



ASME | PLANT SYSTEMS DESIGN

PSD-1: Plant Systems Design Standard

NRC Standards Forum

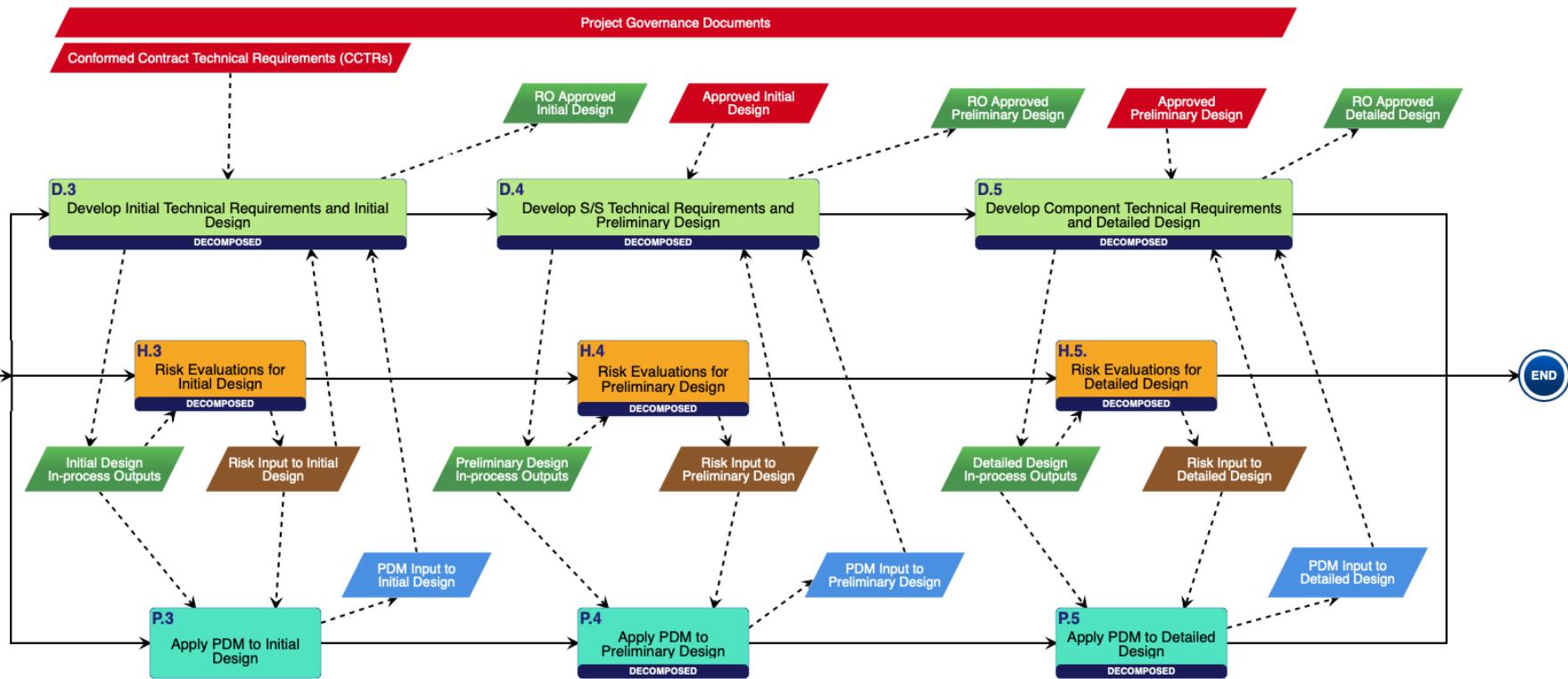
Virtual Presentation – September 25, 2025

Ralph Hill, Chair ASME

Plant Systems Design Standards Committee

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Plant Systems Design Workflow



What is different about PSD-1?

- Integrates systems engineering, risk evaluation, and probabilistic design into traditional plant engineering processes.
- Integrates risk to plant performance and availability with safety risk!

What is different about PSD-1?

- Complete and comprehensive design process workflow map - a repeatable process that can be tailored to each design and construction project.
- For a given project, designer selects elements of the PSD-1 design process workflow map that should be applied, creating a project specific design process workflow.

What is PSD-1?

Technology neutral standard for design of plant systems for facilities with the potential of significant hazards to the worker, public safety, and the environment.

What is PSD-1 Applicability?

- fossil power generation facilities (e.g., coal, natural gas, etc.)
- nuclear power generating facilities
- oil refining
- oil and natural gas production;
- petrochemical
- chemical
- hazardous waste plants and facilities.

What is value of using PSD-1?

Provides a workflow which plant owners, designers, and other stakeholders may execute projects in a manner that **minimizes errors and omissions** in the design process and **produces better cost and schedule outcomes** for its users

3-Key PSD-1 Activities

1. Conduct plant process hazard evaluations and analysis in the early phases of design that:
 - a. Provide early identification of hazards, including strategies to avoid and mitigate them
 - b. Advance as the design matures
 - c. Provide structure to the development of a quantitative risk assessment

3-Key PSD-1 Activities

(Continued)

2. Incorporate and integrate systems engineering design processes, practices, and tools with traditional architect engineering design processes, practices, and tools
3. Integrate probabilistic design processes, practices, and tools with traditional deterministic design processes using reliability and availability targets

PSD-1 Status

- It has been approved through the ASME consensus process and completed the 60-day public review process.
- Scheduled publication is by end of 2025
- Five papers on PSD-1 were presented in their own session at PVP-2025 in Montreal.
- Deep Fission is in early stages of piloting PSD-1.

PSD-1: Summary Description

- Will be approximately 480 pages.
- Consists of two mandatory parts, several mandatory appendices, and multiple non-mandatory appendices.
- Part 1 establishes general principles and common requirements for application of PSD-1.
- Part 2 defines the requirements for successful implementation of PSD-1.

SD-1 Summary Description

When published in PDF, PSD-1 will be approximately 480 pages. It consists of two mandatory parts, several mandatory appendices, and multiple non-mandatory appendices.

PSD-1: Summary Description

- Focus is on new plant design.
- Can be used for design of new capabilities added to existing plants.
- Includes requirements and guidance that consider the entire life cycle of a plant from initial design through decommissioning.

SD-1 Summary Description

When published in PDF, PSD-1 will be approximately 480 pages. It consists of two mandatory parts, several mandatory appendices, and multiple non-mandatory appendices.

PSD-1: Summary Description

Integrated design and risk evaluation processes provide assurance that health, safety, and environmental risk objectives, as well as production risk objectives, are met and that the plant design is optimized for product quality, safety, and life cycle availability.

For Further Information

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