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Digital Instrumentation and Control (I&C) DAC

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Justification for I&C DAC

- Rapidly changing nature of digital technology
 - New hardware and software
 - Design approaches
- Level of detail generally unavailable at time of design certification
 - Implementation and testing details
- I&C DAC were used in ABWR, System 80+, AP600, AP1000, and ESBWR design certifications

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Approach to I&C DAC

- Staff would use a two-part approach (SECY-92-053)
- First Part: Detailed review at the architectural level to verify functional and safety design requirements
 - Single failure protection
 - Independence
 - Defense-in-depth and diversity
 - Testing and calibration
- Second Part: Verify completion of FSAR level of design detail and implementation of digital I&C systems
 - ITAAC (DAC)

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Recent I&C DAC Experience

- Level of detail sufficient to make safety conclusion
 - ACRS
 - NRC management
- Example – AP1000 design certification amendment
 - Which ITAAC are DAC?
 - Where should the boundary be drawn?
- Guidance on level of detail
 - 10 CFR 52.47
 - Reg. Guide 1.181 – Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e)

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I&C DAC Considerations

- I&C implementation design details are ITAAC, not DAC
 - Staff does not fully review implementation details
 - Implementation details would not be part of licensing basis
- Ensure DAC specify methodologies acceptable to ensure that FSAR level of design is correctly completed
 - Reasonable assurance that regulations are met and design is safe
 - DAC should not be a mask for incomplete information the staff would need to reach a safety conclusion
- Sufficient level of design detail to reach safety conclusion
 - Ensure licensing basis addresses safety questions
 - Maintain flexibility to allow plant improvements and support future inspection/licensing activities

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More I&C DAC Experience

- No DAC proposed for current designs under review
 - APRI400, US-APWR, and U.S. EPR
- ITAAC inspections underway for new units at Vogtle and Summer
 - Staff is able to verify the implementation and testing details through inspections
- Level of design detail
 - Overall, on the mark
 - Some challenges with regards to data communication independence

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Moving Forward I&C DAC

- Potential applicants considering design approaches that address safety questions at the traditional FSAR level
 - Able to utilize the latest in digital technology
- Staff will continue to consider lessons learned from licensing and ITAAC inspections
- I&C DAC is a Commission Policy
 - Recent experiences and changes in expectations for the level of design detail in an application significantly reduce the need for I&C DAC
 - Will work with the other technical areas to see if there is a need to modify the overall DAC policy

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Abbreviations

<ul style="list-style-type: none"> • ABWR – Advanced Boiling-Water Reactor • AP – Advanced Passive (600, 1000) • APR – Advanced Pressurized Reactor (1400) • APWR – Advanced Pressurized-Water Reactor • ASME – American Society of Mechanical Engineers • BPV – Boiler and Pressure Vessel (Code) • CFR – Code of Federal Regulations • DAC – design acceptance criteria • DC – design certification • DCD – design control document • DCIP – Division of Construction Inspection and Operational Programs • DEIA – Division of Engineering, Infrastructure, and Advanced Reactors • EPR – Evolutionary Power Reactor • ESBWR – Economic Simplified Boiling-Water 	<p>Reactor</p> <ul style="list-style-type: none"> • ITAAC – inspections, tests, analyses, and acceptance criteria • KHNP – Korea Hydro and Nuclear Power • NRC – Nuclear Regulatory Commission • NRO – Office of New Reactors • RCPB – reactor coolant pressure boundary • SER – safety evaluation report • SRM – Staff Requirements Memorandum • SRP – Standard Review Plan (NUREG-0800)
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