

New Reactors

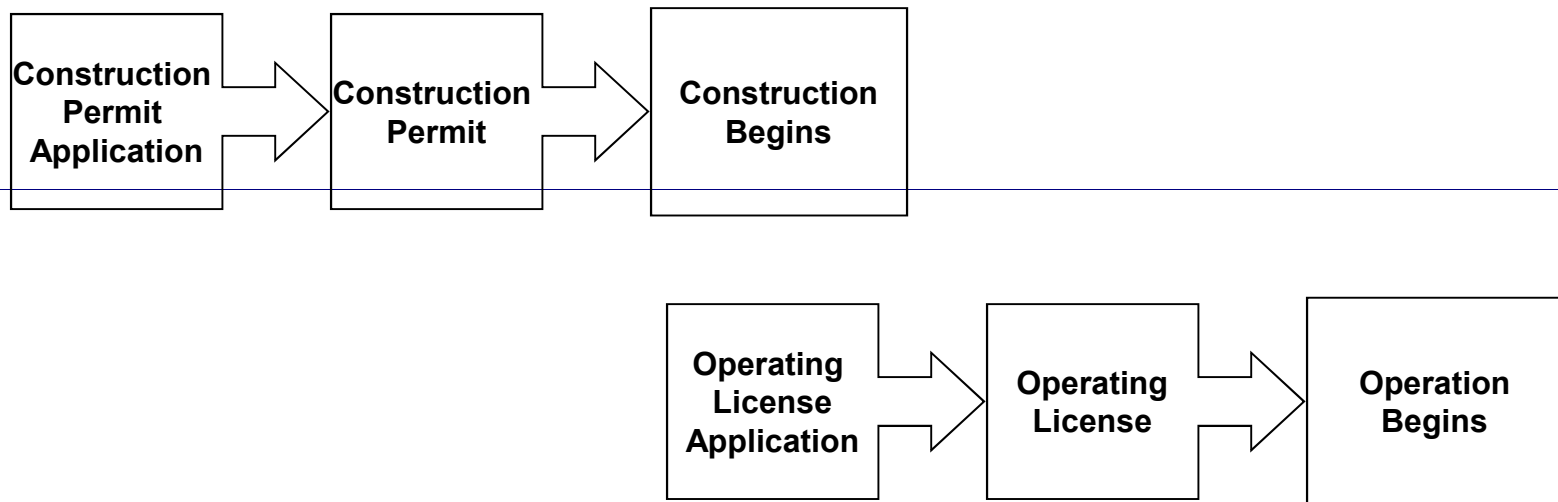


Learning Objectives:

- Understand the basic features of the Part 52 approach to licensing
- Understand the regulatory stability afforded under Part 52
- Be familiar with the advanced reactor terminology

New Reactors

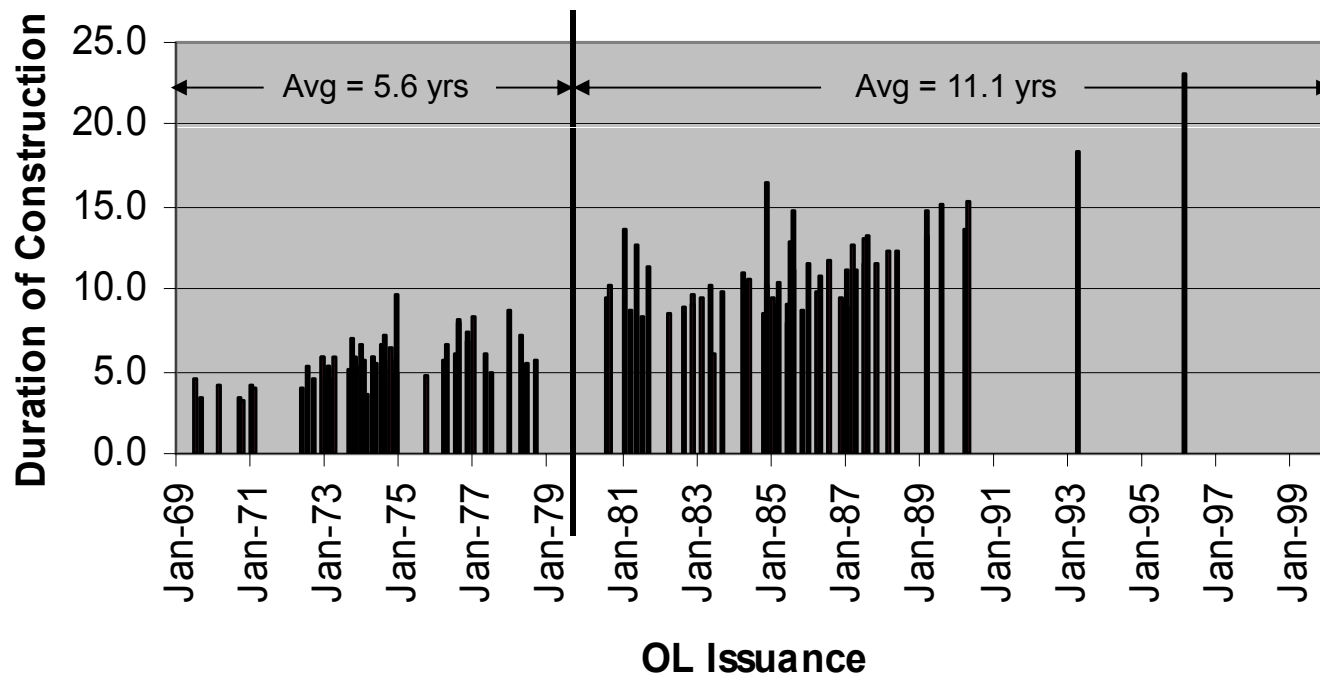
10 CFR Part 50 Licensing



- Design effort proceeded throughout
- No backfit protection with a CP
- Regulatory standards evolved as construction proceeded

New Reactors

Completion times for current fleet



New Reactors



- **Potential Obstacles**
 - Construction Management
 - Demand for Power Plants
 - Offsite Emergency Planning
 - Inspection of Modular Construction / Global Procurement
- **New Power Market**
 - Deregulations
 - Tolerance for Financial Risk

New Reactors

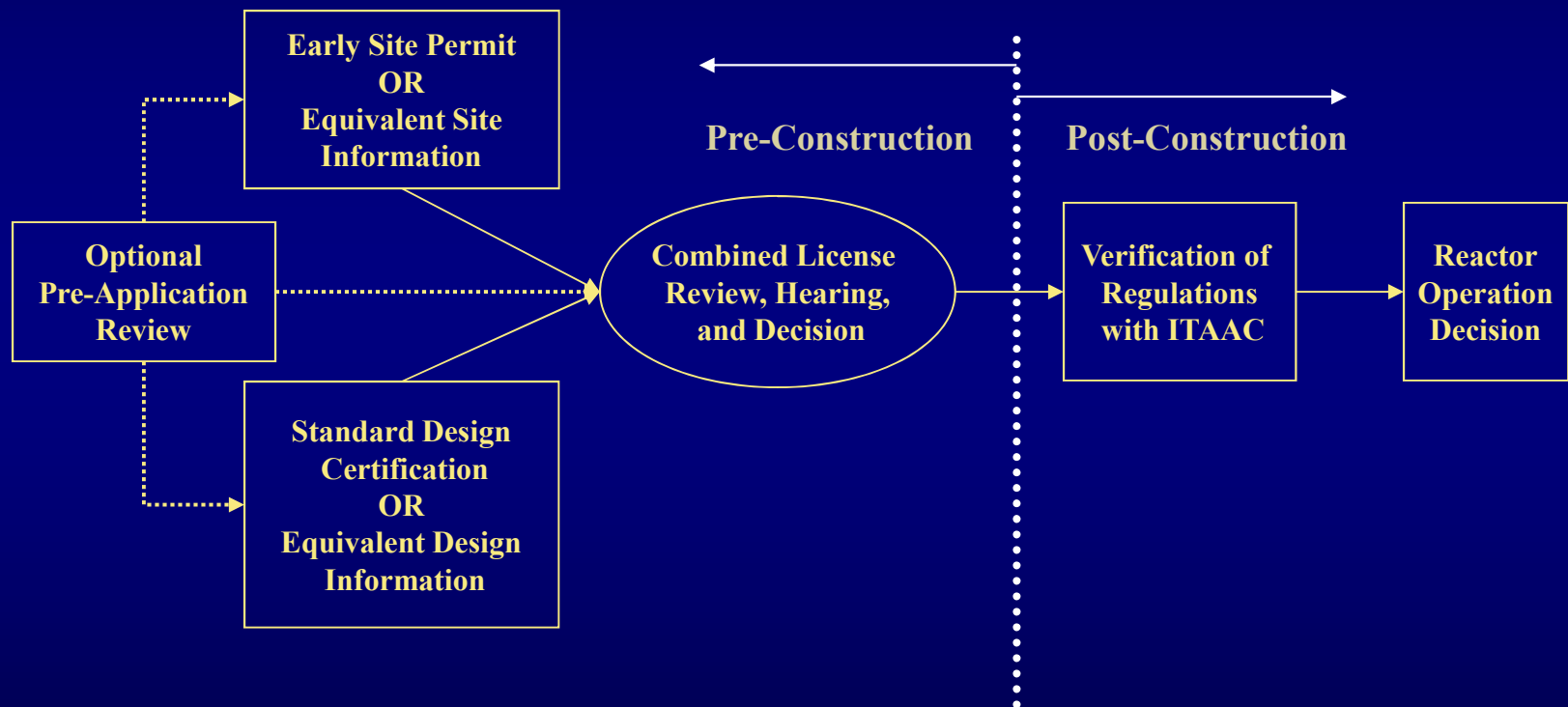


- **New Construction**

- Nuclear plants will be built more rapidly than their predecessors
- Detailed engineering essentially complete by start of construction
- Modular construction techniques may be used
- Fabrication of components may begin before COL issuance
- Components and modules may be fabricated in other countries
- Site preparation work may be performed

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10 CFR Part 52 licensing



- Licensing decisions finalized before major construction begins
- Inspections w/ITAAC verify construction
- Limited work may be authorized before COL issuance

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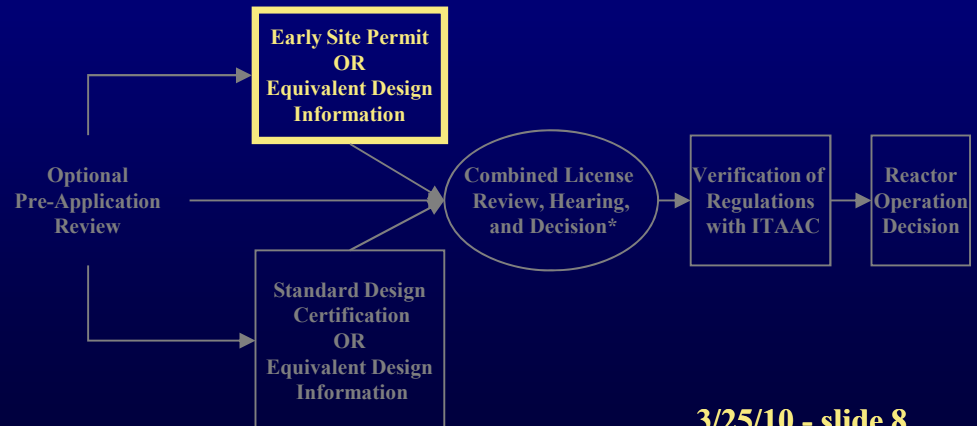


- Required Reviews for Licensing
 - Applicant Qualifications
 - Design Acceptability
 - Environmental Impacts
 - Operational Programs
 - Site Safety
 - Verification with ITAAC

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Early Site Permits (Subpart A)

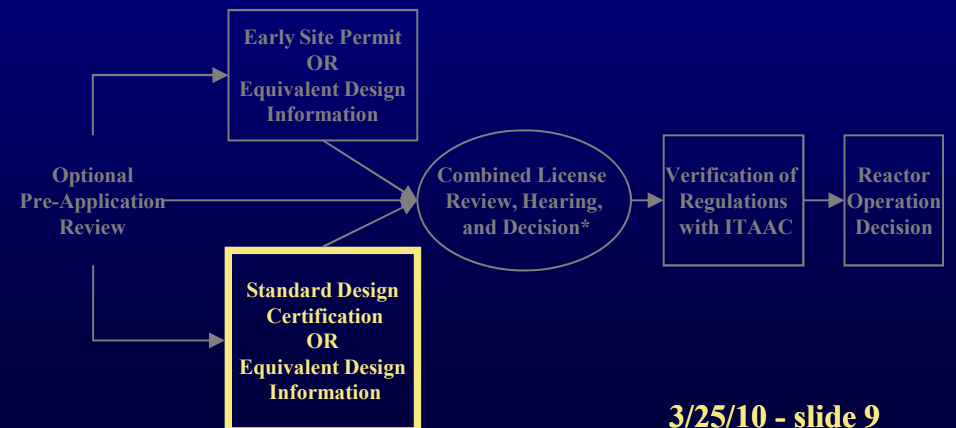
- Allows applicant to “bank” a site
- Are licenses (partial construction permits)
- Good for 10-20 yrs [52.27] + renewal
- Review Scope [52.18] :
 - Site Safety
 - What the environment can do to the design
 - Environmental Impact
 - What the design can do to the environment
 - Emergency Preparedness



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Standard Design Certifications (Subpart B)

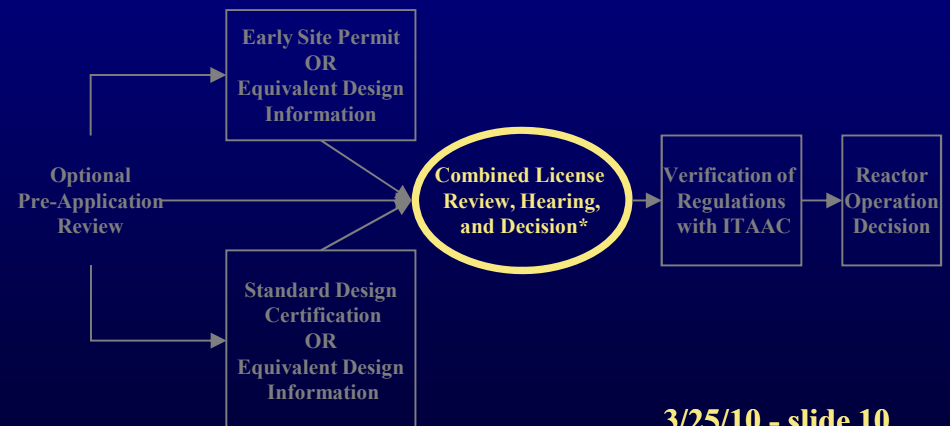
- Allows NSSL vendor/applicant to obtain pre-approval of design through rulemaking (certified design becomes an Appendix to Part 52)
 - Reduces licensing uncertainty by resolving design issues early
 - Facilitates standardization
 - High degree of regulatory finality
- Certification good for 15 yrs [52.55] + renewal



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Combined Licenses (Subpart C)

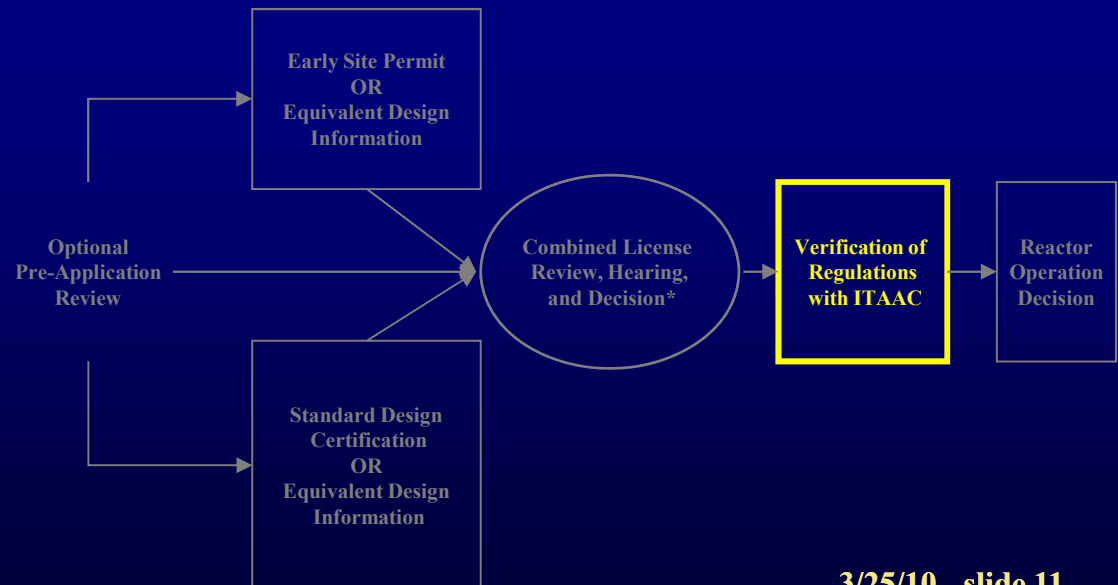
- Combined construction permit and operating license with conditions [52.3(a)]
- Fundamental licensing process in Part 52 for reducing financial risk of applicants/licensees
- Can reference ESP, Certified Design, both, or neither [52.73]
- Lasts 40 yrs [52.83] + renewal



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ITAAC:

- Inspections
- Tests
- Analyses
- Acceptance Criteria



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- 10 CFR 52.79(c) - Necessary and sufficient to provide reasonable assurance that the facility has been constructed and will operate in conformity with the combined license, the Atomic Energy Act and NRC regulations.
- ITAAC are specifically stated in the certified design
- 10 CFR 52.103(g) - Prior to fuel load and operation of the facility, the Commission shall find that the acceptance criteria in the combined license are met.”

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ITAAC COMPLIANCE

In the event that an applicant or licensee cannot demonstrate compliance to a required ITAAC, the applicant or licensee may either:

- request an exemption from the ITAAC in accordance with the Design Certification rule and 10 CFR 52.97(b), or
- petition for rulemaking to amend the Design Certification rule by changing the requirements of the ITAAC

AP 1000 Passive Core Cooling System (PXS)

| Design Commitment | Inspections, Tests, Analyses | Acceptance Criteria |
|--|--|--|
| 1. The <u>FUNCTIONAL ARRANGEMENT</u> of the PXS is as described in the Design Description of Section 2.2.3. | Inspection of the as-built system will be performed. The as-built PXS conforms with the functional arrangement as described in Section 2.2.3. | The as-built PXS conforms with the functional arrangement as described in Section 2.2.3. |
| 3.b) <u>PRESSURE BOUNDARY WELDS</u> in piping identified in Table 2.2.3-2 as <u>ASME Code Section III</u> meet ASME Code Section III requirements. | Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III. | A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds. |
| 5.a) The <u>SEISMIC CATEGORY I equipment</u> identified in Table 2.2.3-1 can withstand seismic design loads without loss of safety function. | ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed. | ii) A report exists and concludes that seismic Cat I equipment can withstand seismic loads without loss of safety function. |
| 7.a) The <u>CLASS 1E equipment</u> identified in Table 2.2.3-1 as being <u>qualified for a HARSH ENVIRONMENT</u> can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. | i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment. | i) A report exists and concludes that the Class 1E equipment identified in Table 2.2.3-1 as qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function. |
| 12.a) The <u>MOTOR-OPERATED and check VALVES</u> in Table 2.2.3-1 perform an active safety-related function to change position as indicated. | i) Tests or type tests of motor-operated valves will be performed that demonstrate the capability of the valve to operate under its design conditions. | i) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.2.3-1 under design conditions. |

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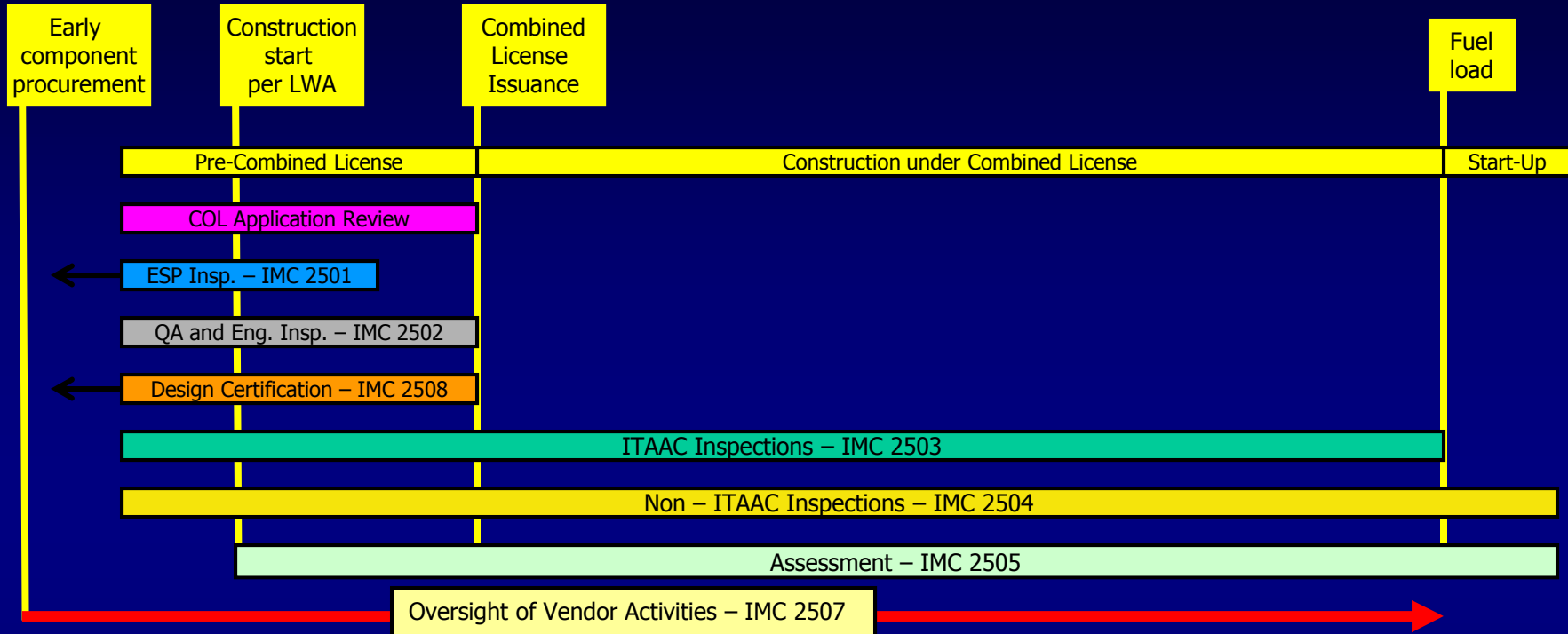


Inspection Process:

- MC 2501 – Early Site Permit
- MC 2502 – Pre-Combined License (Pre-COL) Phase
- MC 2503 – ITAAC
- MC 2504 – Inspection of Construction and Operational Programs
- MC 2505 - Periodic Assessment of Construction Inspection Program Results
- MC 2507 – Vendor Inspections
- MC 2508 – Design Certification
- MC 2512-2517 – Watts Bar Unit 2 Construction

NRC CONSTRUCTION OVERSIGHT HAS MULTIPLE COMPONENTS

Oversight will assure plants are constructed as designed.



Abbreviations

ESP – Early Site Permit
 IMC – Inspection Manual Chapter
 ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria
 LWA – Limited Work Authorization

IMC 2501

- ESP QA controls on integrity & reliability of data collected for site characterization.
- ESP controls for application preparation

IMC 2502

- QA for design, procurement, & construction
- Translation of certified design into design details
- COL controls for application preparation

IMC 2503

Verification of successful performance of ITAAC-related activities

IMC 2504

- QA for construction & operations
- Problem identification, reporting, & corrective action
- Work planning/control over work & contractors
- Translation of certified design into design details
- Design change process
- Pre-operational & startup testing
- Operational programs & operational readiness

IMC 2505

-Guides inspection planning

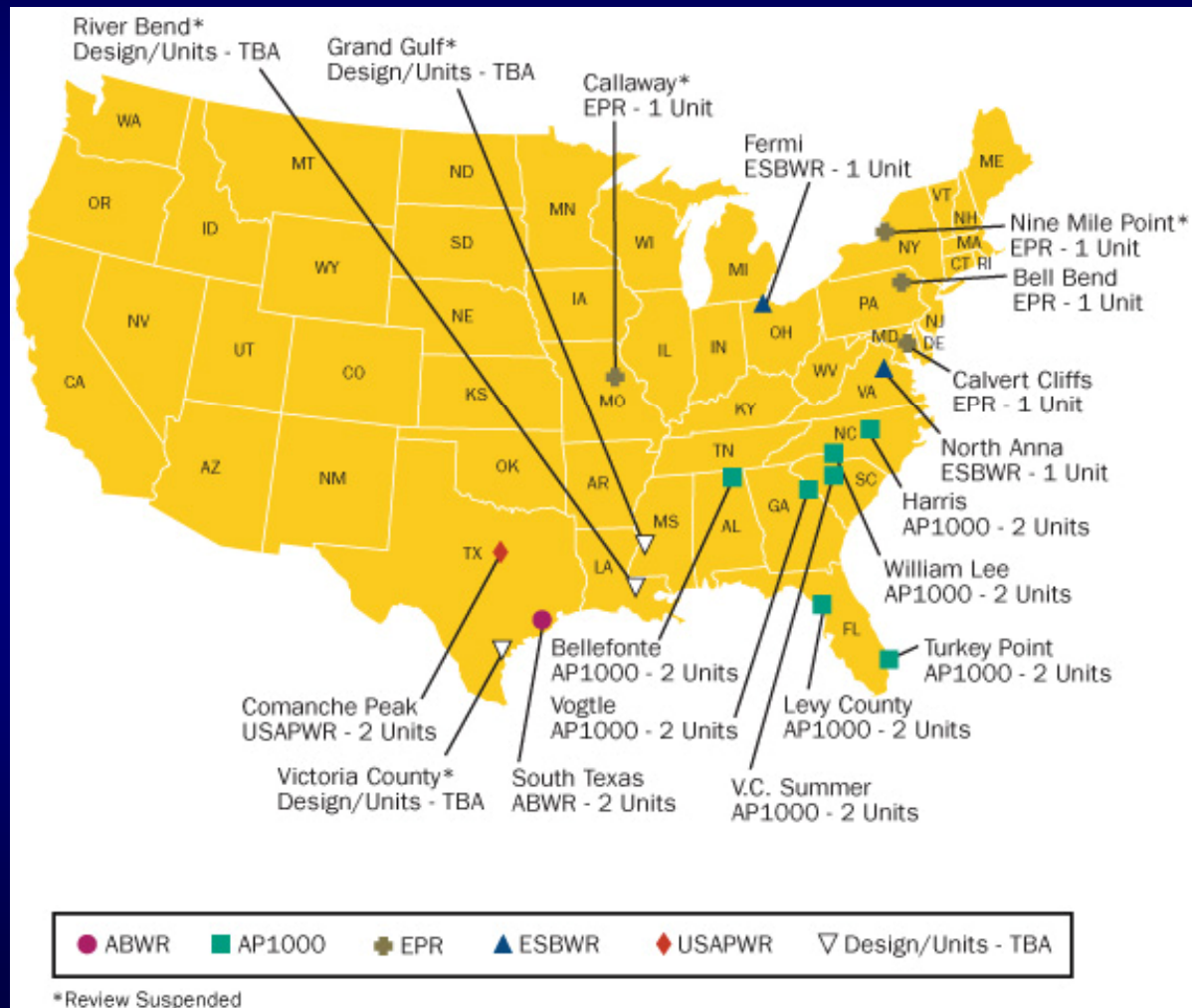
IMC 2507

- Verification of QA program implementation, compliance, reporting and corrective action

IMC 2508

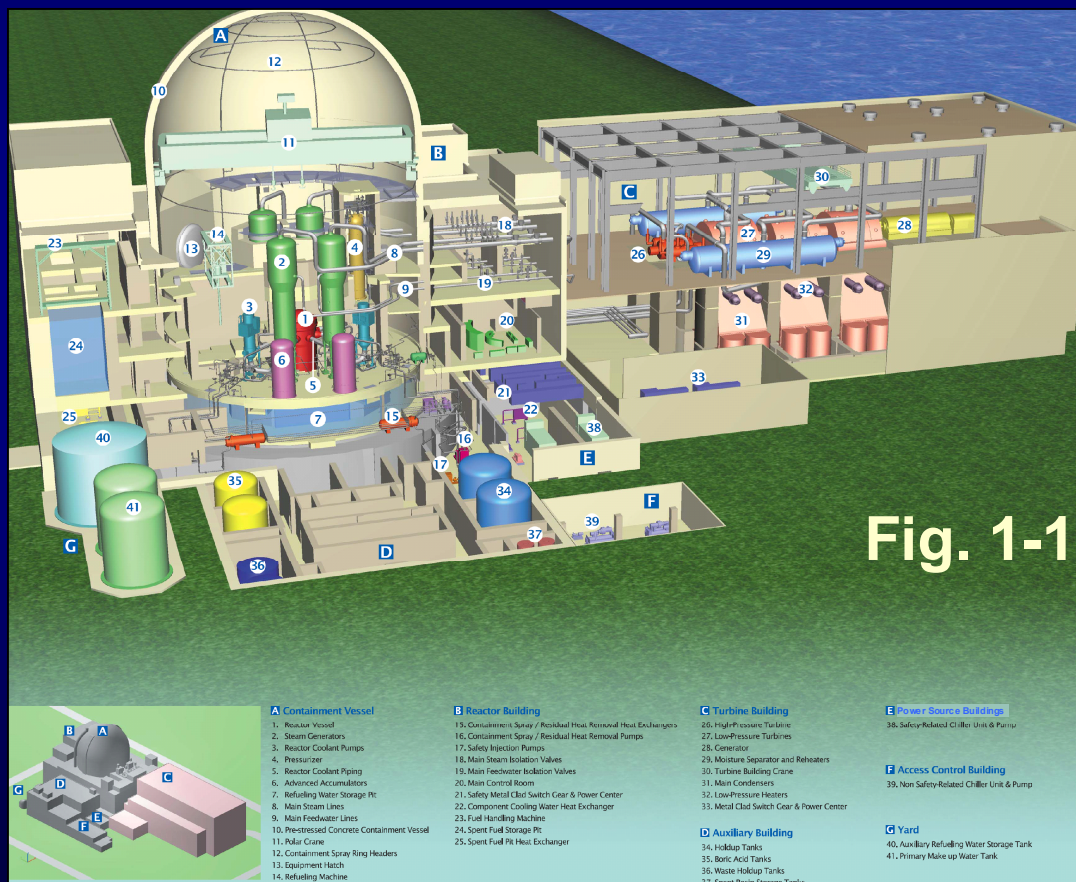
- Verification of QA program implementation for the preparation of a Certified Design.

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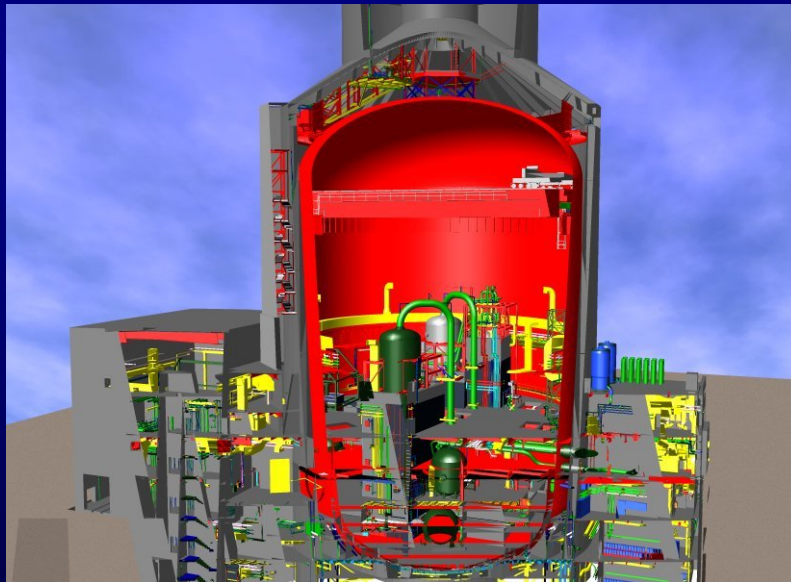
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APWR = Advanced Pressurized Water Reactor



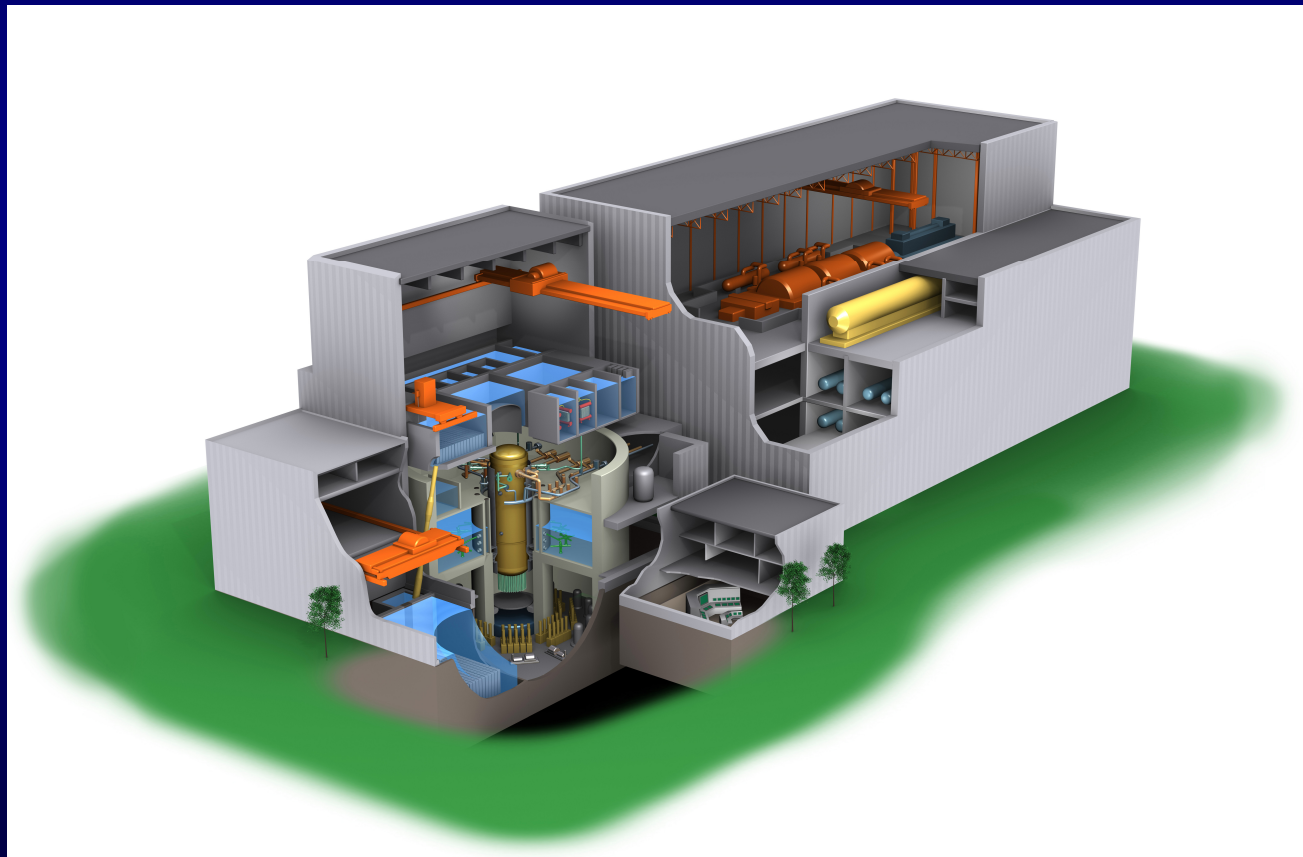
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Westinghouse AP1000



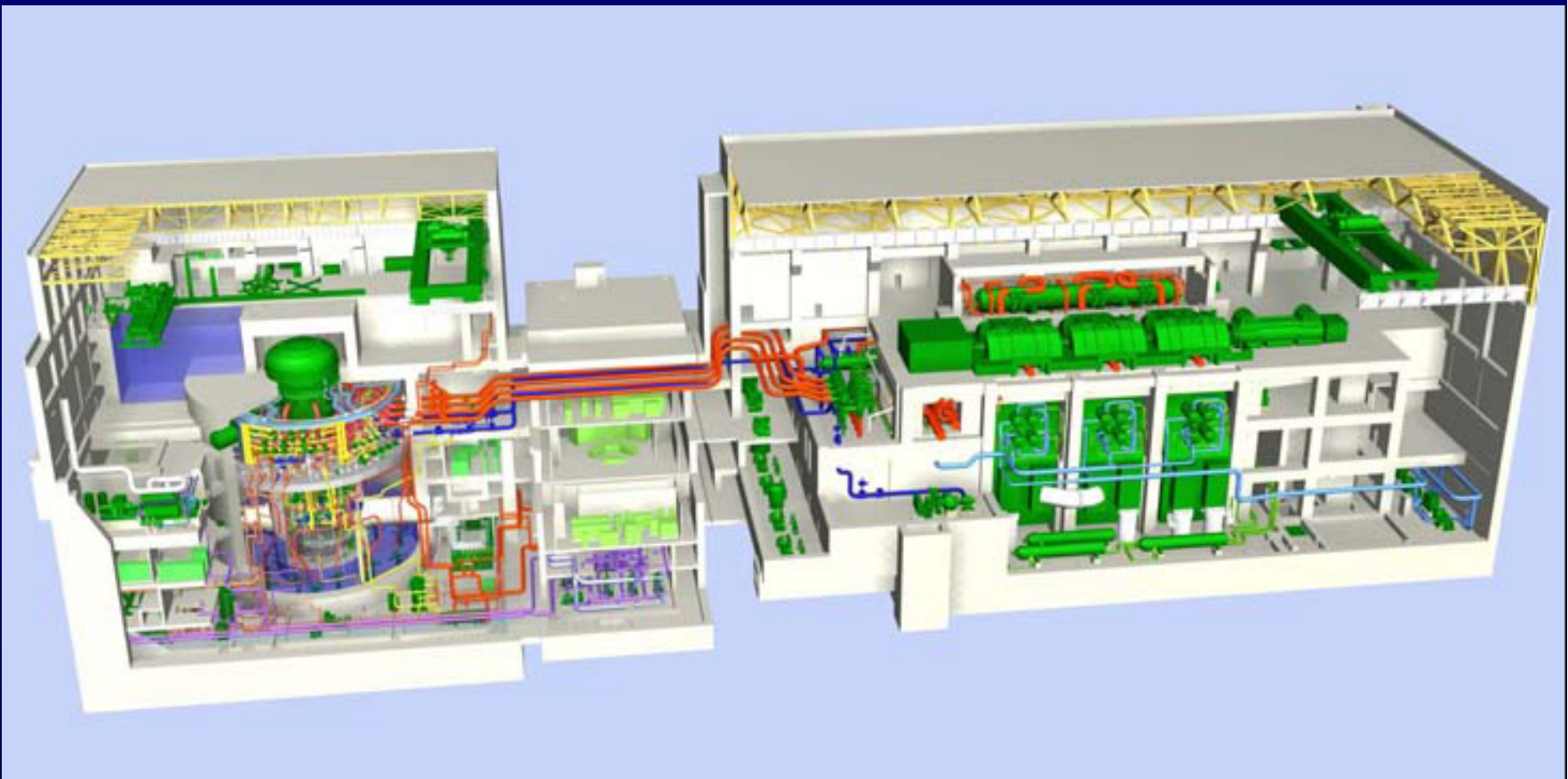
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ESBWR = Economic Simplified BWR



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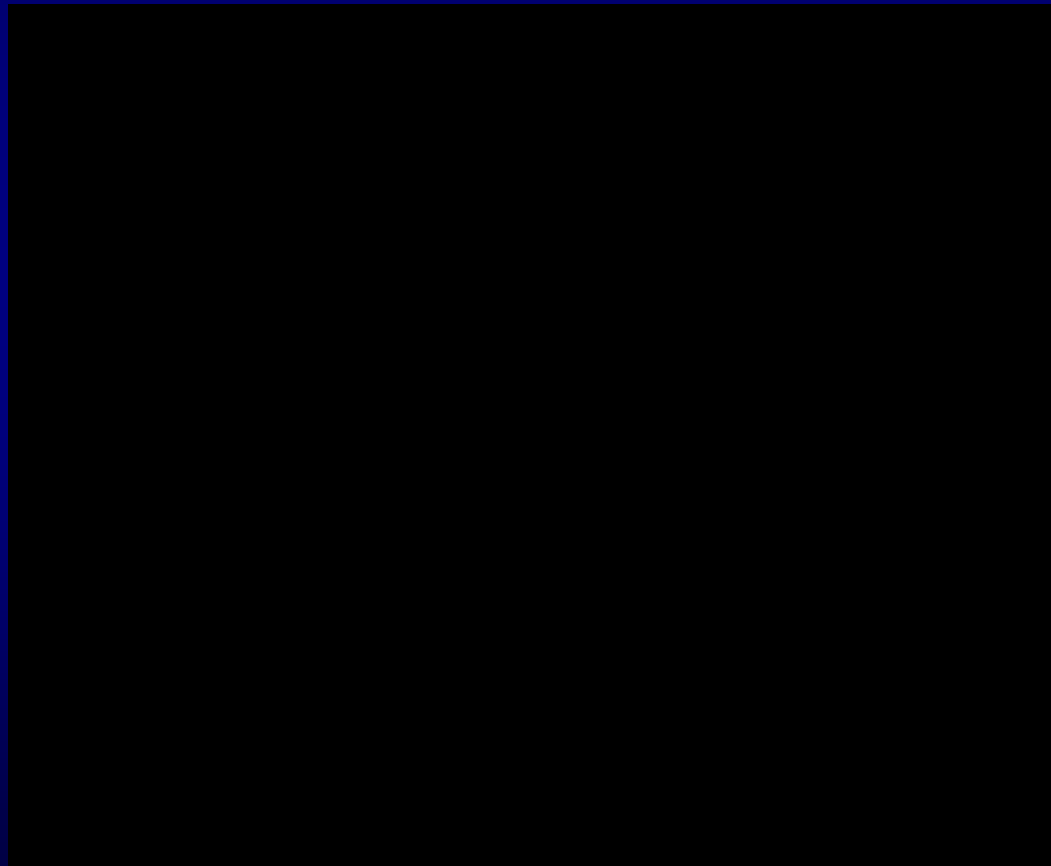
ABWR = Advanced Boiling Water Reactor



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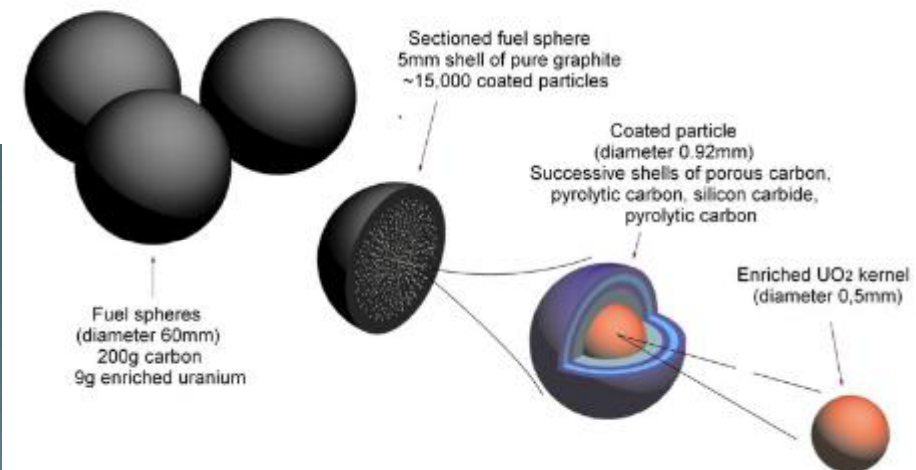


EPR = Evolutionary Power Reactor



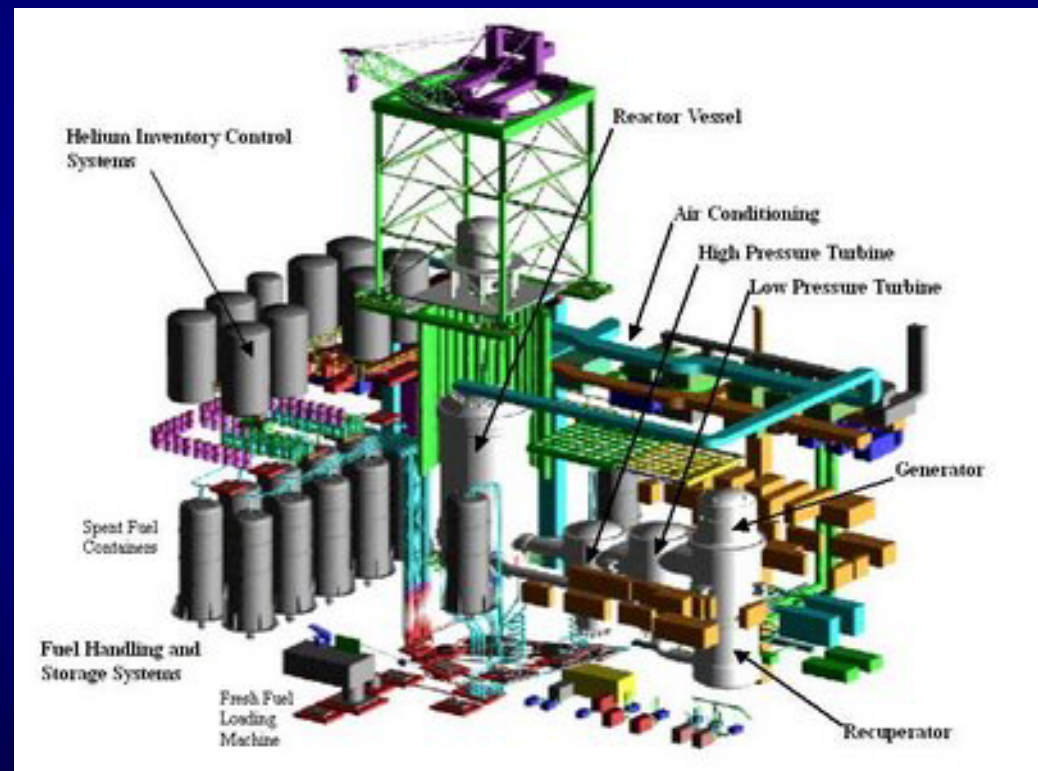
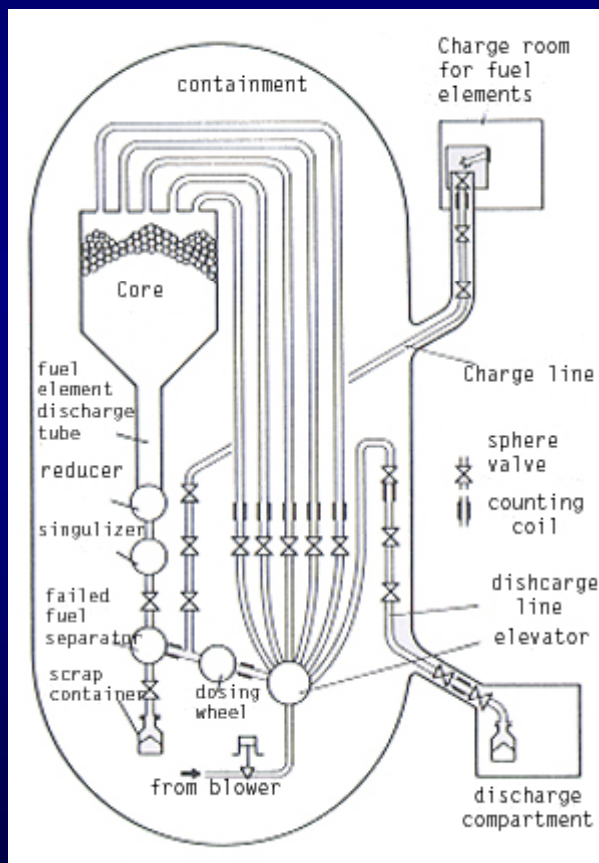
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PBMR = Pebble Bed Modular Reactor



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PBMR



Questions?