

## **C.III.2. Information Needed for a COL Application Referencing a Certified Design and an Early Site Permit**

### **C.III.2.1 *Introduction***

Combined license (COL) applicants that have referenced a certified design and an early site permit will have a significant portion of the facility reviewed by NRC prior to applying for a COL. The remaining portions of the facility design and operation that require review will constitute the information contained in the final safety analysis report (FSAR) of the COL application. This section of the guide will identify the generic information that should be submitted with a combined license application that references a certified design and an early site permit (ESP).

The information in this section was taken from Part I of the guide, to help preclude repetitive submission of information for NRC COL review that is already covered in the design control document (DCD) of a referenced certified design, the site safety analysis report of an early site permit, or that is covered in other portions of the COL application. Part I of the guide includes the information that should be included in a COL application that does not reference either a design certification or an ESP.

In this section of the guide, the staff has identified the scope of the FSAR on a generic basis for COL applications that reference a certified design and an ESP.

### **C.III.2.2 *How to Use this Section***

This section of the guide contains a listing of all the standard review plan (SRP) sections that are included in Part I of this guide. If the FSAR for a COL application that references a certified design and an ESP needs to address a particular section of the SRP, that information is identified in this section. The specific information that the applicant should provide has been copied from the corresponding section in Part I and pasted into this section of the guide. For design topics that have been resolved in the design certification, the guide will state that the COL applicant does not need to include additional information. For topics related to approval of a specific site in an ESP, the guide will state that the COL applicant does not need to include additional information.

Depending on the technology, some design topics may not have been reviewed during the design certification. COL applicants will need to provide this information only if it was not covered in the design certification.

The intent of this information is to facilitate the applicant's effort to submit a complete and concise COL application. However, it should be noted that it will be the combination of information provided by the specific, referenced DCD, the referenced ESP, and the FSAR with the COL application, that will be considered by staff in their evaluation as to whether or not to grant a COL. Thus, due diligence is required by the applicant to provide proper and sufficient information to meet the regulations in order for the staff to make its determination.

### ***C.III.2.3 Design Acceptance Criteria***

All the designs that have been certified when this guide was issued use design acceptance criteria (DAC) for certain portions of the design that were not completed during the design certification review. A unique set of inspections, test, analyses, and acceptance criteria (ITAAC) were established that provide the criteria for which the COL applicant can complete the design. Because DAC are associated with ITAAC, the regulations do not require these portions of the design to be completed prior to issuance of a COL. Section C.III.5 of this guide provides recommendations for COL applicants to complete the design portion of the DAC prior to the issuance of the COL. The development of section C.III.1 of this guide assumes that the design was reviewed and certified without the use of DAC. ESPs do not include DAC.

### ***C.III.2.4 COL Action or Information Items***

Section C.III.1 of the guide does not address any specific COL action or information items for any of the designs previously certified. Instead, Section C.III.4 provides generic guidance for addressing COL action or information items in a COL application referencing a certified design and an ESP. The NRC recommends the COL action or information items be addressed in the appropriate sections of the FSAR.

### ***C.III.2.5 Conceptual Design Information***

Several factors, including whether the certified design incorporates either active or passive safety systems, determine the scope of the NRC review of a COL application referencing a certified design. COL applicants that reference a certified design with systems that are included in the DCD on a conceptual basis should provide the actual design information for these systems so that the staff can complete its review of the design. Further guidance is provided in Section 1.8 of Section C.III.2.

### ***C.III.2.6 Departures from the Certified Design***

Departures from the certified design should be discussed in the section that corresponds to where the topic is discussed in the DCD associated with the certified design referenced by the COL applicant. Sufficient information should be provided for the NRC to resolve all safety and security issues in its review of the departure. COL applicants should consult Sections C.I.1 through C.I.19 of this guide for the information that needs to be included in the FSAR. Information on the applicable design certification change processes is included in Section C.IV.3 of this guide.

### ***C.III.2.7 Exemptions from the Certified Design***

The NRC regards an exemption from the certified design as a potential critical path item in the review of a COL application. It is recommended that COL applicants inform the NRC of the potential for an exemption during pre-application interactions.

As with departures, exemptions from the certified design should be discussed in the sections that correspond to where the topics are discussed in the DCD associated with the certified design referenced by the COL applicant. Sufficient information should be provided for the NRC to resolve all safety and security issues in its review of the exemption. COL applicants should consult Sections C.I.1 through C.I.19 of this guide for the information that need to be included in the FSAR. Information on the applicable design certification change processes is included in Section C.IV.3 of this guide.

### ***C.III.2.8 Verification of Consistency Between Certified Design and COL FSAR***

The NRC expects to verify that the information provided in the FSAR of a COL application is consistent with the certified design. The NRC recommends that the COL application facilitate this review wherever possible.

### ***C.III.2.9 Conformance of Site Characteristics with Site Parameters***

Per 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” Commission review of a COL application that references a design certification will involve a comparison to ensure that the actual characteristics of the site chosen by the combined license applicant fall within the site parameters in the design certification. Additional guidance is provided in Section 1.8 of C.III.2.

If the COL application (FSAR) does not demonstrate that the site characteristics fall within the site parameters specified in the design certification, the application shall include a request for an exemption or departure, as appropriate, that complies with the requirements of the referenced design certification rule and 10 CFR 52.93.

### ***C.III.2.10 Portions of a Final Safety Analysis Report not Addressed by a Certified Design***

The following chapters specify the generic information that should be provided by the applicant when submitting a COL application. While the intent of this information is to facilitate the applicant’s effort to submit a complete and concise COL application, it may not be practical to identify in this guide all information needed to meet the threshold required by a COL application. Additionally, if information listed in the following subsections is not needed – such as being already provided in the specific, referenced DCD, it is suggested that the applicant indicate so in the appropriate portion of their FSAR.

### ***C.III.2.11 Completeness and Accuracy of Referenced Certified Design and Early Site Permit***

COL applicants that reference a DC and an ESP are not required to revise the information included in the DC and ESP. However, pursuant to 10 CFR 52.6, each applicant or licensee that identifies information as having, for the regulated activity, a significant implication for public health and safety or common defense and security shall notify the Commission of this information.

## **Chapter 1. Introduction and General Plant Description**

Combined license (COL) applicants per 10 CFR 52, Subpart C, may incorporate by reference designs that have been certified per 10 CFR 52, Subpart B, and early site permits per 10 CFR 52, Subpart A. The guidance provided in DG-1145, Section C.III.2, is applicable to a combined license applicant that references a certified design and an early site permit (ESP).

Section IV, Additional Requirements and Restrictions, of the appendices to Part 52 codifying the certified designs, require that COL applicants referencing the certified designs shall incorporate by reference, as part of its application, the applicable appendix codifying the certified design. COL applicants referencing a certified design and an ESP will, therefore, have a significant portion of their proposed facility design already reviewed by the NRC prior to submission of their application. In addition, COL applicants referencing a certified design and an ESP will have a significant portion, if not all, of the site characteristics already reviewed by the NRC prior to submission of their application.

### **1.1 *Introduction***

In this section, the COL applicant should present briefly the principal aspects of the overall application, including the type of license requested, the number of plant units, a brief description of the proposed location of the plant, the certified plant design incorporated by reference in the application, the corresponding net electrical output for the plant, and the scheduled completion date and anticipated commercial operation date of each unit. The COL applicant should provide a general description or summary level information on the following areas of the application.

#### **1.1.1 Plant Location**

Included as part of the referenced ESP. No additional information needs to be provided by a COL application referencing a certified design and ESP.

#### **1.1.2 Containment Type**

Included as part of the referenced certified design. No additional information needs to be provided by a COL applicant referencing a certified design and ESP.

#### **1.1.3 Reactor Type**

Included as part of the referenced certified design. No additional information needs to be provided by a COL applicant referencing a certified design and ESP.

#### **1.1.4 Power Output**

The COL applicant should provide net electrical output as this rating may vary (core thermal power rating is provided as part of the referenced certified design).

#### **1.1.5 Schedule**

The COL applicant should provide estimated schedules for completion of construction and commercial operation. (estimates may be in durations rather than calendar dates based on application submittal date.)

### **1.1.6 Format and Content**

The COL applicant should provide information on the following aspects of the format and content of their application:

- 1.1.6.1** *Conformance with regulatory guides on format and content of a combined license application (i.e., DG-1145).*
- 1.1.6.2** *Conformance with the standard review plan (NUREG-0800) for technical guidance and acceptance criteria. Guidance on providing conformance evaluations with individual SRPs is discussed in C.III.2, Section 1.9 of this regulatory guide.*
- 1.1.6.3** *The format, content, and numbering for text, tables, and figures included in the application and a discussion on their use should be provided in the application.*
- 1.1.6.4** *Format for numbering of pages should be discussed in the application.*
- 1.1.6.5** *The method by which proprietary information is identified and referenced should be discussed.*
- 1.1.6.6** *A list of acronyms used in the application should be provided. For applicants referencing a certified design and an ESP, the acronyms provided in the DCD and ESP should be used for consistency and a supplemental list of acronyms for items not included in the DCD and ESP should be provided, as necessary.*

Note that Section IV, Additional Requirements and Restrictions, of the appendices to Part 52 codifying the certified designs, require that COL applicants referencing the certified designs include the same organization and numbering as the certified design, as modified and supplemented by the applicant's exemptions and departures.

### **1.2 *General Plant Description***

In this section, the COL applicant referencing a certified design and ESP should include a summary description of the principal characteristics of the site and a concise description of the facility and supplemental information to that included in the referenced certified design and ESP. In particular, the supplement should include a brief discussion of the principal design criteria, operating characteristics, and safety considerations for the portions of the facility not included in the certified design. The general arrangement of major site-specific structures and equipment should be indicated by the use of plan and elevation drawings in sufficient number and detail to provide a reasonable understanding of the general layout of the plant. Those site-specific features of the plant likely to be of special interest because of their relationship to safety should be identified. Such items as unusual site characteristics, solutions to particularly difficult engineering and/or construction problems (e.g., modular construction techniques or plans) and significant extrapolations in technology represented by the design should be highlighted.

### **1.3 *Comparisons with Other Facilities***

Included as part of the referenced certified design. No additional information needs to be provided by a COL applicant referencing a certified design and an ESP.

#### **1.4 Identification of Agents and Contractors**

In this section, the COL applicant referencing a certified design and ESP should identify the prime agents or contractors for the design, construction and operation of the nuclear power plant. Some of this information may have been included in the DCD for the certified design and in the ESP. Any additional information provided should supplement the DCD and ESP information.

The principal consultants and outside service organizations (such as those providing audits of the quality assurance program) should be identified. The division of responsibility between the certified plant designer, architect-engineer, constructor, and plant operator should be delineated.

#### **1.5 Requirements for Further Technical Information**

The requirements for further technical information are included as part of the referenced certified design. The COL applicant that references a certified design and ESP should identify any requirements for further technical information in their application for the portions of the facility that are not certified, including an estimated schedule for providing the additional technical information that may be necessary for issuance of a combined license.

#### **1.6 Material Referenced**

In this section, the COL applicant that references a certified design and ESP should supplement the information included in the certified design and ESP by providing a supplemental tabulation of any additional topical reports incorporated by reference as part of the application (i.e., topical reports in addition to those incorporated by reference into the DCD and ESP). In this context, “topical reports” are defined as reports that have been prepared by reactor designers, reactor manufacturers, architect-engineers, or other organizations and filed separately with the NRC in support of this application or of other applications or product lines. This tabulation should include, for each topical report, the title, the report number, the date submitted to the NRC, and the sections of the COL application in which the report is referenced. For any topical reports that have been withheld from public disclosure pursuant to Section 2.790(b) of 10 CFR Part 2 as proprietary documents, nonproprietary summary descriptions of the general content of such reports should also be referenced. This section should also include a tabulation of any documents submitted to the Commission in other applications that are incorporated in whole or in part in this application by reference. If any information submitted in connection with other applications is incorporated by reference in this application, summaries of such information should be included in appropriate sections of this application.

Results of tests and analyses may be submitted as separate reports. In such cases, these reports should be referenced in this section and summarized in the appropriate section of the FSAR.



## ***1.7 Drawings and Other Detailed Information***

In this section, the COL applicant that references a certified design and ESP should supplement the information included in the certified design and ESP by providing a supplemental tabulation of the additional and/or updated instrument and control functional diagrams, electrical one-line diagrams cross-referenced to application section, including legends for electrical power, instrument and control, lighting, and communication drawings.

In addition, the COL applicant should provide a supplemental tabulation for systems not included in the design certification and early site permit of system drawings and system designators that are cross-referenced to applicable section of the application. The information should include the applicable drawing legends and notes.

## ***1.8 Site and Plant Design Interfaces and Conceptual Design Information***

The requirements of proposed 10 CFR 52.79(b) specify that COL applicants referencing an ESP must contain information sufficient to demonstrate that the design of the facility falls within the site characteristics and design parameters specified in the ESP. If the FSAR does not demonstrate that design of the facility falls within the site characteristics and design parameters, the application shall include a request for variance that complies with the requirements of §§ 52.39 and 52.93. The requirements of proposed 10 CFR 52.79(d) specify that COL applicants referencing a certified design must provide sufficient information to demonstrate that the characteristics of the site fall within the site parameters specified in the design certification and must contain information sufficient to demonstrate that the interface requirements established for the design under § 52.47 have been met. In addition, Section IV, “Additional Requirements and Restrictions,” of the appendices to Part 52, codifying the certified designs, requires COL applicants referencing the certified designs to provide information that addresses the COL action items, and to provide reports on generic changes and plant-specific departures from the certified design. COL applicants that reference a certified design and an ESP should provide a discussion in this section that demonstrates how the interface requirements identified in the certified design have been met. In addition, the COL applicant should provide a discussion in this section (or reference to other more applicable sections of the FSAR) that demonstrates that the design of the facility falls within the site characteristics and design parameters specified in the ESP, including an ESP that uses the plant parameters envelope approach (PPE). The COL applicant that references an ESP that uses a PPE approach should demonstrate that the design of the facility falls within the site characteristics enveloped in the PPE.

Appendix A to Regulatory Guide 1.70 provides guidance on interfaces for standard designs, however, this guidance was developed for standard design concepts that existed prior to the codification of 10 CFR Part 52. During the development of designs for certification per Subpart B of 10 CFR Part 52, however, reactor vendors utilized the guidance provided in Appendix A of Regulatory Guide 1.70 to more clearly define the interfaces between certified designs and the remainder of the proposed facility design (i.e., site-specific designs) that are necessary, per 10 CFR 52.47, for a combined license application per Subpart C of 10 CFR Part 52. These site interfaces are identified and discussed in Section 1.8 of the DCD for the certified design codified in the applicable appendix to 10 CFR Part 52. These interfaces include requirements for completing site-specific designs for the facility, developing the operational programs for the facility, and verifying that the proposed site for the facility is in compliance with the site parameters upon which the certified design is based. Site parameters assumed in design certifications may be found in the Tier 1 section of the DCD.

In addition, applicants for design certification included conceptual designs in their DCDs in order to facilitate NRC staff review by providing a more comprehensive design perspective. The portions of the design provided in the DCD that are conceptual, and were not certified, are also identified and discussed in Section 1.8 of the DCD for the certified design. These conceptual designs typically included portions of the balance-of-plant. COL applicants that do not reference a certified design are expected to provide complete designs for the entire facility including appropriate site-specific design information to replace the conceptual design portions of the DCD for the referenced certified design. Where this information differs from the conceptual design information assumed for the design certifications, the COL applicant should address the impact of these differences on the certified design and the design PRA. The level of detail needed for the site-specific designs that replace conceptual designs should be consistent with the level of detail provided in the DCD for the non-conceptual (or specific) designs and should be sufficient to resolve all safety issues.

In addition to the above, reactor vendors for certified designs included a list of information items or action items that a COL referencing that certified design is required to address. These COL information items include providing completed design information for the remainder of a proposed facility referencing a certified design; verification of site parameters; completion of analyses and design reports for as-built plant systems; development and implementation of operational programs; completion of designs included in design acceptance criteria, etc. COL applicants should provide a cross-referenced tabulation identifying where in the FSAR the verification of site parameters is located. In addition, COL applicants should provide a cross-referenced tabulation identifying where in the FSAR the COL information items are addressed. In addition, COL applicants referencing an ESP should include information in the application that is sufficient to demonstrate compliance with any ESP permit conditions. Tabulated cross-references to this information should be provided in this section.

Additional recommendations for addressing COL information items are included in section C.III.4 of this guide.

## **1.9 *Conformance with Regulatory Criteria***

### **1.9.1 Conformance with Regulatory Guides**

The requirements of proposed 10 CFR 52.79(a)(4)(I) specify that the contents of a combined license application must include information on the design of the facility, including the principal design criteria for the facility. Appendix A to Part 50 of this chapter, “General Design Criteria for Nuclear Power Plants,” establishes minimum requirements for the principal design criteria for water-cooled nuclear power plants similar in design and location to plants for which construction permits have previously been issued by the Commission and provides guidance to applicants in establishing principal design criteria for other types of nuclear power units. Regulatory Guides, in general, describe methods acceptable to the NRC staff for implementing the criteria associated with the General Design Criteria.



### ***COL applicants that reference a certified design and ESP***

Applicants for design certification also have a requirement to include information on the design of the facility, including the principal design criteria for the facility. This also includes conformance with Regulatory Guides, as discussed above. Designs for which certification has been provided are included in the appendices to 10 CFR 52. Certified designs have already provided information addressing conformance with Regulatory Guides that were in effect 6 months before the docket date of the design certification application. In accordance with the provisions of 10 CFR 52.63, Finality of standard design certifications, COL applicants that reference a certified design are not required to re-address conformance with Regulatory Guides for the portions of the facility design included in the certified design. However, a COL applicant should address conformance with Regulatory Guides in effect 6 months before the docket date of the COL application for the site-specific portions of the facility design which are not included in the certified design. In addition, the COL applicant should address conformance with Regulatory Guides in effect 6 months before the docket date of the COL application insofar as they pertain to operational aspects of the facility.

For a COL application that includes departures from the certified design, these departures should be evaluated for conformance with the Regulatory Guides in effect 6 months before the docket date of the COL application, unless the deviation or variance is included in a Topical Report. In the case of a Topical Report, the deviation or variance from the certified design should be evaluated for conformance with the Regulatory Guides in effect 6 months before the submittal date of the Topical Report.

ESP applicants have already provided information addressing conformance with applicable Regulatory Guides that were in effect 6 months before the docket date of the ESP application. In accordance with the provisions of 10 CFR 52.39, Finality of early site permit determinations, COL applicants that reference an early site permit are not required to re-address conformance with the applicable Regulatory Guides included in the ESP.

### ***COL application timing***

In addition, it is expected that the timing of design certification and COL application submittal may differ by a considerable number of years (i.e., a design certification is valid for 15 years and COL applications referencing a certified design may do so at any point during the valid life of the design certification). Therefore, the revision level of Regulatory Guides that a COL applicant should address might differ considerably from those addressed in the certified design. For example, in the years following issuance of a design certification, new revisions to Regulatory Guides may have been issued by the NRC staff that should be addressed by the COL applicant for the portions of the facility design not included in the certified design. That is, if a design was certified in December 2005, new revisions to Regulatory Guides issued after December 2005 need not be addressed by the COL applicant for the portions of the facility design included in the certified design. The COL applicant should, however, address those Regulatory Guide revisions issued after December 2005 only insofar as they may impact site-specific portions of the facility design not included in the certified design. In addition, the COL applicant should address conformance with the Regulatory Guides in effect 6 months before the docket date of the COL application insofar as they pertain to operational aspects of the facility.

### **1.9.2 Conformance with Standard Review Plan**

The requirements of proposed 10 CFR 52.79(a)(41) specify that for applications for light-water cooled nuclear power plant combined licenses, COL applicants should provide an evaluation of the facility against the Standard Review Plan (SRP) in effect 6 months before the docket date of the application. The evaluation required by this section shall include an identification and description of all differences in design features, analytical techniques and procedural measures proposed for a facility and those corresponding features, techniques and measures given in the SRP acceptance criteria. Where a difference exists, the evaluation shall discuss how the proposed alternative provides an acceptable method of complying with the Commission's regulations, or portions thereof, that underlie the corresponding SRP acceptance criteria. The SRP was issued to establish criteria that the NRC staff intends to use in evaluating whether an applicant/licensee meets the Commission's regulations. The SRP is not a substitute for the regulations, and compliance is not a requirement.

#### ***COL applicants that reference a certified design and ESP***

Applicants for design certification also have a requirement in proposed 10 CFR 52.47(a)(26) to provide an evaluation of the facility against the Standard Review Plan (SRP) in effect 6 months before the docket date of the design certification application. Designs for which certification has been provided are included in the appendices to 10 CFR 52. Certified designs have already provided information addressing conformance with the SRP that were in effect 6 months before the docket date of the design certification application. In accordance with the provisions of 10 CFR 52.63, Finality of standard design certifications, COL applicants that reference a certified design are not required to re-address conformance with the SRP for the portions of the facility design included in the certified design. However, a COL applicant should address conformance with the SRP in effect 6 months before the docket date of the COL application for the site-specific portions of the facility design which are not included in the certified design. In addition, the COL applicant should address conformance with the SRP insofar as they pertain to operational aspects of the facility.

There may be cases where a design certification addresses SRP conformance on design-related issues for which the COL applicant's operationally-related issues/programs are dependent (e.g., fire protection). In such cases, where the SRPs applicable to the certified design have been revised/updated, the COL applicant may address conformance with the version of the SRP evaluated in the certified design even though a later revision of the SRP is in effect. However, it is expected in this situation that the COL applicant will identify and justify a deviation or exception from conformance with the SRP in effect 6 months before the docket date of the COL application.

For a COL application that includes departures from the certified design, the departures should be evaluated for conformance with the Standard Review Plan in effect 6 months before the docket date of the COL application, unless the deviation or variance is included in a Topical Report. In the case of a Topical Report, the deviation or variance from the certified design should be evaluated for conformance with the Standard Review Plan in effect 6 months before the submittal date of the Topical Report.

Applicants for an ESP also have a requirement in proposed 10 CFR 52.17(a)(1)(xiii) to provide an evaluation of the site against applicable sections of the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the early site permit application. ESPs have already provided information addressing conformance with the applicable sections of the SRP that were in effect 6 months before the docket date of the ESP application. In accordance with the provisions of 10 CFR 52.39, Finality of early site permit determinations, COL applicants that reference an ESP are not required to re-address conformance with the applicable SRP sections included in the ESP.

### ***COL application timing***

In addition, it is expected that the timing of design certification and COL application submittal may differ by a considerable number of years (i.e., a design certification is valid for 15 years and COL applications referencing a certified design may do so at any point during the valid life of the design certification). Therefore, the revision level of SRPs that a COL applicant should address may also differ from those addressed in the certified design. For example, in the years following issuance of a design certification, new revisions to SRPs may be issued by the NRC staff and should be addressed by the COL applicant. That is, if a design was certified in December 2005, new revisions to SRPs issued after December 2005 need not be addressed by the COL applicant for the portions of the facility design included in the certified design. The COL applicant should, however, address those SRP revisions issued after December 2005 only insofar as they may impact site-specific portions of the facility design not included in the certified design. In addition, the COL applicant should address conformance with SRPs in effect 6 months before the docket date of the COL application as they pertain to operational aspects of the facility.

### **1.9.3 Generic Issues**

The requirements of proposed 10 CFR 52.79(a)(20) specify that the contents of a combined license application must include the proposed technical resolutions of those unresolved safety issues and medium- and high- priority generic safety issues that are identified in the version of NUREG-0933 current on the date 6 months before application and that are technically relevant to the design.

Since the inception of the generic issues program in 1976, the NRC has identified and categorized reactor safety issues. These safety issues were grouped into TMI Action Plan Items, Task Action Plan Items, New Generic Items, Human Factors Issues, and Chernobyl Issues and are collectively called Generic Safety Issues (GSIs). A listing of these GSIs (i.e., those unresolved safety issues and medium- and high- priority generic safety issues that are identified in the version of NUREG-0933 that was current on the date of issuance of DG-1145) has been provided in Section C.IV.8, *Generic Issues*, of this guide for use by COL applicants. A review of these GSIs was performed to determine whether they have been closed by other NRC actions or requirements. Those issues that remain open and which are technically relevant to the COL applicants design should be addressed in the application.

### ***COL applicants that reference a certified design and ESP***

Applicants for design certification also have a requirement for addressing unresolved safety issues in proposed 10 CFR 52.47(a)(18). Designs for which certification has been provided are included in the appendices to 10 CFR 52. Certified designs have already provided, and have had approved, their proposed technical resolutions of those unresolved safety issues and medium- and high- priority generic safety issues that were identified in the version of NUREG-0933 that was current on the date 6 months before application and that were technically relevant to the design. In accordance with the provisions of 10 CFR 52.63, Finality of standard design certifications, COL applicants that reference a certified design are not required to re-propose technical resolutions for the portions of the facility design included in the certified design as these have already been approved. However, a COL applicant should address any and all applicable unresolved safety issues and medium- and high-priority generic safety issues identified in NUREG-0933, as discussed above, for the site-specific portions of the facility design which are not included in the certified design. In addition, the COL applicant should address these generic issues insofar as they pertain to operational aspects of the facility.

COL applicants that reference a certified design should perform a review of the applicability of generic issues that are technically relevant to the site-specific portions of the facility design that are not included in the referenced certified design. An assessment of the applicable generic issues with respect to the site-specific portions of the facility design should be provided. The COL applicant should include the results of the applicability review and assessment in their application.

In addition, certified designs may include COL action or information items related to generic issues. COL applicants must also address those generic issues that have been identified in the DCDs for certified designs as the responsibility of the COL applicant. These generic issues typically involve operational aspects of the facility and may include design aspects of the facility for which no specific design or conceptual designs were provided in the certified design.

For a COL application that includes departures from the certified design, the departures should be evaluated for compliance with the generic issues that are technically relevant and in effect 6 months before the docket date of the COL application, unless the deviation or variance is included in a Topical Report. In the case of a Topical Report, the deviation or variance from the certified design should be evaluated for compliance with the generic issues that are technically relevant in effect 6 months before the submittal date of the Topical Report.

There is no requirement for an ESP application to address generic issues.

#### ***COL application timing***

In addition, it is expected that the timing of design certification and COL application submittal may differ by a considerable number of years (i.e., a design certification is valid for 15 years and COL applications referencing a certified design may do so at any point during the valid life of the design certification). Therefore, the set of generic issues that a COL applicant should review and assess may also differ from those addressed in the certified design. For example, in the years following issuance of a design certification, new generic issues may be identified by the NRC staff and which should be addressed by the COL applicant. That is, if a design was certified in December 2005, new generic issues that included in NUREG-0933 after December 2005 need not be addressed by the COL applicant for the portions of the facility design included in the certified design. The COL applicant should address these generic issues in effect 6 months before the docket date of the COL application only insofar as they may impact site-specific portions of the facility design not included in the certified design. In addition, the COL applicant should address these generic issues in effect 6 months before the docket date of the COL application insofar as they pertain to operational aspects of the facility.

#### ***Backfit Issues***

The resolution of generic issues that were not resolved prior to design certification includes two categories; those identified generic issues for which resolution efforts were still in progress at the time of design certification; and new generic issues that were identified following design certification. These generic issues may be related to the existing fleet of operating reactors licensed under Part 50 or the new reactor designs certified and licensed to operate under the applicable provisions in Part 52. Should the NRC determine that resolution of a generic issue, included in the two categories discussed above, requires implementation on a new plant design, the implementation requirement would be in accordance with the backfit provisions specified in Section VIII for the applicable certified designs in the Part 52 appendices and in 10 CFR 52.63.

Backfits related to specific certified designs will be implemented on a COL plant-specific basis in accordance with Section VIII for the applicable certified design appendix in Part 52 and in accordance with 10 CFR 52.63. Implementation of the backfit on a certified design may occur prior to the issuance of a COL which references the affected certified design or following issuance of the COL, as necessary to ensure the health and safety of the public is protected.

#### **1.9.4 Operational Experience (Generic Communications)**

A listing of generic communications (i.e., generic letters and bulletins that had been issued prior to date of issuance of DG-1145) has been provided in Section C.IV.8, Generic Issues, of this guide for use by COL applicants. A review of these generic communications was performed to determine whether they have been superseded by other NRC generic communications, NRC actions or requirements. Those generic communications that remain open and which are technically relevant to the COL applicant's facility design, including operational aspects of the facility, should be addressed in the application.

##### ***COL applicants that reference a certified design and ESP***

Applicants for design certification also have a requirement for addressing generic communications in proposed 10 CFR 52.47(a)(19). Designs for which certification has been provided are included in the appendices to 10 CFR 52. Certified designs have already provided information which demonstrates how operating experience insights from generic letters and bulletins up to 6 months before the docket date of the application, or comparable international operating experience, have been incorporated into the certified design. In accordance with the provisions of 10 CFR 52.63, Finality of standard design certifications, COL applicants that reference a certified design are not required to re-demonstrate how operating experience insights from generic letters and bulletins up to 6 months before the docket date of the design certification application, or comparable international operating experience, have been incorporated into the portions of the facility design included in the certified design. However, a COL applicant that references a certified design should address any and all operating experience insights from generic letters and bulletins up to 6 months before the docket date of the COL application for the site-specific portions of the facility design which are not included in the certified design.

In addition, certified designs may include COL action or information items related to operational experience. COL applicants must also address those generic letters and bulletins that have been identified in the DCDs for certified designs as the responsibility of the COL applicant. These generic letters and bulletins typically involve operational aspects of the facility and may include design aspects of the facility for which no specific design or conceptual designs were provided in the certified design.

For a COL application that includes departures from the certified design, the departures should address the applicable generic letters and bulletins up to 6 months before the docket date of the COL application, unless the deviation or variance is included in a Topical Report. In the case of a Topical Report, the deviation or variance from the certified design should address the applicable generic letters and bulletins up to 6 months before the submittal date of the Topical Report.

There is no requirement for an ESP applicant to address generic communications.



### ***COL application timing***

In addition, it is expected that the timing of design certification and COL application submittal may differ by a considerable number of years (i.e., a design certification is valid for 15 years and COL applications referencing a certified design may do so at any point during the valid life of the design certification). Therefore, the set of generic communications that a COL applicant should address may also differ from those addressed in the certified design. For example, in the years following issuance of a design certification, new generic letters and bulletins may be issued by the NRC staff and should be addressed by the COL applicant. That is, if a design was certified in December 2005, new generic letters and bulletins issued after December 2005 need not be addressed by the COL applicant for the portions of the facility design included in the certified design. The COL applicant should, however, address those generic letters and bulletins issued after December 2005 only insofar as they may impact site-specific portions of the facility design not included in the certified design.

### ***Comparable international operating experience***

Applicants for certified design and applicants for a combined license are required to address comparable international operating experience in accordance with proposed 10 CFR 52.49(a)(19) and 10 CFR 52.79(a)(37), respectively. To the extent that the design or portions of the design for which certification is sought originates or is based on international design, the design certification application should address how international operating experience has contributed to the design process. Nuclear industry regulators or industry owners groups in countries that include nuclear reactor vendors and/or nuclear power plants (e.g., Canada, France, Germany, Japan, etc.) may track, maintain, and/or issue operating experience bulletins or reports similar to the NRC's generic letters and bulletins. The applicant for design certification should address how this body of operating experience information has been assessed or incorporated into the design. Applicants for design certification and combined license are responsible for procuring and international operating experience information.

There is no requirement for an ESP applicant to address international operating experience.



## **Chapter 2. Site Characteristics**

Chapter 2 of the final safety analysis report (FSAR) should provide information concerning the geological, seismological, hydrological, and meteorological characteristics of the site and the vicinity, in conjunction with present and projected population distribution and land use and site activities and controls. The purpose is to indicate how these site characteristics have influenced plant design and operating criteria and to show the adequacy of the site characteristics from a safety view point.

### **2.1 *Geography and Demography***

#### **2.1.1 Site Location and Description**

##### **2.1.1.1 *Specification of Location***

COL applicants that reference an early site permit (ESP) do not need to include additional information.

##### **2.1.1.2 *Site Area Map***

COL applicants that reference an ESP do not need to include additional information.

##### **2.1.1.3 *Boundaries for Establishing Effluent Release Limits***

COL applicants that reference an ESP do not need to include additional information.

#### **2.1.2 Exclusion Area Authority and Control**

##### **2.1.2.1 *Authority***

Revise the information provided in the ESP application if there are any known significant changes regarding the applicant's legal rights with respect to all areas that lie within the designated exclusion area. The information should continue to establish, as required by 10 CFR 100.21(a), that the applicant has the authority to determine all activities, including exclusion and removal of personnel and property from the area.

If the applicant has not obtained ownership of all land within the exclusion, those parcels of land not owned within the area should be clearly described by means of a scaled map of the exclusion area, and the status of proceedings to obtain ownership or the required authority over the land for the life of the plant should be specifically described. Demonstrate or provide reasonable assurance that the COL applicant will have either ownership or authority to control activities at the time of the COL issuance.

##### **2.1.2.2 *Control of Activities Unrelated to Plant Operation***

Revise the information provided in the ESP application if there are any known significant changes regarding any activities unrelated to plant operation, which are to be permitted within the exclusion area (aside from transit through the area). Include the nature of such activities, the number of persons engaged in them, and the specific locations within the exclusion area where such activities will be permitted. Describe the limitations to be imposed on such activities and the procedure to be followed to ensure that the applicant is aware of such activities and has made appropriate arrangements to evacuate persons engaged in such activities, in the event of an emergency.

#### **2.1.2.3 *Arrangements for Traffic Control***

Revise the information provided in the ESP application if there are any known significant changes regarding highways, railroads, or waterways that transverse the exclusion area, including the arrangements made (or to be made) to control traffic in the event of an emergency.

#### **2.1.2.4 *Abandonment or Relocation of Roads***

Revise the information provided in the ESP application if there are any known significant changes regarding any public roads traversing the proposed exclusion area which, because of their location, will have to be abandoned or relocated, including authority possessed under State laws to effect abandonment or relocation; the procedures that must be followed; the identity of the public authorities who will make the final determination; and the status of the proceedings completed to date to obtain abandonment or relocation.

#### **2.1.3 Population Distribution**

COL applicants that reference an ESP do not need to include additional information.

### **2.2 *Nearby Industrial, Transportation, and Military Facilities***

#### **2.2.1 Locations and Routes**

COL applicants that reference an ESP do not need to include additional information.

#### **2.2.2 Descriptions**

COL applicants that reference an ESP do not need to include additional information.

#### **2.2.3 Evaluation of Potential Accidents**

COL applicants that reference an ESP do not need to include additional information.

### **2.3 *Meteorology***

#### **2.3.1 Regional Climatology**

##### **2.3.1.1 *General Climate***

COL applicants that reference an ESP do not need to include additional information.

##### **2.3.1.2 *Regional Meteorological Conditions for Design and Operating Bases***

COL applicants that reference an ESP do not need to include additional information.

### **2.3.2 Local Meteorology**

#### **2.3.2.1 *Normal and Extreme Values of Meteorological Parameters***

COL applicants that reference an ESP do not need to include additional information.

#### **2.3.2.2 *Potential Influence of the Plant and Its Facilities on Local Meteorology***

COL applicants that reference an ESP do not need to include additional information.

#### **2.3.2.3 *Local Meteorological Conditions for Design and Operating Bases***

COL applicants that reference an ESP do not need to include additional information.

### **2.3.3 Onsite Meteorological Measurements Program**

If not provided in the ESP, describe the operational programs for meteorological measurements at the site, including offsite satellite facilities. This description should include a site map showing tower location with respect to man-made structures, topographic features, and other site features that may influence meteorological measurements. Indicate distances to nearby obstructions to flow in each downwind sector. In addition, describe the measurements made, elevations of measurements, exposure of instruments, descriptions of instruments used, instrument performance specifications, calibration and maintenance procedures, data output and recording systems and locations, and data processing, archiving, and analysis procedures. Guidance on acceptable onsite meteorological programs is presented in Regulatory Guide 1.23. Identify and justify any deviations from the guidance provided in Regulatory Guide 1.23.

### **2.3.4 Short-Term Atmospheric Dispersion Estimates for Accident Releases**

If not provided in the ESP, provide control room atmospheric dispersion factors ( $\chi/Q$  values) that are not exceeded by more than 5 percent of the time for all potential accident release points for use in control room radiological habitability analyses. A site plan showing true North and indicating locations of all potential accident release pathways and control room intake and unfiltered in-leakage pathways should be provided. Guidance on appropriate dispersion models for estimating control room  $\chi/Q$  values is presented in Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants." Identify and justify any deviations from the guidance provided in Regulatory Guide 1.194. Control room dispersion estimates can be based on the most recent meteorological data presented in the ESP application.

### **2.3.5 Long-Term Atmospheric Dispersion Estimates for Routine Releases**

COL applicants that reference an ESP do not need to include additional information.

## **2.4 *Hydrologic Engineering***

### **2.4.1 Hydrologic Description**

COL applicants that reference an ESP do not need to include additional information.

### **2.4.2 Floods**

#### **2.4.3 Probable Maximum Flood (PMF) on Streams and Rivers**

COL applicants that reference an ESP do not need to include additional information.

#### **2.4.4 Potential Dam Failures, Seismically Induced**

COL applicants that reference an ESP do not need to include additional information.

#### **2.4.5 Probable Maximum Surge and Seiche Flooding**

COL applicants that reference an ESP do not need to include additional information.

#### **2.4.6 Probable Maximum Tsunami Flooding**

COL applicants that reference an ESP do not need to include additional information.

#### **2.4.7 Ice Effects**

Provide information on ice effects related to the design of safety-related SSCs indicating how the interface requirements between the ESP and DC are met.

#### **2.4.8 Cooling Water Canals and Reservoirs**

Present the design bases for the capacity and operating plan for safety-related cooling water canals and reservoirs (see Section 2.4.11 of this guide). Discuss and provide bases for protecting the canals and reservoirs against wind waves, flow velocities (including allowance for freeboard), and blockage and (where applicable) describe the ability to withstand a probable maximum flood, surge, etc.

Discuss the emergency storage evacuation of reservoirs (low-level outlet and emergency spillway). Describe verified runoff models (e.g., unit hydrographs), flood routing, spillway design, and outlet protection.

#### **2.4.9 Channel Diversions**

COL applicants that reference an ESP do not need to include additional information.

#### **2.4.10 Flooding Protection Requirements**

Provide information on how flooding protection requirements are met for those SSCs important to safety that are not part of the DC facility.

#### **2.4.11 Low Water Considerations**

COL applicants that reference an ESP do not need to include additional information.

#### **2.4.12 Groundwater**

For plants employing permanent dewatering systems, describe the implementation program, including milestones, for:

- (1) groundwater monitoring program
- (2) construction and operational groundwater level monitoring programs for dewatering
- (3) outlet flow monitoring program

#### **2.4.13 Pathways of Liquid Effluents in Ground and Surface Waters**

For an ESP with a permit condition precluding accidental liquid releases, provide information on how the DC complies with the permit condition.

#### **2.4.14 Technical Specification and Emergency Operation Requirements**

Describe any emergency protective measures designed to minimize the impact of adverse hydrology-related events on safety-related facilities. Describe the manner in which these requirements will be incorporated into appropriate technical specifications and emergency procedures. Discuss the need for any technical specifications for plant shutdown to minimize the consequences of an accident resulting from hydrologic phenomena such as floods or the degradation of the ultimate heat sink. In the event emergency procedures are to be used to meet safety requirements associated with hydrologic events, identify the event, present appropriate water levels and lead times available, indicate what type of action would be taken, and discuss the time required to implement each procedure.

### ***2.5 Geology, Seismology, and Geotechnical Engineering***

#### **2.5.1 Basic Geologic and Seismic Information**

COL applicants that reference an ESP do not need to include additional information.

#### **2.5.2 Vibratory Ground Motion**

COL applicants that reference an ESP do not need to include additional information.

#### **2.5.3 Surface Faulting**

COL applicants that reference an ESP do not need to include additional information.

#### **2.5.4 Stability of Subsurface Materials and Foundations**

Revise the information provided in the ESP application based on results of additional subsurface borings, soil and rock testing, geotechnical and geophysical investigations, and site explorations performed for COL application. Verify that the soil and rock properties, as well as their variability and uncertainty, are consistent with those presented in the ESP application. Verify that the stability of all soils and rock that may affect the nuclear power plant facilities under both static and dynamic conditions, is consistent with the information provided in the ESP application. Information presented in other chapters should be cross-referenced rather than repeated.

##### ***2.5.4.1 Geologic Features***

Describe geologic features, including the following:

- (1) areas of actual or potential surface or subsurface subsidence, solution activity, uplift, or collapse, as well as the causes of these conditions
- (2) zones of alteration or irregular weathering profiles, and zones of structural weakness
- (3) unrelieved residual stresses in bedrock, and their potential for creep and rebound effects
- (4) rocks or soils that might be unstable because of their mineralogy, lack of consolidation, water content, or potentially undesirable response to seismic or other events

- (5) history of deposition and erosion, including glacial and other pre-loading influence on soil deposits and
- (6) estimates of consolidation and pre-consolidation pressures, and methods used to estimate these values

Provide descriptions, maps, and profiles of the site stratigraphy, lithology, structural geology, geologic history, and engineering geology.

#### **2.5.4.2 *Properties of Subsurface Materials***

Describe in detail the properties of underlying materials, including the static and dynamic engineering properties of all soils and rocks in the site area. Describe the testing techniques used to determine the classification and engineering properties of soils and rocks. Indicate the extent to which the procedures used to perform field investigations to determine the engineering properties of soil and rock materials conform to RG 1.132, "Site Investigations for Foundations of Nuclear Power Plants." Likewise, indicate the extent to which the procedures used to perform laboratory investigations of soils and rocks conform to with RG 1.138, "Laboratory Investigations of Soils and Rocks for Engineering Analysis and Design of Nuclear Power Plants."

Provide summary tables and plots that show the important test results. Also provide a detailed discussion of laboratory sample preparation when applicable. For critical laboratory tests, provide a complete description (e.g., how saturation of the sample was determined and maintained during testing, how the pore pressures changed).

Provide a detailed and quantitative discussion of the criteria used to determine that the samples were properly taken and tested in sufficient manner to define all critical soil parameters for the site. For sites underlain by saturated soils and sensitive clays, show that all zones that could become unstable as a result of liquefaction of strain-softening phenomena have been adequately sampled and tested. Describe the relative density of soils at the site. Show that the consolidation behavior of the soils, as well as their static and dynamic strength, have been adequately defined. Explain how the developed data are used in the safety analysis, how the test data are enveloped by the design, and why the design envelope is conservative. Present values of the parameters used in the analyses.

#### **2.5.4.3 *Exploration***

Discuss the type, quantity, extent, and purpose of all post-ESP site explorations. Provide plot plans that graphically show the location of all site explorations such as borings, trenches, seismic lines, piezometers, geologic profiles, and excavations with the locations of the safety-related facilities superimposed thereon. Also, provide profiles illustrating the detailed relationship of the foundations of all Seismic Category I and other safety-related facilities to the subsurface materials.

Provide logs of all core borings and test pits. Furnish logs and maps of exploratory trenches and geologic maps and photographs of the excavations for the facilities of the nuclear power plant.

#### **2.5.4.4 *Geophysical Surveys***

Provide a description of the post-ESP geophysical investigations performed at the site to determine the dynamic characteristics of the soil or rock. Provide the results of compressional and shear wave velocity surveys performed to evaluate the occurrence and characteristics of the foundation soils



and rocks in tables and profiles. Discuss other geophysical methods used to determine foundation conditions.

#### **2.5.4.5 *Excavations and Backfill***

Discuss the following data concerning excavation, backfill, and earthwork analyses at the site:

- (1) Sources and quantities of backfill and borrow. Describe exploration and laboratory studies and the static and dynamic engineering properties of these materials in the same fashion described in Sections 2.5.4.2 and 2.5.4.3 of this guide.
- (2) Extent (horizontally and vertically) of all seismic Category I excavations, fills, and slopes. Show the locations and limits of excavations, fills, and backfills on plot plans and geologic sections and profiles.
- (3) Compaction specifications and embankment and foundation designs.
- (4) Dewatering and excavation methods and control of groundwater during excavation to preclude degradation of foundation materials. Also discuss proposed quality control and quality assurance programs related to foundation excavation, and subsequent protection and treatment. Discuss measures to monitor foundation rebound and heave.

#### **2.5.4.6 *Groundwater Conditions***

Discuss groundwater conditions at the site, including the following:

- (1) groundwater conditions relative to the foundation stability of the safety-related nuclear power plant facilities
- (2) plans for dewatering during construction
- (3) plans for analysis and interpretation of seepage and potential piping conditions during construction
- (4) records of field and laboratory permeability tests
- (5) history of groundwater fluctuations, as determined by periodic monitoring of local wells and piezometers, including flood conditions

If the analysis of groundwater at the site as discussed in this chapter has not been completed at the time the COL application is filed, describe the implementation program, including milestones.

#### **2.5.4.7 *Response of Soil and Rock to Dynamic Loading***

Provide a description of the response of soil and rock to dynamic loading, including the following considerations:

- (1) any investigations to determine the effects of prior earthquakes on the soils and rocks in the vicinity of the site, including evidence of liquefaction and sand cone formation
- (2) P and S wave velocity profiles, as determined from field seismic surveys (surface refraction and reflection and in-hole and cross-hole seismic explorations), including data and interpretation of the data
- (3) results of dynamic tests in the laboratory on samples of the soil and rock
- (4) results of soil-structure interaction analysis

Material on site geology included in this section may be cross-referenced in Section 2.5.2.5 of the FSAR.

#### **2.5.4.8 *Liquefaction Potential***

If the foundation materials at the site adjacent to and under safety-related structures are saturated soils or soils that have a potential to become saturated, and the water table is above bedrock, provide an appropriate state-of-the-art analysis of the potential for liquefaction occurring at the site. Indicate the extent to which the guidance provided in RG 1.198, "Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites," was followed.

#### **2.5.4.9 *Earthquake Design Basis***

Provide a brief summary of the derivation of the safe-shutdown earthquake (SSE) ground motion, including a reference to Section 2.5.2.6 of the FSAR.

#### **2.5.4.10 *Static Stability***

Describe an analysis of the stability of all safety-related facilities for static loading conditions. Describe the analysis of foundation rebound, settlement, differential settlement, and bearing capacity under the dead loads of fills and plant facilities. Include a discussion and evaluation of lateral earth pressures and hydrostatic groundwater loads acting on plant facilities. Discuss field and laboratory test results. Discuss and justify the design parameters used in stability analyses. Provide sufficient data and analyses so that the staff may make an independent interpretation and evaluation.

#### **2.5.4.11 *Design Criteria***

Provide a brief discussion of the design criteria and methods of design used in the stability studies of all safety-related facilities. Identify required and computed factors of safety, assumptions, and conservatisms in each analysis. Provide references. Explain and verify computer analyses used.

#### **2.5.4.12 *Techniques To Improve Subsurface Conditions***

Discuss and provide specifications for measures to improve foundations, such as grouting, vibroflotation, dental work, rock bolting, and anchors. Discuss a verification program designed to permit a thorough evaluation of the effectiveness of foundation improvement measures. If the foundation improvement verification program in this section has not been completed at the time the COL application is filed, describe the implementation program, including milestones.

### **2.5.5 Stability of Slopes**

Present information concerning the static and dynamic stability of all natural and man-made earth or rock slopes, (cuts, fills, embankments, dams, etc.) for which failure, under any of the conditions to which they could be exposed during the life of the plant, could adversely affect the safety of the nuclear power plant facilities that are outside the scope of the certified design. Include a thorough evaluation of site conditions, geologic features, and the engineering properties of the materials comprising the slope and its foundation. Present the results of slope stability evaluations using classic and contemporary methods of analyses. Include, whenever possible, comparative field performance of similar slopes. All information related to defining site conditions, geologic features, engineering properties of materials, and design criteria should be of the same scope as that provided in Section 2.5.4 of this guide. Cross-references may be used where appropriate. For the stability evaluation of man-made slopes, include

summary data and a discussion of construction procedures, record testing, and instrumentation monitoring to ensure high-quality earthwork.

#### **2.5.5.1 *Slope Characteristics***

Describe and illustrate slopes and related site features in detail. Provide a plan showing the limits of cuts, fills, or natural undisturbed slopes, and show their relation and orientation relative to plant facilities. Clearly identify benches, retaining walls, bulkheads, jetties, and slope protection. Provide detailed cross-sections and profiles of all slopes and their foundations. Discuss exploration programs and local geologic features. Describe the groundwater and seepage conditions that exist and those assumed for analysis purposes. Describe the type, quantity, extent, and purpose of exploration, and show the location of borings, test pits, and trenches on all drawings.

Discuss the sampling methods used. Identify material types and the static and dynamic engineering properties of the soil and rock materials comprising the slopes and their foundations. Identify the presence of any weak zones, such as seams or lenses of clay, mylonites, or potentially liquefiable materials. Discuss and present results of the field and laboratory testing programs, and justify selected design strengths.

#### **2.5.5.2 *Design Criteria and Analyses***

Describe the design criteria for the stability and design of all safety-related and seismic Category I slopes. Present valid static and dynamic analyses to demonstrate the reliable performance of these slopes throughout the lifetime of the plant. Describe the methods used for static and dynamic analyses, and indicate the reasons for selecting them. Indicate assumptions and design cases analyzed with computed factors of safety. Present the results of stability analyses in tables identifying design cases analyzed, strength assumptions for materials, forces acting on the slope and pore pressures acting within the slope, and the type of failure surface. For assumed failure surfaces, show them graphically on cross-sections, and appropriately identify them in both the tables and sections. In addition, describe adverse conditions such as high water levels attributable to the probable maximum flood (PMF), sudden drawdown, or steady seepage at various levels. Explain and justify computer analyses, and provide an abstract of computer programs used.

Where liquefaction is possible, present the results of the analysis of major dam foundation slopes and embankments by state-of-the-art finite element or finite-difference methods of analysis. Where there are liquefiable soils, indicate whether changes in pore pressure attributable to cyclic loading were considered in the analysis to assess the potential for liquefaction, as well as the effect of pore pressure increase on the stress-strain characteristic of the soil and the post-earthquake stability of the slopes.

#### **2.5.5.3 *Logs of Borings***

Present the logs of borings, test pits, and trenches that were completed for the evaluation of slopes, foundations, and borrow materials to be used for slopes. Logs should indicate elevations, depths, soil and rock classification information, groundwater levels, exploration and sampling method, recovery, rock quality designation (RQD), and blow counts from standard penetration tests. Discuss drilling and sampling procedures and indicate where samples were taken on the logs.

#### **2.5.5.4 *Compacted Fill***

Provide a description of the excavation, backfill, and borrow material planned for any dams, dikes, and embankment slopes. Describe planned construction procedures and control of earthworks.

This information should be similar to that outlined in Section 2.5.4.5 of this guide. Discuss the quality control techniques and documentation during and following construction, and reference the applicable quality assurance sections of the FSAR.

## Chapter 3. Design of Structures, Systems, Components, and Equipment

The information in this chapter is identical to the information in Chapter 3 of C.III.1, with the exception of Section 3.5.1.6. Specific information required for section 3.5.1.6, if not included in the ESP, is addressed in this Chapter. COL applicants referencing a certified design and an early site permit should reference Chapter 3 of C.III.1 for the information needed to prepare their COL applications.

### 3.5.1.6 *Aircraft Hazards*

If not included in the ESP, provide an aircraft hazard analysis for each of the following:

- (1) Federal airways, holding patterns, or approach patterns within 3.22 kilometers (2 miles) of the nuclear facility
- (2) all airports located within 8.05 kilometers (5 statute miles) of the site
- (3) airports with projected operations greater than  $193d^2$  ( $500d^2$ ) movements per year located within 16.10 kilometers (10 statute miles) of the site and greater than  $386d^2$  ( $1000d^2$ ) outside 16.10 kilometers (10 statute miles), where  $d$  is the distance in kilometers (statute miles) from the site
- (4) military installations or any airspace usage that might present a hazard to the site [for some uses, such as practice bombing ranges, it may be necessary to evaluate uses as far as 32.19 kilometers (20 statute miles) from the site]

Hazards to the plant may be divided into accidents resulting in structural damage and accidents involving fire. These analyses should be based on the projected traffic for the facilities, the aircraft accident statistics provided in Section 2.2 of the FSAR, and the critical areas described in Section 3.5.2 of the FSAR.

The aircraft hazard analysis should provide an estimate of the total aircraft hazard probability per year. If aircraft accidents that could lead to radiological consequences in excess of the exposure guidelines of 10 CFR 50.34(a)(1) have a probability of occurrence of an order of magnitude of  $10^{-7}$  per year demonstrate by some other means (e.g., re-analyzing or redesigning the proposed facility) that the proposed facility is acceptable at the proposed site. Provide and justify the aircraft selected as the design-basis impact event, including its dimensions, mass (including variations along the length of the aircraft), energy, velocity, trajectory, and energy density. Resultant loading curves on structures should be presented in Section 3.5.3 of the FSAR.

All parameters used in these analyses should be explicitly justified. Wherever a range of values is obtained for a given parameter, it should be plainly indicated and the most conservative value used. Justification for all assumptions should also be clearly stated.

## **Chapter 4. Reactor**

The information in this chapter is identical to the information in Chapter 4 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 4 of C.III.1 for the information needed to prepare their COL applications.



## **Chapter 5. Reactor Coolant System and Connected Systems**

The information in this chapter is identical to the information in Chapter 5 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 5 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 6. Engineered Safety Features**

The information in this chapter is identical to the information in Chapter 6 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 6 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 7. Instrumentation and Controls**

The information in this chapter is identical to the information in Chapter 7 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 7 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 8. Electric Power**

The information in this chapter is identical to the information in Chapter 8 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 8 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 9. Auxiliary Systems**

The information in this chapter is identical to the information in Chapter 9 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 9 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 10. Steam and Power Conversion System**

The information in this chapter is identical to the information in Chapter 10 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 10 of C.III.1 for the information needed to prepare their COL applications.



## **Chapter 11. Radioactive Waste Management**

The information in this chapter is identical to the information in Chapter 11 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 11 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 12. Radiation Protection**

With the exception of the information requested in Section 12.3.5 of C.III.1, the information in this chapter is identical to the information in Chapter 12 of C.III.1. An application for an early site permit should address the information requested in Section 12.3.5 of C.III.1 (i.e., an estimate of annual doses to construction workers in a new construction area from the existing operating plant(s)). COL applicants referencing a certified design and an early site permit should refer to Chapter 12 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 13. Conduct of Operations**

The information in this chapter is identical to the information in Chapter 13 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 13 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 14. Verification Programs**

The information in this chapter is identical to the information in Chapter 14 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 14 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 15. Transient and Accident Analyses**

The information in this chapter is identical to the information in Chapter 15 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 15 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 16. Technical Specifications**

The information in this chapter is identical to the information in Chapter 16 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 16 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 17. Quality Assurance & Reliability Assurance**

The information in this chapter is identical to the information in Chapter 17 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 17 of C.III.1 for the information needed to prepare their COL applications.

## **Chapter 18. Human Factors Engineering**

The information in this chapter is identical to the information in Chapter 18 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 18 of C.III.1 for the information needed to prepare their COL applications.



## **Chapter 19. Probabilistic Risk Assessment**

The information in this chapter is identical to the information in Chapter 19 of C.III.1. COL applicants referencing a certified design and an early site permit should refer to Chapter 19 of C.III.1 for the information needed to prepare their COL applications.