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Development of HFE Sections of DG-1145

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DISCLAIMER

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INTRODUCTION

For the licensing of the current fleet of commercial nuclear power plants (NPPs), the Nuclear Regulatory Commission (NRC) used two key documents, NUREG-0800 and Regulatory Guide (RG) 1.70. RG 1.70 provided guidance to applicants on the contents needed in their Safety Analysis Reports (SARs) submitted as part of their application to construct or operate an NPP. NUREG-0800, the NRC Standard Review Plan (SRP), provides guidance to the NRR staff reviewers on performing their safety reviews of these applications. As part of the preparation for a new wave of improved NPP designs the NRC is in the process of updating the SRP and is also developing a new RG designated as draft RG or DG-1145, "Combined License Applications for Nuclear Power Plants (LWR Edition)." This will eventually become RG 1.206 and will take the place of RG 1.70. This will provide guidance for combined license (COL) applicants, as well as for other 10CFR Part 52 variations that are permitted.

DEVELOPMENT OF DG-1145

The various options that exist in Part 52 include early site permits (ESP), design certification (DC), combined license and variations on those themes. That is, an applicant may reference, in a COL application: a DC, an ESP, both of these, or neither. DG-1145 was written to be most inclusive, that is for the case of a COL application which is complete in itself and does not reference other already-approved applications. Thus, RG 1.206 will be able to be used by all of the various applicants.

Human Factors Engineering (HFE) is addressed in Chapter 18 of the SRP and in Section C.I.18 of DG-1145. The more detailed review guidance for HFE is contained in NUREG-0711 and is referenced by SRP Chap. 18. In developing DG-1145, both of these NRC review and guidance documents were used. The focus was to describe what material should be provided by the applicant in their final safety analysis report (FSAR) or design control document (DCD), so that the NRC review could proceed smoothly in accordance with the already-published review guidance. Experience gained from the review of previous DC applications was applied.

The overall purpose of this section of an FSAR is to illustrate how human characteristics and capabilities are successfully integrated into the nuclear power plant design, in such a way that they result in a state-of-the-art design and support successful performance of the required tasks by plant personnel. Thus, Section C.I.18 contains subsections for each of the 12 HFE elements of NUREG-0711, namely: HFE Program Management, Operating Experience Review, Functional Requirements Analysis and Function Allocation, Task Analysis, Staffing and Qualifications, Human Reliability Analysis, Human-System Interface Design, Procedure Development, Training Program Development, Human Factors Verification and Validation, Design Implementation, and Human Performance Monitoring.

This section of the SAR is somewhat unique in that when the COL application is submitted, some of the HFE elements may not have been completed. If an HFE element is incomplete, then guidance is provided to describe the objectives and scope of the applicant's activities related to the element, the methodology that will be used to perform the activities, and the expected results of the activities. In addition, an "implementation plan" and schedule for completing the element should be submitted and ITAAC should be submitted with criteria for closure of the element when it is completed. A discussion of the timing for submittal of these plans is also provided.

PUBLIC COMMENT

The draft of DG-1145 was reviewed and commented upon in several public meetings through early 2006. A somewhat updated version was then formally placed on the NRC website for further comment in September, 2006. Formal comments were received from six individuals and organizations. The majority of comments were from the nuclear industry, as summarized and submitted the Nuclear Energy Institute (NEI). These were incorporated into an updated draft DG-1145 in December, 2006.

Key public comments that were addressed in the updated Section C.I.18 were as follows:

- Where possible reference regulatory guidance rather than repeat it.
- Provide more information on what documents must be submitted on the docket and which may be only referenced and retained by the applicant for NRC audit.
- Clarify objectives of each HFE element.
- Clarify discussion of staffing levels as minimum or nominal.

REFERENCES

1. NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants.”
2. NRC Regulatory Guide 1.70, “Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition),” November 1978
3. 10 CFR Part 52, “Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants.”
4. NRC Draft Regulatory Guide DG-1145, “Combined License Applications for Nuclear Power Plants (LWR Edition),” September, 2006.
5. NUREG-0711, Human Factors Engineering program Review Model, Rev. 2, 2004.
6. NEI comments on DG-1145, letter to NRC from A. Heymer, NEI, Oct. 20, 2006.