Plant Parameter Envelope Methodology

NRC Staff Discussion

PSEG Power LLC

Presentation Agenda

***Discussion Objective*:** To familiarize NRC staff with PSEG's approach to Plant Parameter Envelope (PPE) development and to work towards a common understanding and vocabulary for future interactions

Discussion Topics:

- Why did PSEG choose the PPE approach?
- What is our PPE development approach?
- General Questions regarding available NRC Guidance

Why Did PSEG Choose the PPE Approach?

- We wanted to follow the Part 52 process as it was designed by filing an Early Site Permit
- However, the reactor technology designs are not yet mature
  - Significant regulatory risk exists until Design Certification reviews are complete
  - Significant technology and commercial risks exist until detailed designs are more complete
- The PPE approach identifies bounding values for parameters that define the facility's interaction with the environment, allowing us to engage our external stakeholders in conversations about these issues early

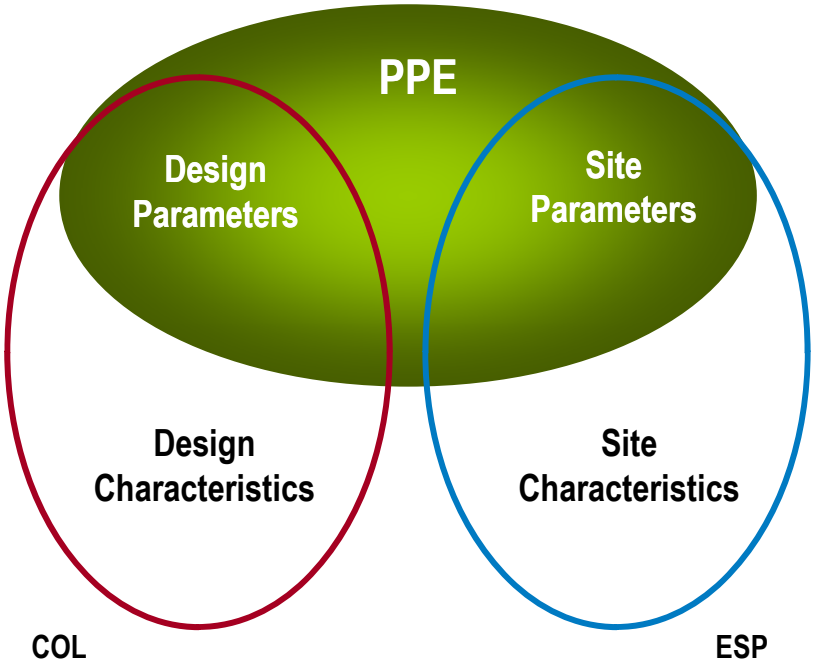
What Have We Learned?

- Three previous ESPs used a PPE – Clinton, North Anna, Grand Gulf
  - Included technologies not reviewed by NRC (i.e., ACR-700, PBMR, IRIS)
- After issuance of the ESPs, DOE and NEI performed lessons learned reviews
  - DOE report addressed PPE
    - Concluded that PPE approach was useful and should be continued
    - Considerable interaction needed to establish common expectations
    - Additional NRC guidance needed in certain areas
- Parameters should be limited to those “design parameters” and “site parameters” necessary to provide an overall and thorough description (i.e., “envelope”) of the reactor technologies

What Have We Learned? (Cont'd)

- Conclusions from reviews of existing NRC guidance/previous Early Site Permit Applications
  - Typical PPE values include:
    - Cooling water requirements (flow, temperature, etc.)
    - Cooling system and intake conceptual designs
    - Make up water needs
    - Air, liquid and radiological emissions and release points
    - Site boundary, exclusion areas, etc.
    - Radiological source term
    - Staffing/construction workforce
- Parameters should be based on those used in the three previous ESPAs, adjusted for site specific issues, and on the requirements contained in NUREG-0800 and NUREG-1555
- Early and frequent communication is essential, including consistent definitions and use of terminology

Plant Parameter Development Approach



"Parameters" are supplied by Reactor Vendors
"Characteristics" are specific to the actual site and technology selected

Design parameters – The postulated features of the reactor or reactors that could be built. These features describe design information that is necessary to prepare and review an ESP application.

Site parameters – The postulated physical, environmental and demographic features of an as-yet unidentified site. These are the site-related parameters that vendors have assumed in completing a reactor design. They establish the physical, environmental and demographic characteristics that a site must "deliver" if it is to be suitable for the vendor's reactor or reactors.

Design Characteristics – The real features of a reactor or reactors.

Site characteristics – The real physical, environmental and demographic features of the proposed location for a new facility. These values are established through data collection and/or analysis and are reported in the applicant's ESP application. They are developed in accordance with NRC requirements and guidance and form the basis for future comparison (at the COL stage) with "design characteristics" of the selected design to verify that the site is suitable for that design.

Plant Parameter Development Approach (Cont'd)

- PPE Tables
  - Design Parameters
  - Site Parameters*
  - Chemical Emissions
  - Radionuclide Releases
- Sample Format

Table A-1 Plant Parameters Envelope				
Parameter	**Value**	**Units**	**Reference**	**Definition**
1. Structures				
1.1 Building Characteristics				
1.1.1 Height		ft		The height from finished grade to the top of the tallest power block structure, excluding cooling towers.
1.1.2 Foundation Embedment		ft		The depth from finished grade to the bottom of the basemat for the most deeply embedded power block structure.
1.1.3 Foundation Plan Dimensions		ft		The length and width of the basemats for the Seismic Category I structures.
1.2 Precipitation (for Roof Design)				
1.2.1 Maximum Rainfall Rate		in/hr		The probable maximum precipitation (PMP) value that can be accommodated by a plant design. Expressed as maximum precipitation for 1 hr in 1 mi^2 with a ratio for five minutes to the 1 hr PMP of 0.32 as found in National Weather Service Publication HMR No. 52.
1.2.2 Snow Load		lb/ft^2		The maximum 100-year return interval snow load on structure roofs that can be accommodated by the plant design.

* Site Parameters will be compared to Site Characteristics

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Plant Parameter Development Approach (Cont'd)

Plant Parameter Examples:

SECTION:	SUB-SECTION:	PARAMETER:	DEFINITION:	BASIS FOR INCLUSION:
1.0 Structure	**1.6 Tornado (Design Basis)**	**Maximum Pressure Drop**	The design assumption for the decrease in ambient pressure from normal atmospheric pressure due to the passage of the tornado	▪ SRP 2.3.1 ▪ Provided by first three ESP applicants or in SER
2.0 Normal Plant Heat Sink	**2.3 Condenser**	**Condenser**	Design value for the waste heat rejected to the circulating water system across the condensers	▪ NUREG-1555, Sections 3.5 and 5.4 ▪ Provided by first three ESP applicants or in SER
3.0 Ultimate Heat Sink	**3.1 Ambient Air Requirements**	**Maximum Ambient Temperature**	Assumption used for the maximum ambient temperature in designing the UHS system to provide heat rejection for 30 days under the assumed temperature condition	▪ SRP 2.3.1 ▪ SRP 9.2.5
9.0 Unit Vent / Airborne Effluent Release Point	**9.4 Release Point**	**Elevation (Normal)**	The elevation above finished grade of the release point for routine operational releases	▪ SRP 11.3 ▪ Provided by first three ESP applicants or in SER
	9.5 Source Term	**Gaseous (Normal)**	The annual activity, by isotope, contained in routine plant airborne effluent streams, excluding tritium	▪ NUREG-1555, Sections 3.5 and 5.4 ▪ Provided by first three ESP applicants or in SER
18.0 Construction	**18.2 Laydown Acreage**	**Temporary Construction Facilities**	The land area required to provide space for construction support facilities. Provide a list of what buildings and/or areas and the associated acreage for each	▪ NUREG-1555, Sections 5.1

General Questions

- See attached