

2.1.2 Emergency Power Generating Buildings

Design Description

1.0 System Description

The Emergency Power Generating Buildings (EPGB) are safety-related, Seismic Category I, reinforced concrete structures supported by a reinforced concrete basemat. There are two essentially identical EPGBs (EPGB 1/2 and EPGB 3/4) located adjacent to the Nuclear Island (NI). To address aircraft and explosion pressure wave hazards, these structures are physically separated by the NI complex as illustrated on Figure 2.1.2-1. Information in tables and figures in this section is for information only with the exception of the specific features listed in the ITAAC for verification.

Each structure houses two diesel generators, two fuel oil tanks, two control rooms, heating ventilation and air conditioning (HVAC) equipment, electrical equipment, and miscellaneous equipment associated with the operation of each generator. The two diesel generators are separated by a reinforced concrete wall to protect against internal hazards. The two fuel oil tanks are separated from the diesel generators by a reinforced concrete wall to protect against internal hazards.

The EPGBs are Seismic Category I structures, which are capable of performing their safety-related function during and following a safe shutdown earthquake (SSE). These structures are designed for external hazards including rain and snow loads, flooding, wind loads, extreme wind loads, missile impact loads, SSE loads, and site-proximity hazards. The buildings are also designed for structure and component dead loads, live loads, pipe reactions, and thermal effects. There are no internally generated missile impact loads applicable to the design of these buildings.

Each EPGB provides the following safety-related functions:

- Supports the emergency diesel generators and associated mechanical, electrical, and instrumentation and control equipment required to function during and after a design basis event.
- Provides protection for safety-related equipment against external hazards.
- Provides separation between the main diesel generators and fuel oil tanks.
- Each EPGB structure is approximately 95 ft by 178 ft by 68 ft high.

2.0 Arrangement

2.1 The basic configuration of the EPGBs is as shown on Figure 2.1.2-1—U.S. EPR Building Layout Showing EPGB Locations.

3.0 Mechanical Design Features

- 3.1 Separation is provided between the EPGBs and the NI common basemat structures as shown on Figure 2.1.2-1 to preclude interaction between the EPGBs and NI common basemat structures.
- 3.2 The EPGBs site grade level is located between 12 inches and 18 inches below finish floor elevation at ground entrances.
- 3.3 Internal hazard protection barriers separate internal rooms within each EPGB, and EPGB 1 from EPGB 2 and EPGB 3 from EPGB 4 so that the impact of internal hazards, including fire, flood, high-energy line break and missile impact, is contained within the respective room of the EPGB of hazard origination.
- 3.4 The EPGB structures are Seismic Category I and will withstand design basis loads, as specified below, without loss of structural integrity and safety-related functions:
 - Normal plant operation (e.g., dead loads, live loads, lateral earth pressure loads, hydrostatic loads, hydrodynamic loads, and temperature loads).
 - Internal events (e.g., internal flood loads, accident pressure loads, accident thermal loads, accident pipe reactions, and pipe break loads—including reaction loads, jet impingement loads, cubicle pressurization loads, and missile impact loads).
 - External events (e.g., wind, extreme winds, rain, snow, flood, extreme winds-generated missiles, and earthquake).
- 3.5 Deleted.
- 3.6 The EPGB structures have key dimensions and tolerances specified in Table 2.1.2-1—Key Dimensions of Emergency Power Generating Building Structure and Table 2.1.2-2—Key Dimensions of Emergency Power Generating Building Foundation Footprint.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1.2-3 lists the EPGB ITAAC.

Table 2.1.2-1—Key Dimensions of Emergency Power Generating Building Structure

| Label | Section Descriptions | Region | Floor Elevation or Elevation Range | Key Dimensions ⁽¹⁾ |
|-------|---------------------------------|--------------------------|--|-------------------------------|
| F4 | Foundation Basemat. | Refer to Figure 2.1.2-3. | Nominal elevation 0 ft – 0 in. | 6 ft – 0 in. |
| W11 | Typical Wall at Column Line 11. | Refer to Figure 2.1.2-2. | From nominal elevations 0 ft to 69 ft. | 1 ft – 11 5/8 in. |
| S10 | Reinforced Concrete Slab. | Refer to Figure 2.1.2-3. | Nominal elevation 51 ft – 6 in. | 2 ft – 0 in. |

1. Concrete forming and placement tolerances shall conform to the requirements of ACI 349 and ACI 117.

Table 2.1.2-2—Key Dimensions of Emergency Power Generating Building Foundation Footprint

| Label | Section Descriptions | Region | Key Dimension | Tolerance |
|-------|---|--------------------------|----------------|------------|
| D11 | Distance from North to South edge of EPGB foundation base slab. | Refer to Figure 2.1.2-1. | 178 ft – 0 in. | +/- 12 in. |
| D12 | Distance from East to West edge of EPGB foundation base slab. | Refer to Figure 2.1.2-1. | 94 ft – 6 in. | +/- 12 in. |
| D13 | Distance from top of EPGB foundation base slab to top of roof. | Refer to Figure 2.1.2-3. | 68 ft – 0 in. | +/- 12 in. |

Table 2.1.2-3—Emergency Power Generating Building ITAAC
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| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---------------------------|--|--|---|
| 2.1 | The basic configuration of the EPGBs is as shown on Figure 2.1.2-1. | An inspection of the basic configuration of the as-built EPGBs will be performed. | The basic configuration of the EPGBs is as shown on Figure 2.1.2-1. |
| 3.1 | Separation is provided between the EPGBs and the NI common basemat structures as shown on Figure 2.1.2-1 to preclude interaction between the EPGBs and NI common basemat structures. | An inspection will be performed to verify the as-built physical separation distance between the EPGBs and the NI common basemat structures. | The EPGBs are separated from the NI common basemat structures as shown on Figure 2.1.2-1. A separation distance of at least 20 ft exists between the EPGBs and NI common basemat structures. |
| 3.2 | The EPGBs site grade level is located between 12 inches and 18 inches below finish floor elevation at ground entrances. | An inspection will be performed to verify the as-built EPGBs site grade level is located below finish floor elevation at ground entrances. | The EPGBs site grade level is located between 12 inches and 18 inches below finish floor elevation at ground entrances. |
| 3.3 | Internal hazard protection barriers separate internal rooms within each EPGB, and EPGB 1 from EPGB 2 and EPGB 3 from EPGB 4 so that the impact of internal hazards, including fire, flood, high-energy line break and missile impact, is contained within the respective room of the EPGB of hazard origination. | <p>a. An analysis will be performed to determine the internal hazard protection barriers separate internal rooms within each EPGB, and EPGB 1 from EPGB 2 and EPGB 3 from EPGB 4 so that the impact of internal hazards, including fire, flood, high-energy line break and missile impact, is contained within the respective room of the EPGB of hazard origination.</p> <p>b. An inspection will be performed to verify the as-built internal hazard protection barriers that separate internal rooms within each EPGB, and EPGB 1 from EPGB 2 and EPGB 3 from EPGB 4.</p> | <p>a. A report defines the internal hazard protection barriers separate internal rooms within each EPGB, and EPGB 1 from EPGB 2 and EPGB 3 from EPGB 4 so that the impact of internal hazards, including fire, flood, high-energy line break and missile impact, is contained within the respective room of the EPGB of hazard origination.</p> <p>b. Internal hazard protection barriers that separate internal rooms within each EPGB, and EPGB 1 from EPGB 2 and EPGB 3 from EPGB 4.</p> |

Table 2.1.2-3—Emergency Power Generating Building ITAAC
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| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|-----|--|---|--|
| 3.4 | <p>The EPGB structures are Seismic Category I and will withstand design basis loads, as specified below, without loss of structural integrity and safety-related functions:</p> <ul style="list-style-type: none"> • Normal plant operation (e.g., dead loads, live loads, lateral earth pressure loads, hydrostatic loads, hydrodynamic loads, and temperature loads). • Internal events (e.g., internal flood loads, accident pressure loads, accident thermal loads, accident pipe reactions, and pipe break loads – including reaction loads, jet impingement loads, cubicle pressurization loads, and missile impact loads). • External events (e.g., wind, extreme winds, rain, snow, flood, extreme winds-generated missiles, and earthquake). | <p>An inspection and analysis will be performed to verify the as-built EPGB structures will withstand design basis loads.</p> | <p>A report concludes that the EPGB structures will withstand the design basis loads, as specified below, without loss of structural integrity or safety-related functions:</p> <ul style="list-style-type: none"> • Normal plant operation (e.g., dead loads, live loads, lateral earth pressure loads, hydrostatic loads, hydrodynamic loads, and temperature loads). • Internal events (e.g., internal flood loads, accident pressure loads, accident thermal loads, accident pipe reactions, and pipe break loads – including reaction loads, jet impingement loads, cubicle pressurization loads, and missile impact loads). • External events (e.g., wind, extreme winds, rain, snow, flood, extreme winds-generated missiles, and earthquake). |
| 3.5 | Deleted. | Deleted. | Deleted. |
| 3.6 | <p>The EPGB structures have key dimensions and tolerances specified in Table 2.1.2-1 and Table 2.1.2-2.</p> | <p>An inspection will be performed to verify key dimensions and tolerances of the as-built EPGB structures.</p> | <p>The EPGB structures conform to the key dimensions and tolerances specified in Table 2.1.2-1 and Table 2.1.2-2.</p> |