

D-RAP ITAAC

From DC/COL-ISG-018, Interim Staff Guidance on Standard Review Plan Section 17.4, “Reliability Assurance Program”

A.8 ITAAC for D-RAP

The application should specify an ITAAC for the D-RAP to ensure that appropriate controls are applied to the RAP SSCs early in the COL design phase. The objective is to ensure that the design bases and other requirements have been correctly translated into the detailed design documents used for procurement and construction of every RAP SSC. This is achieved through assurance that appropriate controls were imposed during the development of design products for RAP SSCs. Subsequent activities, including system ITAAC, are predicated on the assumption that those products are correct.

This ITAAC includes all RAP SSCs so that no RAP SSC is overlooked. The staff considers the scope of this ITAAC to be fixed when the COL is issued. Subsequent changes to the list can only occur through D-RAP activities, providing adequate assurance that appropriate controls are applied to SSCs that are added to the scope of RAP. Such modifications may change the particular reliability assurance activities that apply to a particular SSC (e.g., a change in safety classification); the acceptance criterion would simply be met by a different D-RAP activity.

Other inspections are relied upon to provide ongoing confidence that the D-RAP activities are effective (e.g., staff inspections to verify implementation of 10 CFR Part 50, Appendix B requirements as well as staff inspections of quality controls applied to SSCs that are not safety-related). These obviate the need for an ITAAC to confirm that the essential elements of D-RAP are accomplished. Other ITAAC will confirm that the construction is correct and the as-built configuration is consistent with the approved design documents.

An acceptable D-RAP ITAAC would include a design commitment that the design of RAP SSCs is consistent with the risk insights and key assumptions from probabilistic, deterministic, and other methods of analysis used to identify and quantify risk (e.g., SSC design, reliability, and availability). An analysis would demonstrate that the initial design of all RAP SSCs has been completed in accordance with the D-RAP. The staff considers the initial design to be complete when approved for procurement or for construction by the responsible design organization of the licensee. The acceptance criterion for the D-RAP ITAAC should ensure that the initial design of all RAP SSCs identified at the time of the COL issuance has been subject to the applicable reliability assurance activities of the D-RAP.

Model ITAAC for the Design Reliability Assurance Program

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
Ensure that each structure, system, and component within the scope of the reliability assurance program (RAP SSC) is designed in a manner that is consistent with the risk insights and key assumptions of the design.	An analysis will confirm that for every RAP SSC, initial design has been completed in accordance with applicable D-RAP activities.	All RAP SSCs have been designed in accordance with the applicable reliability assurance activities of the D-RAP.

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Value of D-RAP ITAAC

Why it exists: The Commission directed the staff to use ITAAC for D-RAP. ITAAC must be completed satisfactorily before a 103(g) finding can be made. Since D-RAP, by definition, continues until plant operation begins, the ITAAC must be crafted in a manner that can be completed before the end of D-RAP. It should not merely duplicate other activities required of the licensee.

What it can do: System ITAAC will rely on design documents that are not available until after a license is granted. There is no other activity to confirm that the detailed design of RAP SSCs is consistent with the licensed design. (Examples of detailed design that may not be developed until after the license is issued include procurement specifications, installation drawings, setpoint calculations, and the like.) Confirming that the appropriate controls were imposed on every RAP SSC establishes continuity from the licensed design to the detailed design. Approved design documents can then be used with confidence to confirm that the as-built facility is consistent with the licensed design.

Adequacy of the RAP

The Commission has stated that an Appendix B program is an acceptable way to assure that a plant is designed, constructed, and operated in a manner that is consistent with certified design. Appendix B identifies 16 activities affecting safety-related SSCs and 18 requirements for programs and measures to assure that they are adequate.

This applies to all safety-related SSCs. The applicant's Appendix B program is evaluated by the staff. If the program is acceptable, the staff has confidence that the detailed design of all safety-related SSCs will be consistent with the certified design. Approved design documents can be used for procurement, construction, inspection, test, and analysis of the plant.

At issue is the treatment of non-safety-related SSCs. A program that addresses the same 18 requirements (but not with the same level of rigor as Appendix B) *may* be an acceptable way to assure the reliability of risk-significant but non-safety-related SSCs. If proposed, such a program will be evaluated by the staff. If the program is acceptable to the staff and the applicant can show that the program has been imposed on all RAP SSCs that are not safety-related, then the staff can have confidence that the detailed design documents for those SSCs can be used for procurement, construction, inspection, test, and analysis of the plant.

Problems with previously proposed D-RAP ITAAC

If the scope of RAP includes any non-safety-related SSCs, there will have to be a program to assure their reliability. If such a program exists, the staff will evaluate that program. An ITAAC to confirm that it exists or that it will be inspected by the licensee adds no value.

The staff determines that the scope of the RAP is acceptable before approving a standard or certified design. If necessary, that scope is extended before a COL is issued. An acceptance criterion that the method for determining the scope of RAP is adequate adds no value.

References to reliability or availability targets imply that these characteristics can be specified at the time of procurement and demonstrated in some way. (Manufacturer claims such as mean

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time between failures are useful indications of reliability but can't be demonstrated for the component that is received.) Probabilistic risk assessment uses values for reliability and availability that are based on experience with representative populations of components, not measurable attributes of a particular component. Reliability assurance programs and measures establish confidence that the component received is a member of the population used to estimate component reliability.

A related problem is the proposal to compare the component reliability assumed when completing the conceptual design and component reliability when plant construction is complete. Since these reliability values and distributions are based on nearly identical populations and the interval between these assessments may be small, there is no way for the value to improve significantly. On the other hand, there is a very real possibility that adverse operating experience will cause an adverse shift in predicted failure rates. At the component level, this is not unusual. The importance of reduced component reliability should be evaluated but it rarely has a significant impact on plant risk. It should not automatically result in ITAAC failure.