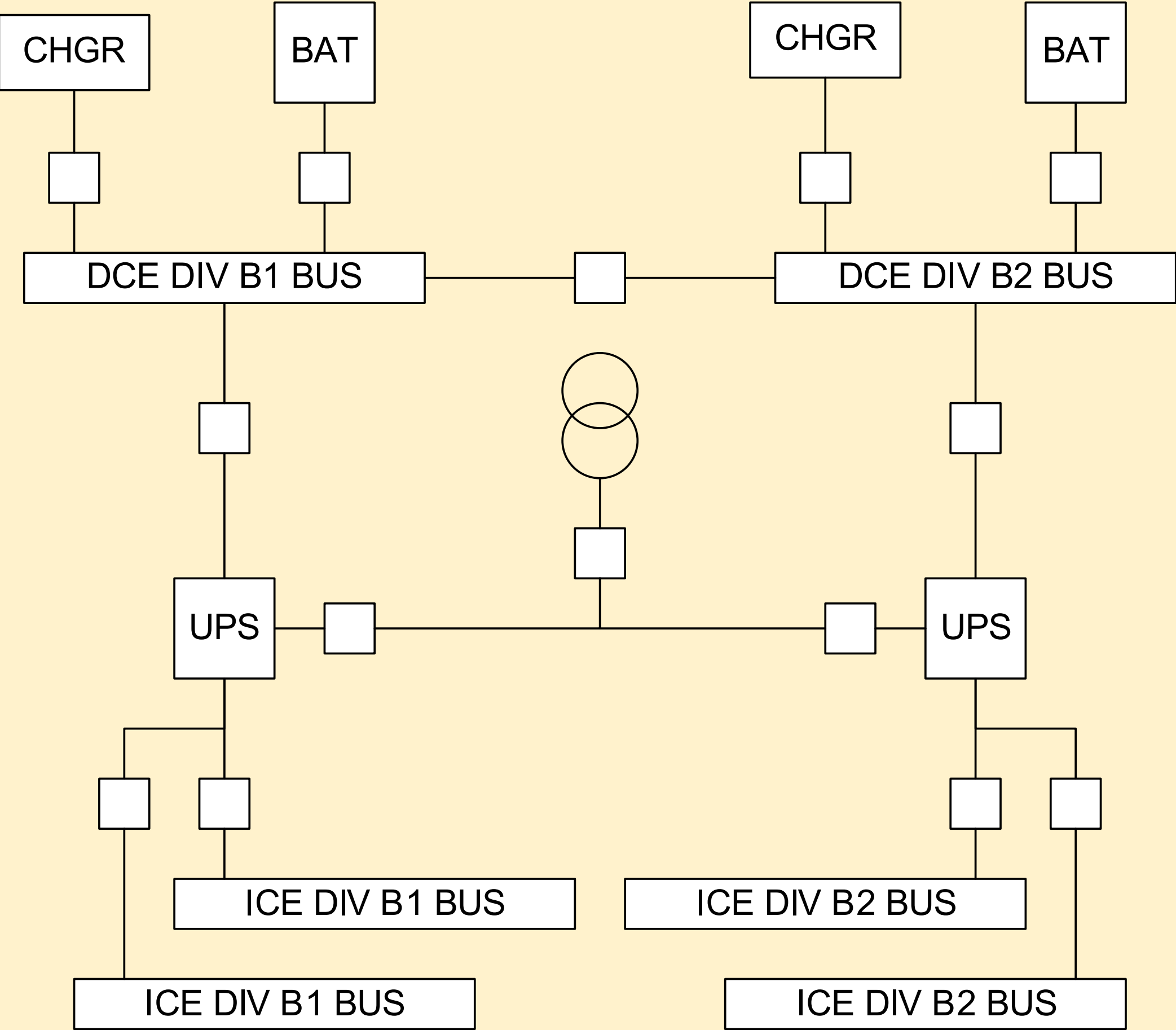
- Common Station Service transformer (SST) and non-Class 1E switchgears
- Independent Class 1E circuit



# Class 1E Electrical Distribution System



UNIT 1  
DIVISION A



UNIT 1  
DIVISION B

# SMR-300 Electrical Safe Shutdown Approach

- The Class 1E batteries are sized with a coping time of 72 hours and to address SBO coincident with a LOCA

## Sequence of Events

Loss of all AC power to battery chargers.

Battery starts to discharge powering Class 1E DC loads and inverters

Loads include continuous loads from the inverter as well as loads that are normally energized but will later be de-energized.

Safeguards Actuation signal, Containment Isolation signal. Loads include continuous loads from the inverter, energization of MOV's changing position, and de-energization of NC (normally closed) AOV's/SOV's to place them in their safety position.

Continuous loads for duration of 72-hour coping period.



# SMR-300 Regulatory Compliance Overview

- SMR-300 design supports an exemption to GDC 17
  - ✓ SMR-300 still meets underlying purpose of GDC 17
  - ✓ Will be compliant with proposed PDC 17
  
- SMR-300 design similarly supports exemption to portions of GDC 33, 34, 35, 38, 41, and 44
  - ✓ Only portions requiring offsite power sources
  - ✓ Will be compliant with proposed PDCs

- *An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.*
- *The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.*
- *Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights of way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.*
- *Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.*



## Underlying Purpose of GDC 17

- To ensure that sufficient electrical power is available to permit safety functions of the SMR-300
- The SMR-300 is designed to utilize passive safety systems that only rely on redundant, onsite Class 1E power systems to achieve and maintain safe shutdown during anticipated operating conditions and postulated accidents.

- *A redundant onsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for the system shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.*
- *The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.*
- *Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.*

# Remaining GDCs – GDC 34

- *A system to remove residual heat shall be provided. The system safety function shall be to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded.*
- *Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.*



# Remaining GDCs – SMR-300 PDC 34

- *A system to remove residual heat shall be provided. The system safety function shall be to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded.*
- *Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) the system safety function can be accomplished, assuming a single failure.*

# Exemptions – 10 CFR 50.12

## ■ The proposed exemption request is

### ✓ Authorized by law

- Not inconsistent with Atomic Energy Act of 1954

### ✓ No undue risk to the public health and safety

- No impact to postulated accident progressions or consequences

### ✓ Consistent with the common defense and security

- No impact to plant security or safeguards

### ✓ Accompanied by special circumstances

- Underlying purpose of the rule is met



# Open Forum