

## ClinchRiverESPHFNPEm Resource

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**From:** Schiele, Raymond Joseph <rjschiele@tva.gov>  
**Sent:** Monday, November 13, 2017 12:28 PM  
**To:** Nguyen, Quynh  
**Cc:** Fetter, Allen; Stout, Daniel Paul  
**Subject:** [External\_Sender] TVA ACRS Presentation  
**Attachments:** TVA\_ACRS Presentation\_11-13-17.pdf

Quynh, Good Morning,

My name is Ray Schiele and I am the TVA Licensing Manager for the Clinch River Small Modular Reactor Project. TVA is presenting to ACRS on Wednesday morning and Allen Fetter asked me provide a copy of the slides to you. If you have any questions or need any additional information, please contact me at your convenience.

Thanks!

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# TVA Clinch River SMR Project Early Site Permit

November 15, 2017

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Advisory Committee on Reactor Safeguards  
Subcommittee Meeting

# **Early Site Permit – Overview**

**Dan Stout**

**Senior Manager, Small Modular Reactors**



# Early Site Permit Application (ESPA)

An Early Site Permit assesses site suitability for potential construction and operation of a nuclear power plant.

The TVA ESPA contains more than 8,000 pages and is supported by over 80,000 pages in referenced documents.

## **Application includes:**

- Site Safety Analysis Report to address impacts of the environment on the plant
- Environmental Report
- Emergency Plans (Part 5A and Part 5B)
- Exemptions (Part 6)

## **ESPA based on a “plant parameter envelope” (PPE)**

- Based on input from the four U.S. light-water SMR designs developed by BWX Technologies, Holtec, NuScale Power, Westinghouse
- Assumes two or more SMR units of a single design
- Up to 800MWt for a single unit with a combined nuclear generating capacity not exceeding 2420 MWt (800 MWe)

# Application Organization

## **Part 1 – Administrative Information**

## **Part 2 – Site Safety Analysis Report**

- Chapter 1 – Introduction and General Description
- Chapter 2 – Site Characteristics
- Chapter 3 – Aircraft Hazards
- Chapter 11 – Radioactive Waste Management
- Chapter 13 – Emergency Planning
- Chapter 15 – Transient and Accident Analysis
- Chapter 17 – Quality Assurance

## **Part 3 – Environmental Report**

## **Part 4 – Limited Work Authorization – Not Used**

## **Part 5 – Emergency Plan**

## **Part 6 – Exemptions and Departures**

## **Part 7 – Withheld Information**

## **Part 8 – Enclosures**

# ESPA Contractor Support by Part

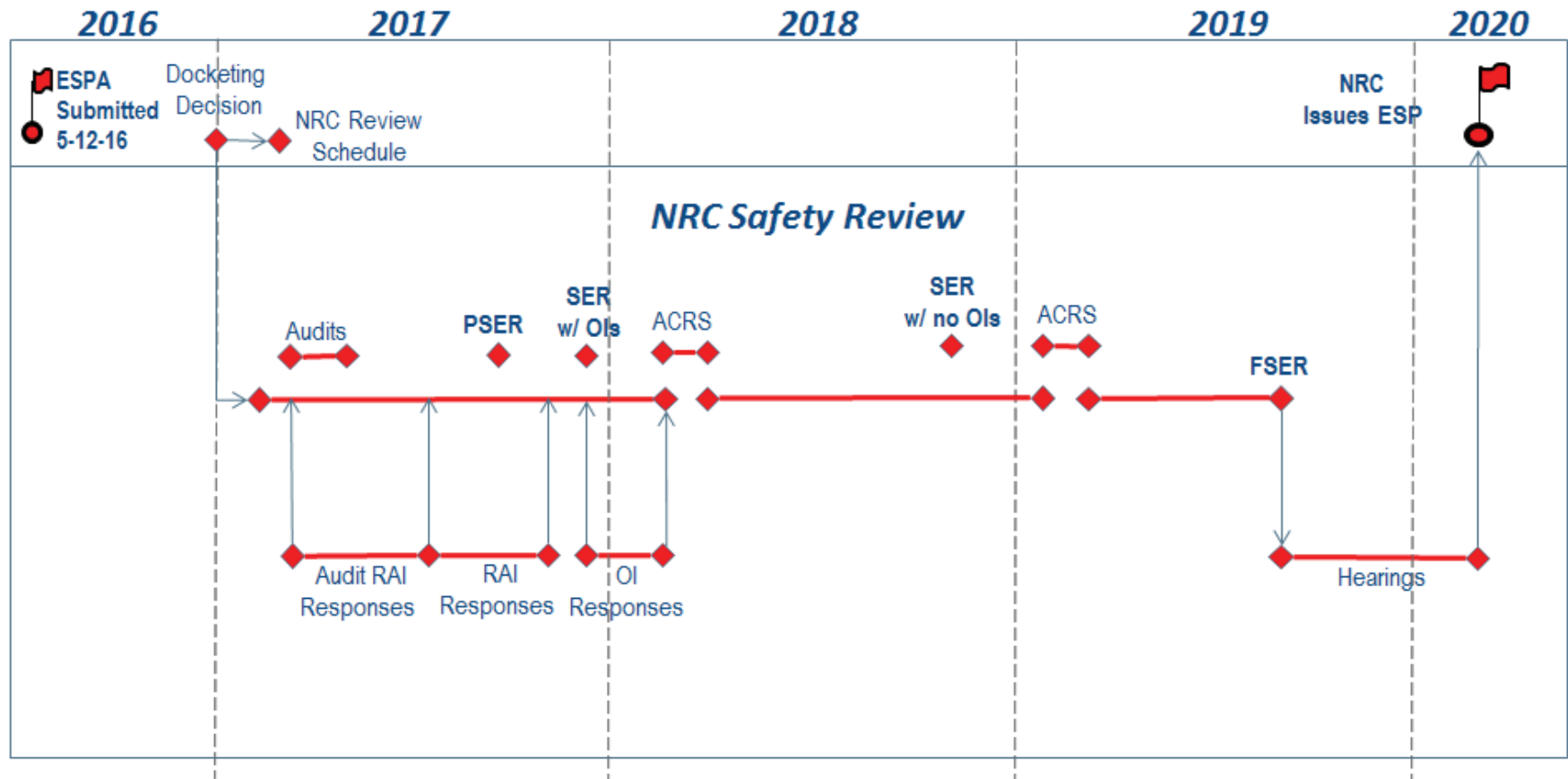
ESPA Part	Originator
1- Administrative Information	TVA
2- Site Safety Analysis Report (SSAR)	Bechtel (with exceptions below)
Demography	Enercon
Meteorology	TVA & Enercon
Flooding	BWSC
Seismic	Bechtel, URS, & Rizzo
Ch13 - Conduct of Operations	TVA
Ch17 - Quality Assurance	TVA
3- Environmental Report (ER)	AECOM
5- Emergency Plan	Enercon
6- Exemptions	TVA & Enercon
7- Withheld	TVA
8- Enclosures	Bechtel

# Early Site Permit Application – Chronological Development

- TVA begins exploring potential SMR Project 2009
- Site Characterization 2010 - 2015
- ESPA Submitted to NRC May 2016
- NRC accepts ESPA for review December 2016
- NRC performs audits & issues RAls March – October 2017
- Contentions filed, ASLB formed June 2017
- Two Contentions Admitted by ASLB October 2017



# ESPA Project Update – Licensing Process



# Application Submittal

## NRC Site Visits

- |                                     |                |
|-------------------------------------|----------------|
| ■ Pre-Environmental Report Visit    | March 2013     |
| ■ PPE Development                   | September 2014 |
| ■ Pre-application Site Visit        | October 2014   |
| ■ Alternative Sites Visit           | June 2015      |
| ■ ESPA Readiness Review             | August 2015    |
| ■ Meteorology and Source Term Audit | April 2017     |
| ■ Hydrology and Groundwater Audit   | April 2017     |
| ■ Seismic/Geotechnical Audit        | May 2017       |
| ■ Environmental Audit               | May 2017       |

# Site Location

**The CRN property encompasses 1200 acres of land adjacent to the Clinch River arm of the Watts Bar Reservoir, within the City of Oak Ridge, Roane County, Tennessee.**

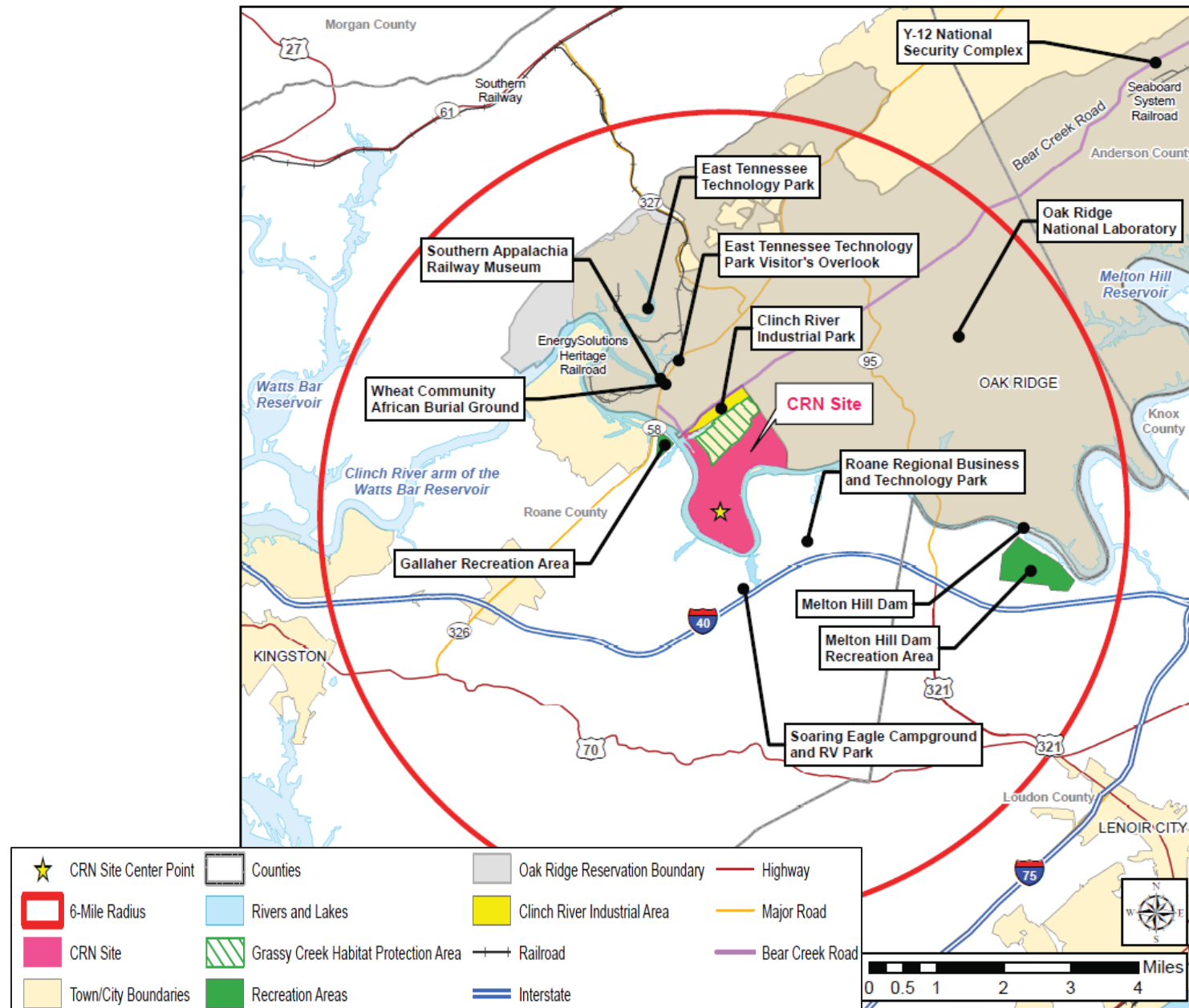
- Borders DOE Oak Ridge Reservation
- 6.8 miles east of Kingston, TN
- 9.2 miles east-southeast of Harriman, TN
- 8.8 miles southeast of Lenoir City, TN
- 25.6 miles west-northwest of Knoxville, TN

**The land is owned by the United States of America and managed by TVA as the agent of the federal government.**



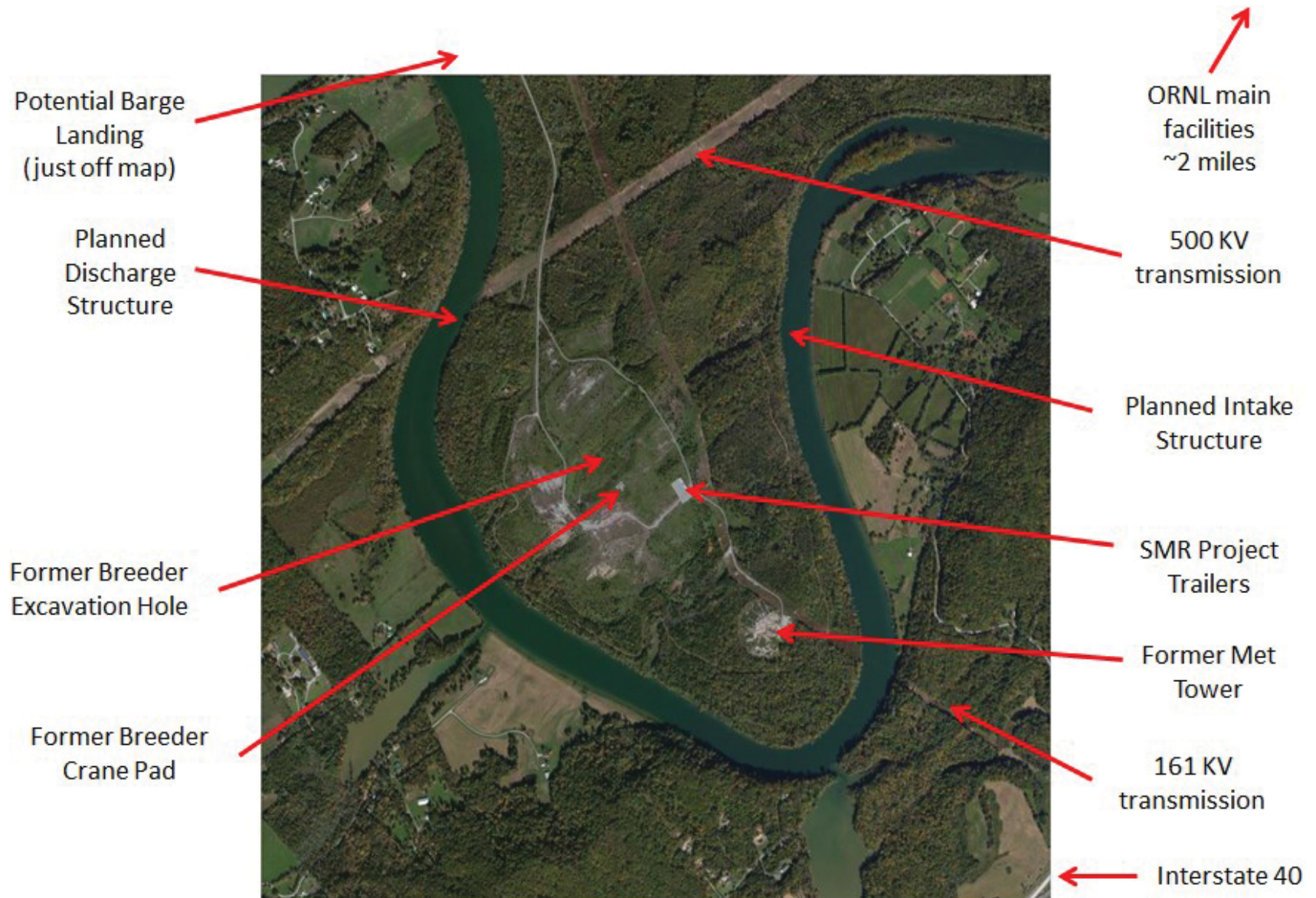


# TVA ESP Site and Local Vicinity





# TVA ESP Site – Points of Interest



# ESP Application Development

## Regulatory guidance to prepare the application

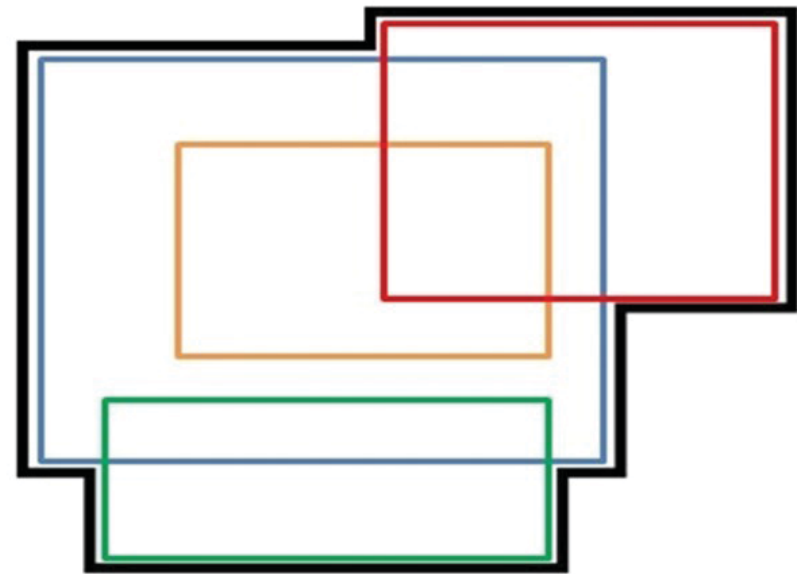
- 10 CFR Part 52, Subpart A
- RG 1.206 - Combined License Applications for Nuclear Power Plants (LWR Edition)
- NUREG – 0800 - Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition
- RS-002 – Processing Applications for Early Site Permits
- Appropriate Guidance Documents

# What is a Plant Parameter Envelope (PPE)?

Composite of reactor and engineered parameters that bound the safety and environmental impact of plant construction and operation

## Considers 4 SMR Vendors

- BWXT mPower
- NuScale
- Holtec SMR-160
- Westinghouse

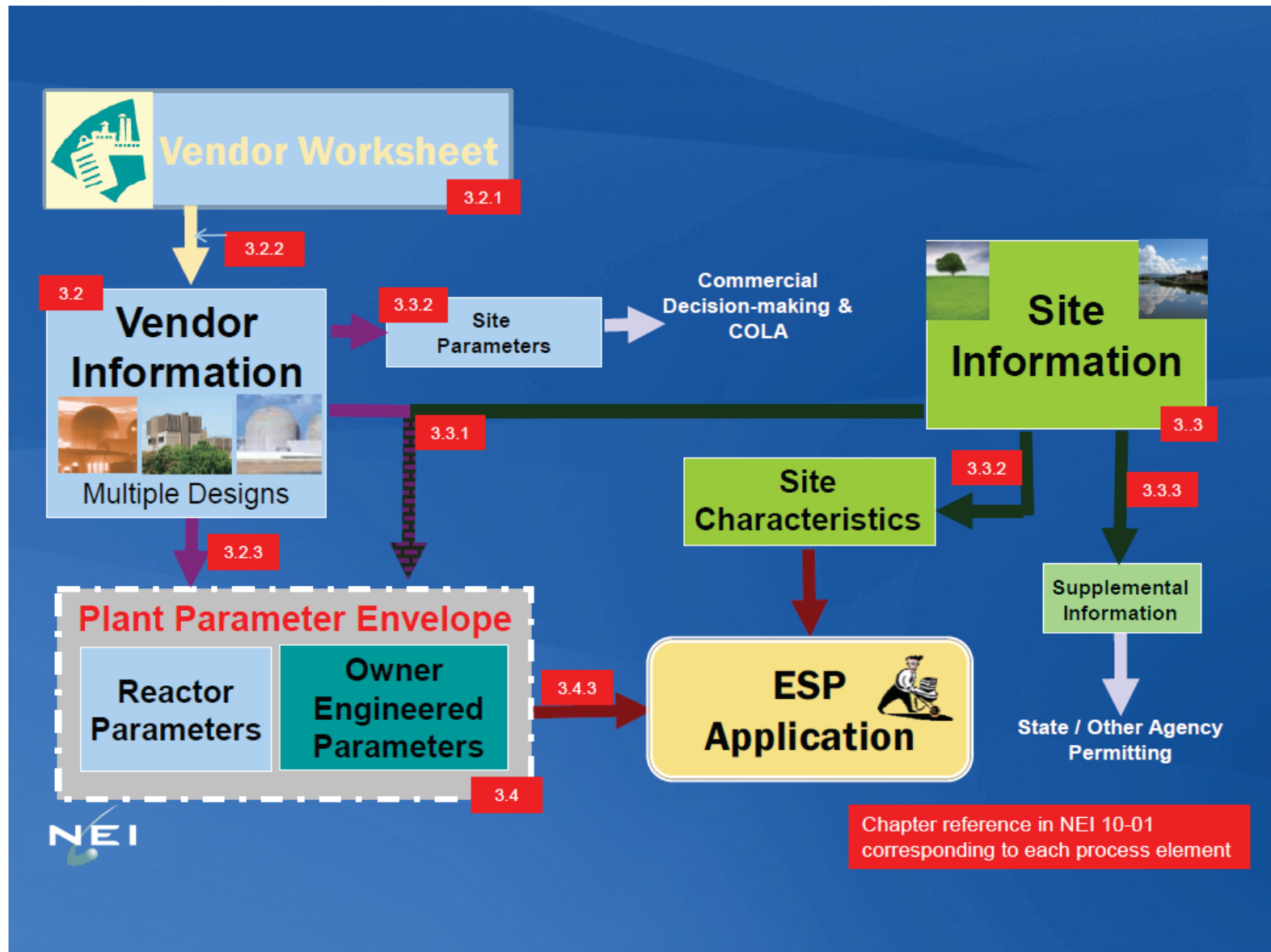


## Developed based on NEI 10-01 Guidance

- Margin added to specific parameters as appropriate
- Creates “Franken-plant” or a “Black Box Plant”



# Plant Parameter Development Process



# PPE Use Considerations

## **Includes Appropriate Conservatism**

- Prevents rework when vendor analysis is updated
- Safety conclusion becomes more apparent
- Document and, when possible, quantify conservatisms

**Allows use of multiple reactor designs, providing flexibility for future business decisions.**

## **An integral element of 10 CFR Part 52**

- Works well with a future COLA



# Conclusions

**TVA is exploring more generation options**

**SMRs have desirable attributes:**

- Safety
- Cost
- Operational and Deployment Flexibility

**An ESP would establish suitability of the Clinch River Site for potential future construction and operation of an SMR facility**

- Valid for up to 20 years
- Reduces future COLA licensing risk by achieving finality on most siting and environmental matters
- Addresses some regulatory policy issues such as appropriately-sized Emergency Planning Zones (EPZs)

