

**AGENDA**  
**EARLY SITE PERMIT (ESP) MEETING WITH NUCLEAR ENERGY INSTITUTE (NEI)**  
**ROOM T-7-A1**  
**DECEMBER 5, 2002**

8:30 a.m.	Introductory Comments	NRC / NEI
8:40 a.m.	Follow-up Items from October 16-17 Meeting	NRC/NEI/ESP Applicants
8:50 a.m.	ESP-3: QA requirements of ESP information ESP-6: Bounding Plant Parameter Approach ESP-7: 10 CFR 52.17 Requirements <i>ESP-18a: Alternative Site Reviews</i>	NEI/ESP Applicants
	Break	
11:50 a.m.	Opportunity for public comment	
12:00 Noon	Lunch	
1:00 p.m.	ESP-8: Use of a bounding approach for providing fuel cycle and transportation information required by NEPA (Tables S-3 & S-4) ESP-11: Criteria for determining ESP duration (10-20 years) <i>ESP-12: Guidance for evaluating severe accident mitigation alternatives under NEPA</i> ESP-22: Form and Content of an ESP	NRC/NEI/ESP Applicants
	Break	
4:20 p.m.	Opportunity for public comment	
4:30 p.m.	Topics for next meeting	
4:40 p.m.	Summary	
5:00 p.m.	Adjourn	

NOTE: Topics in *italics* are either new topics or topics substantially revised in scope.

Information Regarding the Clinton Event Discussed During the 10/16-17, 2002 NEI Meeting

Mr. Bagchi provided the following:

I was thinking of a 3.0 (MnGS) in April 1990 69 km from the site. There was a 3.2 (MDSLM) in December 1990 and a 3.1 (MnGS) in December 1996. In 1990 there were some discussions about the intensity of the ground motion at the site, given that a small earthquake has occurred.

FOLLOW-UP ITEM FROM 10/16-17 NEI MEETING - J. MITCHELL FEEDBACK RE  
MITIGATION

52.17.a.2 requires that the applicant for ESP submit an Environmental Report as required by 51.45. 51.45.c, among other things, requires an analysis that considers "alternatives available for reducing or avoiding adverse environmental effects." Note that it does not say "if the effects are large." This has been interpreted, as in the GEIS for License Renewal, as having to consider mitigation for effects, even if they are small. All the Category 1 impacts in the GEIS for LR have some statement about how the small effect could be mitigated. The conclusions were that the costs are large and the mitigation not justified. This is to be expected for an existing facility, but for a plant-site that is still in design, the costs would be expected to be less. Given that with a PPE, one has a large envelope to consider. The concern is given the finality associated with the ESP if the applicant does not: (1) define what the impact is, e.g., number of birds killed by the cooling towers; (2) determine its significance (small, medium, or large); and (3) consider mitigation of the adverse impact how can the staff perform an adequate assessment of 51.45.c?

**Generic Topic ESP-3**  
**NEI white paper on QA requirements for ESP - 11/20/02**

## **Introduction**

One of the first generic issues identified with respect to plans for preparation, submittal and review of first-ever ESP applications concerned the quality assurance processes to be applied to ESP activities. The industry indicated the view that NRC regulations did not mandate use of 10 CFR Part 50, Appendix B, for ESP and thus that either Appendix B or alternative quality processes could be applied. While disagreement on this fundamental point was not immediately evident, recent statements by the NRC make clear the staff expectation that Appendix B is applicable for ESP and that ESP applications would be reviewed for compliance with Appendix B. This paper describes our basis for concluding that Appendix B is neither required nor necessary for ESP and thus that applicants may apply either Appendix B or alternative quality processes to their ESP activities.

## **Summary of Issue**

As expressed in our public meetings, and most recently on October 17, ESP applicants are committed to implementing effective quality processes to provide adequate confidence in the completeness, accuracy and general quality of ESP information to facilitate efficient ESP application review by NRC. It is the industry's view that to achieve these objectives, ESP applicants may apply 10 CFR Part 50, Appendix B, or they may apply non-Appendix B alternative quality processes. We hold this view because Appendix B is neither required for ESP by NRC regulations nor necessary for assuring quality. Moreover, if non-Appendix B alternative quality processes are used, NRC review of ESP applications for compliance with Appendix B would not be expected and justifications for departures from specific Appendix B requirements, Regulatory Guides, and ASME NQA-1 would not be required.

Contrasting with this view are NRC staff statements made in discussions with NEI and the pilot ESP applicants, as well as in recently released IMC-2501. These statements reflect the view that ESP applications are subject to Appendix B and would be reviewed for compliance with Appendix B. Notwithstanding these statements, the NRC staff has acknowledged that the applicability of Appendix B to ESP is currently under review by the Office of General Counsel.

The acceptability of using either Appendix B or alternative quality processes is an important unresolved issue for ESP applicants. Clarification of QA program requirements for ESP is needed as quickly as possible to support ongoing preparations of ESP applications.

The following is a summary of our basis for concluding that Appendix B is not necessary to assure quality and by its terms does not apply to ESP activities. More detailed discussion of the industry view is provided in the attachment.

1. ESP activities are not within the scope of Appendix B. By its terms, Appendix B establishes quality assurance requirements for the design, fabrication, construction, testing and operation of nuclear plant structures, systems and components (SSCs) that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of

the public. Appendix B applies to the activities affecting the safety-related functions of those SSCs. ESP includes no such activities.

2. While NRC regulations explicitly state that applications for Construction Permits, Operating Licenses, Design Certifications and Combined Licenses are subject to Appendix B, Section 52.17, *Contents of [ESP] Applications*, does not specify QA requirements for ESP applications.
3. 10 CFR Part 52, Subpart A, contain the following requirements:
  - ◆ Section 52.18, *Standards for review of applications*, specifies that ESP applications “will be reviewed according to the *applicable standards* set out in 10 CFR Part 50 and its appendices and Part 100 as they apply to applications for construction permit for nuclear power plants.” [Emphasis added.]
  - and,
  - ◆ Section 50.34(a)(7) requires construction permit applications to include “a description of the quality assurance program to be applied to the *design, fabrication, construction and testing of the structures, systems and components of the facility*,” (Emphasis added) and further that the QA program description “include a discussion of how the applicable requirements of Appendix B will be satisfied.”

However, contrary to the NRC staff conclusion in IMC-2501, the requirement for construction permit applications to include Appendix B-compliant QA program descriptions is not an “applicable standard” for review of ESP applications because ESP activities do not include facility design, fabrication, construction or testing.

4. Consideration of an ESP as a “partial construction permit” in Sections 52.21 and 52.37 is for the specific purposes of defining, respectively, required hearing procedures and reporting of defects. Considering an ESP as a “partial construction permit” for these specific purposes does not impose all the requirements for a construction permit on an ESP. In particular, it does not impose Appendix B quality assurance requirements on ESP applicants through either Sections 52.18 or 50.55(f)(1).
5. Lack of specific QA requirements is consistent with scope of ESP activities and the distinction recognized in Part 100 between siting activities and those related to design, construction, testing and operation.
6. Notwithstanding the absence of specific quality assurance program requirements for ESP, the completeness and accuracy of ESP applications are assured by 10 CFR 50.9, which requires that licensing submittals to NRC be complete and accurate in all material respects, and by quality processes employed by the applicant. Completeness and accuracy are further promoted by use of NRC Regulatory Guides and Standard Review Plans that outline methods and sources of data acceptable to the staff for the technical information provided in the ESP.

As previously discussed, the pilot ESP applicants are committed to and are implementing effective quality processes (1) in furtherance of their obligation to provide complete and accurate information

pursuant to 10 CFR 50.9, and (2) to provide an overall level of quality that facilitates efficient ESP application review by the NRC.

To promote understanding of ESP applicant quality processes and facilitate timely and efficient ESP application reviews by the NRC staff, pilot ESP applicants are providing a description of their quality processes to NRC for pre-application consideration and feedback. Future ESP applicants may do likewise.

#### Summary of industry views for regarding QA requirements for ESPs

- ◆ ESP applicants may apply Appendix B or non-Appendix B alternative quality processes to provide adequate confidence in the completeness, accuracy and overall quality of ESP information
- ◆ ESP applicants may, but are not required by Section 52.17 to describe their quality processes in ESP applications.
- ◆ The NRC should review ESP applications for completeness and accuracy of the information presented. Unless the ESP applicant commits to use Appendix B, NRC reviews for compliance with Appendix B would not be appropriate.
- ◆ ESP information approved by the NRC is appropriate for use in a COL application as provided by 10 CFR Part 52, Subpart C.
- ◆ Existing NRC guidance, including IMC-2501, should be modified, and forthcoming ESP Review Standard should reflect that Appendix B is not mandatory for ESP related activities

Detailed discussion of these industry views and bases therefor is provided in the attachment.

## **Industry White Paper on Generic Topic ESP-3 Quality Assurance Requirements for an ESP Application**

### **Summary of Issue**

As expressed in our public meetings, and most recently on October 17, ESP applicants are committed to implementing effective quality processes to provide adequate confidence in the completeness, accuracy and general quality of ESP information to facilitate efficient ESP application review by NRC. It is the industry's view that to achieve these objectives, ESP applicants may apply 10 CFR Part 50, Appendix B, or they may apply non-Appendix B alternative quality processes. We hold this view because Appendix B is neither required for ESP by NRC regulations nor necessary for assuring quality. Moreover, if non-Appendix B alternative quality processes are used, NRC review of ESP applications for compliance with Appendix B would not be expected and justifications for departures from specific Appendix B requirements, Regulatory Guides, and ASME NQA-1 would not be required.

Contrasting with this view are NRC staff statements made in discussions with NEI and the pilot ESP applicants as well as in recently released IMC-2501. These statements reflect the view that ESP applications are subject to Appendix B and would be reviewed for compliance with Appendix B and associated Regulatory Guides, ANSI Standards, ASME NQA-1, etc. Notwithstanding these statements, the NRC staff has acknowledged that the applicability of Appendix B to ESP is currently under review by the Office of General Counsel.

The acceptability of using either Appendix B or alternative quality processes is an important unresolved issue for ESP applicants. Clarification of QA program requirements for ESP is needed as quickly as possible to support ongoing preparations of ESP applications.

The following sets forth with more particularity our basis for concluding that Appendix B is not necessary to assure quality and by its terms does not apply to ESP activities.

**1. ESP applicants are not required by 10 CFR Part 52, Subpart A, to submit a quality assurance program or program description in support of an ESP application.**

Numerous sections within Title 10 require the submittal of a Quality Assurance (QA) Program Description (QAPD) in connection with certain licensing activities. For example, a QAPD submittal is expressly required to be included for the Preliminary Safety Analysis Report in accordance with 50.34(a)(7) for a construction permit application, and in the Final Safety Analysis Report in accordance with 50.34(b)(6) for an operating license application.

Similarly, Section 52.47 requires an application for design certification to include "the technical information which is required of applicants for construction permits and operating licenses by 10 CFR Part 20, Part 50 and its appendices, and Parts 73 and 100, and which is technically relevant to the design and not site-specific." The specific requirement to include the technical information required by Part 50 and its appendices includes both the references to 50.34(a)(7) and 50.34(b)(6); thus a QAPD is clearly required for a design certification application under Subpart B of Part 52. This requirement is appropriate since the development of a design certification application involves design activities that are clearly within the scope of Appendix

## B QA criteria.

Finally, Section 52.79 requires an application for a combined license to include “the technically relevant information required of applicants for an operating license by 10 CFR 50.34.” This also includes both the references to 50.34(a)(7) and 50.34(b)(6); thus a QAPD is clearly required for a combined license application under Subpart C of Part 52. This requirement is similarly appropriate since the combined license activities also include design as well as a construction and operation activities that are clearly within the scope of Appendix B QA criteria.

No express provision for a QAPD is contained within Subpart A of Part 52. Section 52.17 states that an ESP application shall consist of a site safety assessment, an environmental report, emergency planning information, and under some conditions not pertinent to this issue, a site redress plan. It does not require a QAPD to be a part of the application. Each of the other above-mentioned licensing activities expressly requires the inclusion of the QAPD information required by 50.34. However, the Early Site Permit application requirements of 52.17 do not include a reference that includes either 50.34(a)(7) or 50.34(b)(6). Accordingly, no QAPD is required to be submitted with an Early Site Permit application. Not requiring a QAPD for the ESP application is appropriate since no design, construction, or operation activities are being carried out during this phase of the licensing process.

### **2. Section 52.18, *Standards for review of applications*, does not expand the required contents of ESP applications**

As discussed above, there is no express provision within Subpart A requiring a QAPD to be submitted with an ESP application. The Staff, as set forth in its recently issued Inspection Manual Chapter (IMC) 2501, seeks to require a QAPD through Section 52.18, *Standards for review of applications*, which invokes provisions set forth for Construction Permits, including Section 50.34(a)(7)<sup>1</sup>. Section 03.11 of the NRC IMC 2501 identifies the “Tendered/Docketed Application” consistent with 10 CFR 52.17. However, Section 05.05 titled “Quality Assurance” presumes that Section 52.18 somehow extends Section 52.17 to require the submittal of a QAPD.

Section 05.05 reads (in part):

“10 CFR 52.18 requires that applications filed under Part 52 be reviewed according to the applicable standards set out in 10 CFR Part 50 and its appendices and Part 100 as they apply to applications for construction permits for nuclear power plants. Section 50.55, ‘Conditions of a Construction Permit’ states in (f)(1) that each construction permit holder subject to the QA criteria in appendix B shall implement, pursuant to 50.34(a) a QA plan. 10 CFR 50.34 states that an applicant is required to submit a QA program description discussing how the applicable requirements of

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<sup>1</sup> 10 CFR 50.34(a)(7) requires:

A description of the quality assurance program to be applied to the design, fabrication, construction and testing of the structures, systems, and components of the facility. Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” sets forth the requirements for quality assurance programs for nuclear power plants and fuel reprocessing plants. The description of the quality assurance program for a nuclear power plant or fuel reprocessing plant shall include a discussion of how the applicable requirements of appendix B will be satisfied.

Appendix B will be satisfied. Accordingly, those portions of the ESP application which are applicable to the requirements of 10 CFR Part 50 Appendix B will be inspected and reviewed pursuant to Appendix B (and if provided with the ESP application), the QA program description. The quality associated with those parts of the ESP application not applicable to Appendix B will be reviewed to recognized industry codes and standards.”

While 52.18 identifies the criteria for the NRC staff to review and evaluate the information provided in the application per 52.17, it does not extend those requirements such that additional information not identified in 52.17 must be included in the application. Using logic as applied in Section 05.05 of IMC 2501, all informational provisions of 50.34 would be required to be submitted with an ESP application. There is no indication in the regulations that this blanket application of section 50.34 was intended by sections 52.17 or 52.18.

The NRC staff has cited the Subpart A characterization of an ESP as a “partial construction permit” as basis for broadly applying construction permit standards and conditions to ESP applications as indicated in Section 05.05 of IMC 2501. The regulations indicate that an ESP is considered a partial construction permit, but only for the purposes of Part 21 and 50.100 (see section 52.37<sup>2</sup>) and for the purposes of procedural requirements of 10 CFR Part 2 (see section 52.21<sup>3</sup>). These specific limitations to the scope of the ESP application as a construction permit clearly demonstrate a desire not to impose all of the requirements for a construction permit on an ESP. This proposition is further supported by the language of § 52.25, “Extent of activities permitted”, which limits activities to be accomplished by an ESP holder to only those non-safety related activities allowed by 10 CFR 50.10(e)(1).<sup>4</sup> These distinctions to and limitations of the application of construction permit requirements demonstrate the intent that not all construction permit requirements are applicable to an ESP.<sup>5</sup>

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<sup>2</sup> 10 CFR § 52.37, “Reporting of Defects and non-compliance; revocation, suspension, modification of permits for cause”, states: “For purposes of part 21 and 10 CFR 50.100, an early site permit is a construction permit.”

<sup>3</sup> 10 CFR § 52.21, “Hearings” states in pertinent part:

An early site permit is a partial construction permit and is therefore subject to all procedural requirements in 10 CFR part 2 which are applicable to construction permits, including ... docketing ..., and notice of hearing.”

<sup>4</sup> 10 CFR § 50.10(e)(1) permits:

This regulation provides for conduct of “the following activities: (i) Preparation of the site for construction of the facility (including such activities as clearing, grading, construction of temporary access roads and borrow areas); (ii) installation of temporary construction support facilities (including such items as warehouse and shop facilities, utilities, concrete mixing plants, docking and unloading facilities, and construction support buildings); (iii) excavation for facility structures; (iv) construction of service facilities (including such facilities as roadways, paving, railroad spurs, fencing, exterior utility and lighting systems, transmission lines, and sanitary sewerage treatment facilities); and (v) the construction of structures, systems and components which do not prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public.”

<sup>5</sup> This proposition is further reinforced by section 50.55(a), which requires the “permit shall state the earliest and latest dates for completion of the construction or modification.” This is clearly not applicable to an ESP since no construction or modification is allowed by an ESP (per 52.25). Similarly, 50.55(f)(1) is not applicable to an ESP since as indicated above, no quality assurance program is [required to be] described or referenced in the

Section 05.05 continues in pertinent part by stating that “the application should provide an adequate basis for evaluation of the acceptability of the QA program implementation” and “the inspector will review the description of the QA program provided in the application....” As indicated above, these are also extensions of § 52.17 without regulatory basis. There is no requirement for a QAPD to be included in an ESP application.

- 3. Appendix B to 10 CFR Part 50 is not mandatory for ESP activities, and therefore ESP applicants may apply Appendix B, or they may apply non-Appendix B alternative quality processes.**

10 CFR 50.34(a)(7) requires, as part of the preliminary safety analysis report:

*“A description of the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” sets forth the requirements for quality assurance programs for nuclear power plants and fuel reprocessing plants. The description of the quality assurance program for a nuclear power plant or a fuel reprocessing plant shall include a discussion of how the applicable requirements of appendix B will be satisfied.”* [Emphasis added]

As indicated in 50.34(a)(7) the quality assurance requirements for nuclear power facilities are identified in Appendix B to 10 CFR Part 50. The introduction to Appendix B is repeated below.

*“Introduction.* Every applicant for a construction permit is required by the provisions of §50.34 to include in its preliminary safety analysis report a description of the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Every applicant for an operating license is required to include, in its final safety analysis report, information pertaining to the managerial and administrative controls to be used to assure safe operation. Nuclear power plants and fuel reprocessing plants include structures, systems, and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. This appendix establishes quality assurance requirements for the design, construction, and operation of those structures, systems, and components. The pertinent requirements of this appendix apply to all activities affecting the safety-related functions of those structures, systems, and components; these activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying.

*“As used in this appendix, ‘quality assurance’ comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system,*

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Safety Analysis Report. Again, §50.34(a)(7) is not referenced in §52.17; thus no QAPD is required to be included in the ESP application.

or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements.”

Note that this requirement indicates that the “appendix establishes quality assurance requirements for the *design, construction, and operation* of those structures, systems, and components” and that the “pertinent requirements of this appendix apply to all activities affecting the safety-related functions of those structures, systems, and components.” The NRC Staff has cited this latter statement to expand beyond the stated “design, construction, and operation” activities. However, the introduction further clarifies that “these activities include *designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying.*” (emphasis added) Site characterization activities are not identified. Similarly, the 10 CFR 50.34(a)(7) requirement is for a description of “*the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility.*” Note that, like Appendix B, this requirement is also limited to design, fabrication, construction, and testing activities.

The industry does not disagree that Appendix B is applicable to design, construction, and testing activities for structures, systems, and components (SSC) that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. However, because the scope of the ESP application does not include the design, construction or testing of such “safety-related” SSCs, Appendix B is not applicable to ESP activities.

**4. The lack of specific QA requirements for ESP and the acceptability of applying Appendix B or alternative non-Appendix B quality processes are consistent with the limited scope of ESP activities and the recognized distinction between siting factors and those related to design, construction, testing and operation.**

The requirements of 10 CFR Part 52, Subpart A, provide for “approval of a site or sites for one or more nuclear power facilities separate from the filing of an application for a construction permit or combined license for such a facility” (see 52.11). Such approval is provided in an Early Site Permit and is based primarily on the identification of site characteristics (which comply with Part 100, “Reactor Site Criteria,”) in a safety analysis report and acceptable environmental impacts as identified in an environmental report. These site characteristics will then be used as design input when the safety-related design process begins for any future facility to be constructed on the site.

Note the distinction between “design process” and the “design input.” The NQA-1 (1983) standard, Quality Assurance Program Requirements for Nuclear Facilities (as endorsed by Regulatory Guide 1.28, Quality Assurance Program Requirements (Design and Construction)), contains the following definitions and other pertinent statements:

- ◆ **Design process (definition):** technical and management processes that commence with identification of design input and that lead to and include the issuance of design output documents.
- ◆ **Design input (definition):** those criteria, parameters, design bases, regulatory requirements, or other design requirements upon which detailed final design is based.
- ◆ “Applicable design inputs shall be identified and documented, and their selection reviewed and approved.” [Section 3 (200)]
- ◆ “Documentation of design analyses shall include... (b) design inputs and their sources.” [Section 3 (402)]
- ◆ “Design inputs include many characteristics and functions of an item or system,” including: “(e) loads such as seismic, wind, thermal and dynamic... and (f) environmental conditions anticipated during storage, construction, operation, and accident conditions, such as pressure, temperature, humidity, corrosiveness, site elevation, wind direction, exposure to weather, flooding, ...” [Appendix 3A-1 (200)]

Each of the above statements has been consistently included in appropriate standards since ANSI N45.2.11 (1974), *Quality Assurance Requirements for the Design of Nuclear Power Plants*.

Thus, the selection of design inputs (at COL application stage) would be included in the design process; however, the determination/development of the design inputs (at the ESP application stage) would not be included in the design process. Since Appendix B does not apply until the design process begins, Appendix B is not applicable to ESP stage activities under the “design” activities criterion.

Consideration of site characteristics as design inputs is also consistent with their treatment in 10 CFR Part 52, Subpart B, for standard design certification. Site parameters are identified as design inputs to determine the acceptability of the design as identified in SRP 14.3.1 (draft Rev. 0, April 1996).

The distinction between siting activities versus design, construction, and operation is also recognized in the Purpose section (§100.1) of Part 100, “Reactor Site Criteria”. The requirements of 10 CFR Part 100 begin:

“(a) The purpose of this part is to establish approval requirements for proposed sites for stationary power and testing reactors subject to part 50 or part 52 of this chapter.

(b) There exists a substantial base of knowledge regarding power reactor siting, design, construction, and operation. This base reflects that the primary factors that determine public health and safety are the reactor design, construction and operation.

(c) Siting factors and criteria are important in assuring that radiological doses from normal operation and postulated accidents will be acceptably low, that natural phenomena and potential man-made hazards will be appropriately accounted for in

the design of the plant, that site characteristics are such that adequate security measures to protect the plant can be developed, and that physical characteristics unique to the proposed site that could pose a significant impediment to the development of emergency plans are identified.

(d) This approach incorporates the appropriate standards and criteria for approval of stationary power and testing reactor sites. The Commission intends to carry out a traditional defense-in-depth approach with regard to reactor siting to ensure public safety. Siting away from densely populated centers has been and will continue to be an important factor in evaluating applications for site approval.”

Section (a) indicates that the “purpose of this part is to establish approval requirements for proposed sites for stationary power and testing reactors subject to part 50 or part 52 of this chapter.” However, Part 100 does not identify Appendix B to 10 CFR Part 50 as one of those requirements.

Section (b) indicates an NRC differentiation between power reactor siting activities and the power reactor activities of design, construction, and operation. It clearly notes “*the primary factors that determine public health and safety are the reactor design, construction and operation.*” Appendix B to 10 CFR Part 50 indicates clearly that it “establishes quality assurance requirements for the design, construction, and operation of those structures, systems, and components” that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. It does not mention siting activities, and Part 100 does not indicate siting is considered as a primary factor.

Section (c) does indicate that “siting factors and criteria are important” in radiological dose considerations, in the design of the plant, in security, and in emergency planning. Section (d) then indicates “this approach incorporates the appropriate standards and criteria for approval of stationary power and testing reactor sites.” Again, this approach, i.e., Part 100, does not identify Appendix B to 10 CFR Part 50 as one of “the appropriate standards and criteria for approval of stationary power and testing reactor sites.”

Further, Part 100 clearly indicates the investigations required for geological, seismological, and engineering characteristics described in Part 100 are within the scope of investigations permitted by §50.10(c)(1) of this chapter. Specifically, §100.23(b) clearly states “The investigations required in paragraph (c) of this section [Geological, seismological, and engineering characteristics] are within the scope of investigations permitted by § 50.10(c)(1) of this chapter.” The activities permitted by §50.10(c)(1) are identified therein as “borings... or other pre-construction monitoring to establish background information related to the suitability of the site or to the protection of environmental values.” Such activities, i.e., those permitted by §50.10(c)(1), while conducted in a quality manner, have historically been conducted outside the purview of a formal Appendix B quality assurance program.

While granting of an ESP may include authorization of preliminary construction activities under Section 52.25, the “extent of activities permitted” limits activities to those allowed by 10 CFR 50.10(e)(1). This regulation provides for conduct of “the following activities” under an ESP:

“(i) Preparation of the site for construction of the facility (including such activities as clearing, grading, construction of temporary access roads and borrow areas); (ii) installation of temporary construction support facilities (including such items as warehouse and shop facilities, utilities, concrete mixing plants, docking and unloading facilities, and construction support buildings); (iii) excavation for facility structures; (iv) construction of service facilities (including such facilities as roadways, paving, railroad spurs, fencing, exterior utility and lighting systems, transmission lines, and sanitary sewerage treatment facilities); and (v) the construction of structures, systems and components which do not prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public.”

These activities have historically not fallen under the Appendix B “construction” activities criterion.

- 5. The ESP pilot applicants are implementing quality processes to provide adequate confidence in the completeness, accuracy and general quality of ESP information. Quality assurance practices that provide a complete and accurate ESP application are sufficient.**

Because NRC regulations do not require the use of Appendix B, ESP applicants may apply 10 CFR Appendix B or alternative quality processes to provide adequate confidence in the completeness, accuracy and general quality of ESP information to facilitate efficient ESP application review by NRC.

Unless an applicant commits to use Appendix B, it would be inappropriate to review ESP applications for compliance with Appendix B or to require justification for departures from specific Appendix B criteria.

NRC can and should verify quality of ESP application field data, input, and evaluations through technical review of the application. It is expected that quality would also be verified through audit of both the data collection and analysis processes (to identified and accepted industry standards) and of the implementation of alternative or augmented quality processes. Such reviews and audits can also be used to verify the information is accurate and complete in conformance with §50.9 requirements.

NRC Inspection Manual Chapter 2501 appropriately states in §05.05, “the quality and pedigree associated with those parts of the ESP application not applicable to Appendix B will be reviewed to recognized industry codes and standards.” This would provide an appropriate basis for evaluating an ESP application .

Appendix B was developed to provide the minimum acceptable standards for “structures, systems, and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public.” While appropriate for such SSCs,

these standards typically result in a significant increase in the expenditure of resources, both time and money. This higher standard is not necessary for determining site characteristics or performing environmental studies and associated evaluation activities to provide sufficient confidence in the results. Acceptability of non-Appendix B alternative quality processes is consistent with NRC guidance on quality assurance in several important areas, including

- ◆ Regulatory Guide 4.15, on radiological monitoring of effluent streams and the environment for normal operations
- ◆ Regulatory Guide 1.97, on requirements for design and use of post-accident instrumentation
- ◆ Regulatory Guide 1.176, which recommends augmented non-Appendix B quality assurance for non-safety-related equipment that may be of high safety significance
- ◆ Generic Letter 85-06, which provides quality assurance guidance for ATWS equipment
- ◆ Regulatory Guide 1.155, which provides quality assurance guidance for station blackout equipment
- ◆ Regulatory Guide 1.189 and Branch Technical Position 9.5-1, which provide quality assurance guidance for fire protection equipment

It is important to differentiate between §50.9 requirements for complete and accurate information and the Appendix B to 10 CFR Part 50 requirements for SSC design, construction, and operation activities. These are separate requirements for separate activities. Complete and accurate information does not ensure a quality pedigree for design, construction, and operation activities. Similarly, quality processes for design, construction, and operation activities do not provide any assurance that the information in a submittal to NRC will be complete and accurate. Either can be met or violated without effect on the other.

**6. Existing NRC guidance, including IMC-2501, should be modified, and the forthcoming ESP review standard should reflect, as described above, that Appendix B is not mandatory for ESP related activities, and specifically that**

- ◆ ESP applicants may apply Appendix B or non-Appendix B alternative quality processes to provide adequate confidence in the completeness, accuracy and overall quality of ESP information
- ◆ Per Section 52.17, ESP applicants may, but are not required to describe their quality processes in ESP applications.
- ◆ The NRC should review ESP applications for completeness and accuracy of the information presented. Unless the ESP applicant commits to use Appendix B, NRC reviews for compliance with Appendix B would not be appropriate.
- ◆ ESP information approved by the NRC is appropriate for use in a COL application as provided by 10 CFR Part 50, Subpart C.

*DRAFT*



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**ESP-6**  
**Radiological Consequence Assessment of**  
**Design Basis Accidents**  
**For Preparation of Early Site Permit**  
**Environmental Report**

**Presentation to the NRC**

**December 5, 2002**

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## INDUSTRY APPROACH

- ❑ Applicants for Early Site Permits will evaluate a spectrum of example accidents to assess the environmental radiological consequences associated with the alternative reactor technologies being considered for an ESP site.
- ❑ Selection of the accidents is based on the likelihood of occurrence and consequences considering the accidents identified in NRC regulatory guidance.
- ❑ Applicants will use the 50 percentile post-accident site dispersion  $\chi/Q$  factors at the exclusion and low population zone boundaries to perform the assessments.
- ❑ The radiological consequences of the selected design basis accidents will be assessed using the activity released to the environs as provided in the standard safety analysis reports or as specified by the reactor vendor.
- ❑ The released activities account for the reactor core and accident mitigation features in the reactor vendor's standard plant designs.

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## **SOURCE TERMS AND ACTIVITY RELEASES**

- The reactor technologies use different source terms and approaches to define the post accident activity releases.
- Accident analyses are tempered with regulatory guide and NUREG 0800 SRP approaches.
- The Advanced Boiling Water Reactor's (ABWR) source term is based on TID-14844.
- The AP-1000 Pressurized Water Reactor's source term and accident approaches are based on the Alternate Source Term (AST) in accordance with Regulatory Guide 1.183. AP 600 and/or AP 1000 source terms and releases bound the limiting accident release for the IRIS advanced reactor.
- Source terms associated with the limiting DBA are identified by the vendors of the non-LWR advanced reactor designs. These designs include: GT-MHR, PBMR, and the ACR-700.

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## SELECTION OF DESIGN BASIS ACCIDENTS

- A representative set of design basis accidents is selected based on the proposed range of reactor technologies and available data and guidance.
  
- Applicable regulatory guidance for assessing the radiological consequences of accidents in the ESP ER is provided in Regulatory Guide 1.183 and NUREG 1555.
  
- Current USNRC guidance focuses on LWRs. It does not specifically address the other reactor concepts considered in the ESP effort.
  
- A “similar-familiar” approach is used to select reasonably representative and bounding DBAs events for the BWR, PWR and Non-LWR designs.

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**SELECTION OF DESIGN BASIS ACCIDENTS**  
**Comparison of LWR Accidents Addressed by RG 1.183**

**ABWR**

➤ **RG 1.183 Listed Accidents Analyzed in Certification Package:**

Loss of Coolant Accident (LOCA): TID Source Term used

Fuel Handling Accident (FHA): RG 1.25 assumptions used

Main Steam Line Break (MSLB)

Rod Drop: No Fuel or Clad Damage – No Radiological Consequences

➤ **Other Accidents Analyzed in Certification Package But Not in RG 1.183:**

MSIV Closure

Small Line (Instrument) Break Outside Containment

RWCU Break Outside Containment

Offgas System Failure

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**SELECTION OF DESIGN BASIS ACCIDENTS**  
**Comparison of LWR Accidents Addressed by RG 1.183**

**PWR**

➤ **RG 1.183 Listed Accidents Analyzed in Certification Package:**

LOCA

Steam Generator Tube Rupture (SGTR)

Reactor Coolant Pump (RCP) Locked Rotor

Rod Ejection

➤ **Other Accidents Analyzed in Certification Package But Not in RG 1.183:**

Small Line Break Outside Containment: Sample

Feedwater Line Break: No radiological consequence presented – bounded by steam line break

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## SELECTION OF DESIGN BASIS ACCIDENTS

### Non-LWR Design Basis Accidents

- The post accident releases from the PBMR and GT-MHR are mechanistic releases and limited to the source terms for one of the multi-module station installations.
  
- The ACR-700 large break LOCA has the largest source term and hence the greater potential for offsite dose consequences of the non-LWR plants.
  
- The ACR-700's large break LOCA accident sequence is included in the set of design basis accidents as a benchmark for the non-LWR reactor technologies.

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## **SELECTION OF ENVIRONMENTAL REPORT DESIGN BASIS ACCIDENTS**

- ❑ NUREG 1555 provides the guidance for evaluating the radiological consequences of accidents in the Environmental Report.
- ❑ NUREG 1555, Section 7.1, Listed DBAs are:
  - Main Steam Line Failure Outside Containment (PWR)
  - Feedwater System Pipe Breaks Inside/Outside Containment (PWR)
  - RCP Pump Rotor Seizure
  - RCP Shaft Break
  - Control Rod Drop Accident (BWR)
  - Failure of Small Lines Carrying Primary Coolant Outside Containment
  - Steam Generator Tube Failure (PWR)
  - LOCA: Including Containment Leakage Contribution
    - LOCA: Leakage from ESF Components Outside Containment
    - LOCA: Leakage From MSIV Leakage Control System (BWR)
  - Fuel Handling Accident

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## EVALUATION OF RADIOLOGICAL CONSEQUENCES

- The results of the evaluation should demonstrate that the offsite doses are significantly less than values given in 10CFR100 to ensure minimal risk to the public.
  
- Doses for the representative DBAs are evaluated at the ESP Exclusion Area Boundary (EAB) and Low Population Zone (LPZ).
  
- The evaluations use 50 percentile accident X/Qs. The X/Qs are determined using Regulatory Guide 1.145 methods with on-site meteorological data.
  
- Activities released to environs are time-dependent and based on conservative vendor's standard SAR analyses.



**Example Comparison**  
**ESP Environmental Report Limiting Offsite Dose Consequences**

Design Basis Accident	Reactor	Doses (REM TEDE )		Evaluation Basis
		EAB	LPZ	
☐ Loss of Coolant Accident	AP-1000	1.3E+00	1.1E-01	25
	ABWR	2.0E-01	3.2E-01	25
	ACR-700	6.0E-01	2.8E-01	25
☐ Fuel Handling Accident	AP-1000	1.2E-01	6.5E-03	6.25
	ABWR	6.9E-02	8.0E-03	6.25
☐ Main Steam Line Break				
➤ Pre-existing Iodine Spike	AP-1000	3.6E-02	4.6E-03	25
➤ Accident-initiated Iodine Spike		4.1E-02	1.7E-02	2.5
➤ Pre-existing Iodine Spike	ABWR	5.9E-02	2.8E-03	25
➤ Max Equilibrium Iodine Activity		2.9E-03	1.4E-04	2.5



**Example Comparison of Reactor Types for Limiting ESP Offsite Dose Consequences**

Design Basis Accident	Reactor	Doses (REM TEDE )		Evaluation Basis
		EAB	LPZ	
Steam Generator Tube Rupture	AP-1000			
➤ Pre-existing Iodine Spike		1.5E-01	3.7E-03	25
➤ Accident-initiated Iodine Spike		7.6E-02	2.7E-03	2.5
☐ Reactor Coolant Pump Locker Rotor	AP-1000	1.3E-01	6.5E-03	2.5
☐ Control Rod Ejection Accident	AP-1000	1.5E-01	1.9E-02	6.25
☐ Small Line Break	AP-1000	6.6E-02	3.3E-03	2.5
	ABWR	2.5E-03	2.5E-04	2.5

## Generic Topic ESP-07 – Compliance With 10 CFR 52.17(a)(1) 11/19/02

- 1. Issue:** 10 CFR 52.17(a)(1) states in part "...The application must also contain a description and safety assessment of the site on which the facility is to be located. The assessment must contain an analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in Sec.50.34(a)(1) of this chapter. Site characteristics must comply with Part 100 of this chapter." The NRC has questioned how the plant parameters envelope (PPE) approach will comply with these statements in the regulations.

Compliance with 52.17(a)(1) in the ESP application will be accomplished by determining the site X/Q, including the effect of SSCs, if any, that bear significantly on the result.

This issue pertains only to the radiological dose consequences of postulated accidents contained in the safety assessment. The approach for radiological assessment associated with normal operation, postulated and severe accidents in the environmental report, and normal operation in the safety assessment are not discussed in this paper. Similarly, Part 100 prescribes various other siting criteria which are not the subject of this paper.

- 2. Background:** The PPE approach uses a set of bounding reactor parameters as a surrogate for a specific reactor design. This set of parameters is used to prepare the ESP application; its primary use is in evaluating the environmental effects of potential future nuclear reactor(s). The applicant also uses the PPE to provide itself some assurance of the types and number of reactors which could potentially be built on a particular site. The final determination that a particular reactor can be constructed on a particular site is made in a Combined License application.

Compliance with 10 CFR 100.21(c)(2) requires site atmospheric dispersion characteristics be evaluated and dispersion parameters established such that: "Radiological dose consequences of postulated accidents shall meet the criteria set forth in Sec.50.34(a)(1) of this chapter for the type of facility proposed to be located at the site." 10 CFR 52.17(a)(1) requires an analysis and evaluation of the major structures, systems and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in Sec. 50.34(a)(1).

- 3. Discussion:** Compliance with the radiological dose consequence criteria in Sections 100.21 and 50.34(a)(1) for postulated accidents is a requirement under Subpart A, Early Site Permits, Subpart B, Design Certification, and Subpart C, Combined Licenses. While elements of this requirement can be addressed as part of ESP and DC, the determination that radiological dose consequence criteria are met can only be made at COL when both the site and design are known and interface issues can be evaluated.

- An ESP application determines the atmospheric dispersion characteristics for a particular site.
  - A Standard Design Certification application postulates site atmospheric dispersion characteristics ( $X/Q$ ) for a unknown generic site and calculates radiological dose consequences associated with the structures, systems and components of the particular design. This calculation demonstrates that any site with an  $X/Q$  equal to or conservative with respect to the postulated  $X/Q$ , will have dose consequences that meet Section 50.34(a)(1) for the design being certified.
  - A Combined License application integrates a particular site with a specific reactor design and may do so via reference to an ESP and or a DC. If an ESP and DC are referenced, the applicant must provide information sufficient to demonstrate that the design of the facility falls within the parameters specified in the early site permit [Sec. 52.79(a)(1)]. If the postulated  $X/Q$  in the design certification falls within the actual  $X/Q$  in the early site permit, the specific reactor/site combination meets the radiological consequence evaluation factors identified in Sec. 50.34(a)(1). If the postulated  $X/Q$  does not fall within the actual  $X/Q$ , compliance with the radiological criteria must be demonstrated in the Combined License application.
4. **Compliance with Sec. 52.17(a)(1):** As explained above, compliance with the radiological dose consequences in Sec. 50.34(a)(1) as referred to by Sec. 52.17(a)(1) and Sec. 100.21(c)(2) is determined by the integration of the evaluations performed in the Early Site Permit, Standard Design Certification, and Combined License applications.

52.17(a)(1) also states that the ESP safety assessment “must contain an analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in Section 50.34(a)(1)...”

The calculated dose consequences of postulated accidents is dependent on  $X/Q$  (a site characteristic) and release history (a design characteristic):

- $X/Q$  is a function of radiological release point, building wake effects, distance to exclusion area boundary and low population zone boundary, historical meteorological data associated with the site, and atmospheric dispersion models.
- Release History is a function of source term, containment characteristics, filtration system characteristics, other mitigation system characteristics, release timing, and accident type.

For an Early Site Permit application, the acceptability of the site is dependent on the site characteristic of  $X/Q$ , including any assumptions on SSCs that bear significantly on the calculation of  $X/Q$  such as elevated release point, and building locations associated with assumed wake affects. Based on NRC guidance for calculating  $X/Q$ , we expect that for most ESP applicants, there will be no such dependencies on SSCs that affect the calculation of

X/Q. This is true of the pilot ESP applicants, who, consistent with applicable guidance in RG 1.145 for calculating X/Q, are each assuming ground level releases with no wake effects.

For a Standard Design Certification application, the acceptability of the design is dependent on the release history, including any assumptions on SSCs inherent in the calculation of the release history. The accompanying dose calculations postulate a site X/Q which will be compared with an actual site characteristic in a Combined License application.<sup>1</sup>

For a Combined License application, the acceptability of the site/design combination (i.e., meeting Part 100 requirements) is dependent on the site X/Q in the ESP and the release history for the selected design. If the site X/Q is conservative with respect to that postulated in a referenced design certification, then the site/design combination meets Part 100 requirements

5. **Summary:** X/Q is the site characteristic associated with meeting Part 100 requirements, and compliance with Sec. 52.17(a)(1) in the ESP application is accomplished by determining the site X/Q, including the effect of SSCs, if any, that bear significantly on that result. At COL, the site X/Q is combined with the release history information provided in a design certification, or approved during the COL review of an uncertified design, to determine whether Part 100 requirements are met.

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<sup>1</sup> If an ESP application includes release history information for a certified standard design, the integration of x/Q and release history information and the determination that the specified design meets Part 100 requirements can be accomplished at ESP.

## STAFF EXPECTATIONS REGARDING PLANT PARAMETER ENVELOPE (PPE) 11/19/02

### BACKGROUND

The NEI Early Site Permit (ESP ) Task Force (ESPTF) has proposed the use of a bounding Plant Parameter Envelope (PPE) in lieu of any reactor type or preliminary facility information requested in 10 CFR 52.17. This proposal has been presented during the meetings with the NRC beginning in April 2002. The ESPTF has provided examples describing how the ESP applicants would utilize the subject approach. The ESP applications would not reference any specific reactor technology with the intent that the resulting ESP would be applicable to the vast majority of future reactor designs. The bounding PPE values would be accepted as presented by the applicant without further inspection by the NRC staff and they would represent composite parameters not indicative of any specific reactor facility. The NRC staff would be requested to review these PPE values for use in making a determination regarding the acceptability of the proposed site for a possible future construction of a nuclear power plant. Later verification and validation that the actual design chosen for construction on the site was acceptable would occur during the combined license or construction permit stage.

### REQUIRED STANDARDS FOR APPLICATION REVIEW (10 CFR 52.18)

Applications filed under this subpart will be reviewed according to the applicable standards set out in 10 CFR Part 50 and its appendices and Part 100 as they apply to applications for construction permits for nuclear power plants. In particular, the Commission shall prepare an environmental impact statement during review of the application, in accordance with the applicable provisions of 10 CFR Part 51, provided, however, that the draft and final environmental impact statements prepared by the Commission focus on the environmental effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters, and provided further that the statements need not include an assessment of the benefits (for example, need for power) of the proposed action, but must include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed.

### STAFF REVIEW SCOPE

- Site Safety Review (Part 100 and 50.34(a)(1), NUREG-0800)
  1. Seismic Related
  2. Non-Seismic Related ( e.g., Radiological, Security, Hazards)
- Environmental Review (Part 51, NUREG-1555)
- Emergency Preparedness Review (Parts 50 & 52, NUREG-0654)

### REVIEW OBJECTIVES

1. Safety Evaluation Report dispositions whether:
  1. the site being proposed by the ESP applicant meets the site criteria contained in 10 CFR Part 100, such that a reactor having characteristics that fall within the

parameters for the site can be constructed and operated without undue risk to the health and safety of the public; and

2. there is no significant impediment to the development of emergency plans, any major features of emergency plans submitted by the applicant under §52.17(b)(2)(I) are acceptable, and any emergency plans submitted by the applicant under §52.17(b)(2)(ii) provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency for the site being proposed by the ESP applicant.
2. Final Environmental Impact Statement (EIS) focuses on the environmental effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters, including an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed.

Any ESP findings would be subject to finality as described in 10 CFR 52.39.

#### REQUIRED NRC FINDINGS

##### 10 CFR 52.18

- The Commission shall determine, after consultation with the Federal Emergency Management Agency, whether the information required of the applicant by §52.17(b)(1) shows that there is no significant impediment to the development of emergency plans, whether any major features of emergency plans submitted by the applicant under §52.17(b)(2)(I) are acceptable, and whether any emergency plans submitted by the applicant under §52.17(b)(2)(ii) provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.
- The Commission shall prepare an environmental impact statement during review of the application, in accordance with the applicable provisions of 10 CFR part 51, provided, however, that the draft and final environmental impact statements prepared by the Commission focus on the environmental effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters, and provided further that the statements need not include an assessment of the benefits (for example, need for power) of the proposed action, but must include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed.

##### 10 CFR 52.21

- In the hearing, the presiding officer shall also determine whether, taking into consideration the site criteria contained in 10 CFR part 100, a reactor, or reactors, having characteristics that fall within the parameters for the site can be constructed and operated without undue risk to the health and safety of the public.

#### COMMENTS ON PPE APPROACH

The information provided during the meeting with the NEI ESPTF has been helpful to the staff in describing the implementation of the subject approach there remain questions on how the

applicants intend to address some of the remaining issues. However, given the satisfactory resolution of these remaining issues, the staff believes that the applicant can use the following: (1) PPE values to provide surrogate facility information; (2) existing information that can be appropriately justified for use at the proposed site; and (3) other application information developed by the applicant (e.g., site investigations and data, programmatic information) to provide the staff with the necessary information to make a decision regarding the above mentioned findings. It is the staff's expectation that the information contained in the ESP application will address the information requested in the ESP Review Standard now under development. This Standard will reflect the existing regulatory guidance to perform staff reviews in the environmental, site safety, and emergency preparedness areas. The staff does not believe that it is necessary to endorse the PPE values and only intends to use those values to assess the safety and environmental impacts on the site. Any supporting analyses (e.g., ABWR sample calculation in NEI presentation "Use of PPE for Radiological Postulated Design Basis Accidents," discussed at the 9/25/02 Meeting) for the PPE values themselves will be treated for informational purposes only.

## ESP 18A:

# ALTERNATIVE SITE REVIEWS FOR EARLY SITE PERMIT APPLICANTS USING EXISTING LICENSED SITES

## I. INTRODUCTION

This paper discusses and justifies a reasonable approach for considering alternative sites in an Early Site Permit Proceeding (ESP).<sup>1</sup> 10 C.F.R. § 52.17(a)(2) requires an ESP applicant to include in its Environmental Report an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed.<sup>2</sup> As explained in this paper, where ESP applicants, such as the three lead applicants, seek approval of an existing nuclear site for new nuclear units, the evaluation of alternatives should be limited to consideration of other nuclear sites controlled by the applicant, and any other evaluation performed by the applicant (e.g., a generic green-field site, a generic industrial site.)

This scope of evaluation complies with NEPA's standard of reasonableness. The Courts have held that NEPA's requirement to consider alternatives is subject to a rule of reason, and that only those alternatives that serve a private applicant's goals and needs should be considered. While the goals and needs of the public utility applicants who proposed in the 1960s and 1970s to build their first generation of plants may have justified evaluation of a broader range of sites at that time, the goals and needs of today's applicants justify a more focused review. As a practical matter, an applicant for new nuclear units will generally be limited to the expanded use of property it already owns, and the competitive need for economies of scale will strongly militate toward using existing nuclear facilities. Consequently, there should be a strong presumption that new sites do not serve an applicant's need and therefore do not have to be evaluated as alternatives under NEPA.

In addition, there should be a strong presumption that new sites are not "obviously superior" to the expanded use of an existing nuclear site, which has already gone through a previous NEPA review and evaluation of alternatives, and which is already developed and dedicated to nuclear use. A discussion of a generic green-field site and a generic industrial site as described in Section III.B would be provided by the applicant to confirm that there is no reasonable likelihood that such sites will be obviously superior.

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<sup>1</sup> The position in this paper would also apply to a combined Construction and Operating License (COL) proceeding in those cases where an ESP has not been previously obtained.

<sup>2</sup> That standard was first established by the Commission for the evaluation of alternative sites for new nuclear power plants in Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 526-30 (1977). "Obviously superior" was later interpreted also to mean "substantially better." Rochester Gas and Electric Corp. (Stirling Power Project, Nuclear Unit No. 1), CLI-80-23, 11 NRC 731, 737 (1980).

The NRC has long recognized the need to develop new guidance on consideration of alternative sites for new applicants, taking into account the changing nature of the electric industry. In a 1991 Staff Requirements Memorandum on SECY-91-041, Early Site Readiness Review, the Commission stated, "in developing guidance for the review of the early site permit, the staff should consider the need for guidance on the number of alternative sites that must be considered and whether this number would depend on the nature . . . of the ESP applicant permitted under Part 52." While an NRC rulemaking initiative to address this issue became inactive because of other priorities, the NRC reactivated the initiative in 2000 with the objective of commencing a rulemaking in mid FY 2002. Memorandum from W. Travers to the Commissioners, Reconsideration of the Rulemaking Activity Plan: Alternative Site Reviews (RM#313) (Dec. 18, 2000). Clearly, it is time to move forward with an approach that recognizes the changes in the industry and focuses the environmental review so that only those alternative sites that meet a private applicant's goals and needs are examined.

## II. LEGAL STANDARDS

It is well established that NEPA's requirement to examine alternatives is subject to a "rule of reason." NRDC v. Morton, 458 F.2d 827 (D.C. Cir. 1972). This rule of reason requires agencies to consider only "those alternatives necessary to permit a 'reasoned choice.'" City of Angoon v. Hodel, 803 F.2d 1016, 1021 (9<sup>th</sup> Cir. 1986), cert. denied, 484 U.S. 870 (1987); California v. Block, 690 F.2d 753, 767 (9<sup>th</sup> Cir. 1982). "[T]he touchstone . . . is whether an EIS's selection and discussion of alternatives fosters informed decision-making and informed public participation." California v. Block, 690 F.2d at 767.

In Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519 (1978), the Supreme Court explained that alternatives are not self-defining and must be bounded by some notion of feasibility. 435 U.S. at 551. An EIS cannot be found wanting simply because the agency failed to include every alternative device and thought conceivable to the mind of man. Id. at 551. Thus, only reasonable alternatives – alternatives that are ascertainable and reasonably within reach – need be examined. City of Angoon, 803 F.2d at 1022; Druid Hills Civic Ass'n v. Federal Highway Admin., 772 F.2d. 700, 712 (11<sup>th</sup> Cir. 1985), cert. denied, 488 U.S. 819 (1988).

In addition, only alternatives that serve the purpose of the proposed action need be considered. See City of Angoon, 803 F.2d at 1021 ("When the purpose is to accomplish one thing, it makes no sense to consider the alternative ways by which another thing may be achieved."); Trout Unlimited v. Morton, 509 F.2d 1276, 1286 (9<sup>th</sup> Cir. 1974) ("The range of alternatives that must be considered need not extend beyond those reasonably related to the purpose of the project."). See also North Buckhead Civic Ass'n v. Skinner, 903 F.2d 1533, 1542-43 (11<sup>th</sup> Cir. 1990).

In 1991, the U.S. Court of Appeals for the District of Columbia Circuit ruled on an FAA environmental impact statement that considered only the alternatives of approving an airport expansion or not approving the expansion. Citizens Against Burlington v. Busey, 938 F.2d 190 (D.C. Cir.), cert. denied, 502 U.S. 994 (1991). The Court assessed the range of alternatives as follows: "[T]he proposed alternative is reasonable only if it will bring about the ends of the federal action . . . . The goals of an action delimit the universe of the action's reasonable alterna-

alternatives.” Id. at 195 (citations omitted). To support its ruling, the court cited, as an example, a proposed reactor in Vernon, Vermont:

If licensing the Vernon reactor is meant to help supply energy to New England, licensing a reactor in northern New York might make equal sense. If licensing the Vernon reactor is meant as well to stimulate the Vernon job market, licensing a reactor in Lake Placid would be far less effective.

Id. In its example, the court permitted the agency to limit the range of alternatives to be considered to match the purpose and need of its proposed actions.

The FAA described its objectives in this case as follows: “to launch a new cargo hub in Toledo and thereby helping to fuel the Toledo economy.” Id. at 198. The FAA then eliminated three alternatives preliminarily from the EIS, evaluating only the build/no build alternative. The three alternatives excluded from consideration were: approving other geometric configurations for expanding the Toledo airport, approving plans for other airports both in the Toledo metropolitan area and out of it. The court upheld this process as legally sufficient. Furthermore, the court showed great deference to the sponsoring agency in defining its objectives “so long as the objectives that the agency chooses are reasonable” and “so long as the alternatives are reasonable and the agency discusses them in reasonable detail.” Id. at 196.

Moreover, the Court emphasized that where the reviewing agency is considering a private applicant’s proposal, rather than a government project, it is the private applicant’s goals that shape the scope of alternatives to be considered.

The scope of alternatives considered by the sponsoring Federal agency, where the Federal government acts as a proprietor, is wide ranging and comprehensive. Where the Federal government acts, not as proprietor, but to approve and support a project being sponsored by a local government or a private applicant, the Federal agency is necessarily more limited. In the latter instance, the Federal government’s consideration of alternatives may accord substantial weight to the preferences of the applicant and/or sponsor in the siting and design of the project.

Id. at 197; accord City of Grapevine v. DOT, 17 F.3d 1502, 1506 (D.C. Cir.), cert. denied, 513 U.S. 1043 (1994).

Further, the Court stressed that a private applicant’s need and purpose are to be respected:

An agency cannot redefine the goals of the proposal that arouses the call for action; it must evaluate alternative ways of achieving its goals, shaped by the application at issue and by the function that the agency plays in the decisional process. Congress did expect agencies to consider an applicant’s wants when the agency formulates the goals of the proposed action. Congress did not expect

expect agencies to determine for the applicant what the goals of the applicant's proposal should be.

Citizens Against Burlington, 938 F.2d at 199.

These principles are illustrated in City of Angoon. In that case, the Corps of Engineers had prepared an EIS evaluating a proposal by a native tribe to build a log transfer facility on its land. The Court upheld the statement of purpose and need as providing a safe, cost-effective means of transferring timber harvested on the tribe's land to market. 803 F.2d at 1021. Having accepted this statement of purpose, the Court ruled that the EIS did not have to consider as alternatives the possibility that the tribe might be able to exchange its property for land elsewhere. The Court stated that when the purpose is to accomplish one thing, it makes no sense to consider alternative ways by which another thing might be achieved. Id. The Court added, "[t]o require the Corps to select one or more tracts for exchange which, in its view, might induce both an offer and acceptance is to visit upon it a task that would involve almost endless speculation." Id.

The Commission recently addressed the question of the scope of reasonable alternatives and followed the case law discussed above in Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4 (2001), in which it affirmed a licensing board decision regarding a proposed in situ uranium leach mining project.

Agencies need only discuss those alternatives that are reasonable and "will bring about the ends" of the proposed action. "When the purpose is to accomplish one thing, it makes no sense to consider the alternative ways by which another might be achieved."

Id. at 55 (citations omitted). The Commission recognized that the purposes of the project in that case were not merely to provide fuel to nuclear power plants but also to maintain the viability of the domestic uranium mining industry in order to assure a dependable domestic source of uranium; to provide socioeconomic benefits to the local community, the local governments, and the State of New Mexico; and to provide a profit for the license applicant. Id.

The Commission distinguished private projects from Federal projects:

"Where the Federal government acts, not as a proprietor, but to approve . . . a project being sponsored by a local government or private applicant, the Federal agency is necessarily more limited." The NRC is not in the business of crafting broad energy policy involving other agencies and nonlicensee entities. Nor does the initiative to build a nuclear facility or undertake . . . uranium mining belong to the NRC.

When reviewing a discrete license application filed by a private applicant, a federal agency may appropriately "accord substantial weight to the preferences of the applicant and/or sponsor in the citing and design of the project." The agency thus may take into account the "economic goals of the project's sponsor."

Id. (citations omitted). The Commission noted that the applicant proposed to mine in the chosen location because it owned land there in fee simple and that was where the ore body was located. Id. at 56. The alternatives evaluated in this case did not include any alternative sites; rather, they included different levels of mitigation of environmental impacts at the proposed site plus the no action alternative. See Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho, NM 87174), LBP-99-30, 50 NRC 77, 132-33 (1999).

The Commission undertook broader inquiries into electric utility applicants' alternative site analyses for new power plants in the late 1970s, but those cases predated the judicial interpretations of NEPA discussed above and therefore need not be followed. The practices of the 1970s also addressed siting decisions by traditional public utility applicants and are therefore factually distinguishable.<sup>3</sup>

### **III. ALTERNATIVE SITE REVIEW FOR AN ESP APPLICANT SHOULD BE FOCUSED AND LIMITED BY THE APPLICANT'S NEED**

Based on the developments in the law discussed above, the NRC should limit its evaluation of alternatives to those that serve the private applicant's goals and needs. Where the purpose of an applicant for an ESP or COL is to build new units at existing nuclear sites, it makes no sense – and NEPA does not require – consideration of building those units at other locations that the applicant does not control. To attempt to evaluate alternative sites that the applicant would have to acquire (which might well prove impractical or uneconomic), particularly for a merchant applicant with no defined service territory, would involve just the sort of task involving endless speculation that the Courts have indicated is unnecessary.

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<sup>3</sup> While the NRC case law of the 1970's is distinguishable and should not be followed, even some of the old standards established in the 1970s would support limiting review to existing sites. The Commission held that applicants could consider the actual cost of completing the plant at each site, Seabrook, CLI-77-8, 5 NRC at 531-32, thus giving proposed sites near existing infrastructure an advantage over virgin sites. The Appeal Board later held that alternative sites less expensive but more environmentally harmful than the proposed site need not be considered at all. Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-458, 7 NRC 155, 162 (1978). Applicants could also consider the proximity of potential sites to the load centers to be served by the power plants, balancing the load on the electrical transmission system, and potential impacts on grid reliability. Seabrook, CLI-77-8, 5 NRC at 540. Those factors would favor existing power plant sites over virgin sites or other industrial sites. Finally, it held that applicants could consider "possible institutional and legal obstacles associated with construction at an alternat[iv]e site," including, in that case, the lack of franchise privileges and eminent domain powers and the need to restructure existing financial and business relationships. Id. Such factors may make the consideration of entire classes of sites unreasonable. Id. & n.44. Such institutional and legal factors would appear to favor existing nuclear sites very strongly.

## **A. Non-Nuclear Sites Will Not Serve the Applicant's Goals and Needs**

Applicants proposing to build new nuclear plants may have needs and constraints that are very different from those of the public utility applicants in the 1960's and 1970's. These needs and constraints, discussed below, create a strong presumption that only the use of the applicant's existing nuclear sites would serve the applicant's goals.

Applicants may not have powers of eminent domain to acquire new property. Therefore, when proposing to develop new nuclear units, which require an area of considerable size to meet Exclusion Area requirements, the applicants may generally be constrained to use existing sites. It is possible that a very large industrial site might be acquired, but the likely cost and complexity of such an acquisition for a new nuclear generating station makes this possibility very remote.

Such applicants can only proceed with the development of a new nuclear plant if it is economic. They cannot recover their construction costs through cost-of-service rates and therefore do not have the luxury of selecting and developing new sites. Rather, obtaining economies of scale by sharing the resources and infrastructure of an existing nuclear site may be critical to the economic viability of the project and to the competitiveness of the applicant. In general, a multi-unit site will have a substantial cost advantage over a single unit station. Developing a new nuclear plant at a fossil station or at an industrial site would not provide the same economies of scale, because such a site would not offer the trained nuclear work force or nuclear facilities. For example, establishing offsite emergency planning and preparedness at an industrial or fossil plant would be a considerable expense that could be avoided by using an existing nuclear site.

Use of an existing nuclear site also offers a considerable opportunity for reduced construction costs. An enormous amount of information needed to characterize the site will already exist. In addition, use of an existing site is much more likely to be supported by the local populace and government. Political acceptance of a new nuclear plant will be very important for the applicant because the potential for the types of delays that occurred at some plant sites in the past is simply incompatible with modern-day business needs.

Applicants may not serve established service territories. Therefore, they seek to add capacity at locations that serve market opportunities, consistent with the constraints of the transmission system and the economics of the project. Thus, the siting decisions of the applicants are fundamental business decisions driven by the market and finances, rather than franchise decisions established for the public convenience and necessity. This is just the type of private business decision to which the agency should defer.<sup>4</sup>

## **B. Non-Nuclear Sites Are Unlikely to Be Obviously Superior**

The fact that an existing nuclear site has already gone through the NEPA process creates a strong presumption that there are no obviously superior alternative sites. In connection with

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<sup>4</sup> As a practical matter, ignoring the applicant's business judgment could lead to a limitless evaluation of alternative sites because the applicant has no service territory defining the geographic region of interest.

the original selection and licensing, existing sites will already have gone through a screening and evaluation process establishing their suitability, including, for most, a NEPA evaluation of alternatives. The original siting studies were extensive and resulted in the selection and development of the sites chosen, and, absent new and significant information, it is highly unlikely that there are obviously superior alternatives.

In addition, an existing nuclear site is already developed and dedicated to nuclear use. It is hard to conceive of a situation where the construction of new nuclear units at a green-field site would be environmentally superior to the expanded use of an existing nuclear site. It also seems unlikely that development of a non-nuclear industrial site, lacking the necessary infrastructure, could be an "obviously superior" alternative to the expanded use of an existing nuclear site.<sup>5</sup>

These factors greatly distinguish a proposal to site new units at an existing nuclear facility from the applications that were submitted decades ago for first generation plants at pristine locations. Accordingly, the need to evaluate a broad slate of sites no longer exists when an ESP application proposes to use an existing nuclear site. At most, a comparison of the existing site against a generic green-field site and a generic industrial site may be appropriate, to confirm the absence of any anomalous characteristics that might alter the presumption that no obviously superior sites exist.<sup>6</sup>

#### IV. CONCLUSION

For all of these reasons, the NRC should limit its consideration of alternative sites to existing nuclear sites controlled by the applicant, coupled with the applicant's discussion of ge-

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<sup>5</sup> Even in cases dealing with the construction of the first generation of plants, the NRC recognized that a proposal to use an existing site is a significant factor, though not dispositive. Rochester Gas & Electric Corp. (Stirling Power Project, Nuclear Unit No. 1), ALAB-502, 8 N.R.C. 383, 394-95 (1978), citing Boston Edison Co. (Pilgrim Nuclear Generating Station, Unit 2), ALAB-479, 7 N.R.C. 774, 789 (1978). Stirling was unique in that the intervenors were arguing for an existing site while the applicant was arguing for a virgin site. Thus, the factor favoring the applicant's preference was counterbalancing the factors favoring existing sites—a situation unlikely to recur today.

<sup>6</sup> For many years, the Commission's practice was to not initiate an extensive review of an applicant's site selection process unless substantial inferior qualities were identified at the applicant's proposed site. 45 Fed. Reg. 24,168 (1980). In the late 1970s, however, the NRC "dramatically expanded its review of the applicant's site selection process and procedures, as well as its review of the scope and depth of the detailed investigation of alternative sites." Id. The change in the nature of the industry, and the changes in interpretation of NEPA that occurred after the environmental reviews for the current generation of plants, now justify a return to the practice of limiting review in the absence of any significant, environmentally negative characteristic of the applicant's proposed site. An agency is not required under NEPA to consider alternatives when such consideration would serve no purpose. NRDC. v. SEC, 606 F.2d 1031, 1054 (D.C. Cir. 1979); Citizens Comm. Against Interstate Route 675 v. Lewis, 542 F. Supp. 496, 540 (S. D. Ohio 1982).

generic green-field and industrial sites to confirm the presumption that no obviously superior site exists. This approach would focus the review of alternative sites on those serving the private applicant's needs, consistent with the most recent court decisions. The review would also be focused on those sites that a reasonable person would clearly favor. The approach would similarly result in a more efficient, meaningful and reasonable review by avoiding a wasteful evaluation of alternatives that an applicant has no intention, means or wish to develop.

The NRC and Congress have both recognized the need to improve the efficiency and reliability of the NRC licensing process. This objective is all the more important for the next generation of plants because applicants relying on private financing simply cannot afford to participate in some of the protracted proceedings of the past. Respecting the applicant's business needs and judgment will provide some of the certainty that is required for development of the next generation of plants to proceed. In contrast, launching into a far-reaching evaluation of alternative sites, second-guessing an applicant's choice after the applicant has devoted the time and resources necessary to prepare its application, would be an unnecessary obstacle to efficient and predictable licensing, and would also be inconsistent with NEPA's rule of reason.

The staff would request that the upcoming Plant Parameter Envelope (PPE) White Paper address how the following information needs (highlighted) would be provided in the subject approach:

- **the sequences of hypothetical bounding design basis accident (DBA) event for each specific reactor type.**  
Such DBA should be assumed to result in substantial meltdown of the reactor core (a major reactor accident) with subsequent release of appreciable quantities of fission products to the environment. For example, the loss-of-coolant accident is typically the maximum credible accident associated with the light-water reactor design.
- **the reactor accident source term.**  
The source terms are expressed in terms of times and rates of fission product appearance, the types and quantities, and the chemical forms of fission product released.
- **the quantities and release rates of each fission product nuclide released from the site to the environment for the postulated bounding DBA.**
- **The site specific atmospheric dispersion factors ( $\chi/Q$  values) for the exclusion area boundary and the low population zone.**
- **the calculated doses from all postulated fission product release pathways resulting from the hypothetical bounding DBA event assumed from the site to confirm the acceptability of the nearest exclusion area boundary and low population zone outer boundary.**

**Questions for NEI Regarding  
ESP Applications (E-mailed 11/26/02)**

**Questions on ESP Applications Using the Plant Parameter Envelope (PPE) Approach**

1. Is the ESP applicant going to provide the information described in NEI-01-02 (September 28, 2001) in the Environmental Report (ER)? If so, how would the PPE approach be interleaved with the balance of the information (in addition to the site characteristics) needed to address the content of application requirements?
2. For certain impact analyses, an ESP applicant could propose a range of values or request review of 2 or more options instead of proposing the PPE values. Example: The applicant could propose to use either mechanical draft cooling towers or natural draft cooling towers in its application. Is there any intention to apply this approach in the ER and in what areas?
3. NEI indicated that it is going to submit the bases for PPE values; will this be shared publicly or will just the staff be provided with access to this information? If the values proposed by an ESP applicant are not bounded by the NEI proposed values, is the applicant going to describe the bases for the difference?
4. What type of surrogate values and in what areas does the ESP applicant intend to use surrogates to provide sufficient information to perform environmental analyses? As examples, surrogates could be used for determining the source term for design basis or severe accident considerations, release quantities (in Curies) of radionuclides for normal operation evaluation, or employee data for the socioeconomic evaluation.
5. The staff raised concerns during previous meetings regarding whether the ABWR source term is a bounding surrogate for all plants that NEI has proposed to be included in the PPE. Does NEI still intend to use this source term as the bounding surrogate, or has it chosen to use a different surrogate or approach to address this matter? How does NEI intend to address the differences between LWR and non-LWR reactor source terms in the surrogate it selects? What insights does NEI have to offer to reconcile the staff concerns?
6. How will the ESP applicant supplement the PPE values in the ER in order to assess known effects of specific design features on the environment? For example, how will the ESP applicant address scouring, dredging, turbidity, and silt buildup without a design of the intake and discharge structures? Or how will the ESP applicant estimate the impacts of an elevated vapor plume or drift deposition rates without knowing the design of the cooling tower?
7. Matters considered in the socioeconomic impact evaluation include estimated tax or cost revenue information, the projected time frame of operation, capital and O&M expenditures, and effects of generating efficiency. In addition, the evaluation for determining whether another site is obviously superior to the proposed site is a two-part test based on whether there is an environmentally preferable site, and if so, determining whether another site is superior based on a comparison of the estimated costs (environmental, economic, and time). How will the ESP applicant address these matters in conjunction with the PPE values in the ER to provide an estimate of this information

for the socioeconomic impact evaluation?

8. How will the ESP applicant supplement the PPE values in the ER in order to assess key consequence and impacts assessments, such as construction impacts, release of chlorine and biocides, etc.?
9. The staff has expressed concerns that the alternatives considerations and mitigation of environmental impacts may be complicated by use of the PPE approach. Is NEI aware of any precedents for this type of approach used in other regulatory arenas where detailed information is not available to support consequence or impact analyses, or consideration of mitigation strategies or alternatives? If so, how have applicants or those preparing NEPA documents dealt with the limited scope of approvals? For example, deferral of final approval to a later stage in the process?
10. Does the suite of parameters envisioned for the PPE constitute the full set of information to describe the major structures, systems, and components necessary for the assessments on the part of the applicant or will each applicant have to supplement the PPE to complete the assessment?

#### **Questions on Any ESP Application**

1. Discuss the ESP applicant's concerns regarding acquisition of transmission line corridor information if the applicant does not own corridors. Is the information available, but just difficult to obtain from the owner?
2. How and when does the ESP applicant intend to engage the local, State, and Federal permitting authorities regarding future needs for permits?
3. What is the extent of permission that may be sought for the conduct of work under a limited work authorization? For example, would ESP applicants seek to construct transmission lines (principally for a greenfield site) under a LWA-1 and, if so, what would a meaningful redress plan include?

## Generic ESP Topic: Environmental Impact Mitigation Alternatives

### Background:

The NRC staff has asked the ESP applicants to discuss how environmental impact mitigation alternatives will be considered in the ESP applications.

### Concern:

In the absence of detailed design information at ESP, applicants are planning to use the Plant Parameters Envelope (PPE) approach to provide a surrogate for plant design information. The NRC staff has asked for clarification on how design alternatives might be treated in order to examine possible mitigation of environmental impacts of plant construction and operation using the PPE approach.

### Industry Approach:

The consideration of environmental impact mitigation alternatives is not directly related to the use of the PPE approach. The PPE approach provides a basis for quantifying potential environmental impacts and evaluating overall site suitability. To address issues associated with design and mitigation alternatives, additional information beyond that contained in the PPE may be necessary and would be provided in ESP applications.

Each ESP applicant will be responsible for evaluating overall environmental impact of construction and operation. The applicants will determine the range of design alternatives to be considered at the ESP stage to provide an adequate characterization of environmental impacts. Applicants will evaluate the environmental impacts from the range of alternatives considered and select the alternative that provides the most cost beneficial design alternative for the identified level of environmental impact. Where no environmentally preferable alternative is identified, it will be unnecessary to select and specify an alternative at ESP.

For example, an ESP applicant may consider a range of alternatives for discharging water back to the environment. Alternatives considered might include an outfall structure, a submerged pipe discharging to the receiving body, or a diffuser pipe discharging to the receiving body. The ESP applicant would evaluate the anticipated environmental impact from each alternative. If there is no environmentally preferred alternative among the alternatives considered, then the ESP would impose no constraints on which alternative would be used.

ESP applicants are responsible for evaluating mitigation strategies for significant environmental impacts from construction and operation. In those cases where environmental impacts are determined to be insignificant, there is no need to evaluate possible mitigation alternatives.

**COMMENTS REGARDING "ENVIRO IMPACT MITIGATION ALTERNATIVES" NEI  
DOCUMENT**

ESP applicants are responsible for evaluating mitigation strategies for significant environmental impacts from construction and operation. In those cases where environmental impacts are determined to be insignificant, there is no need to evaluate possible mitigation alternatives." This is the problem statement. The regulations do not specify "significant", so that the concept that it is not necessary to consider mitigation for "insignificant" impacts is not correct.



**ESP-8**

**Methodology for Estimating Fuel Cycle and  
Transportation Environmental Impacts for  
Early Site Permit Applications**

December 5, 2002



# ESP-8 Objectives

- Update NRC staff on industry's Tables S-3/S-4 initiative
- Original update intended to provide preliminary results
- Due to revised (earlier) meeting date, this briefing provides additional details regarding methodology
- This briefing also describes approach if certain assumptions in existing tables do not initially bound new technologies



# Proposed Methodology for Determining Fuel Cycle Environmental Impacts

- Determine fuel cycle requirements [uranium, enrichment, transportation] for range of technologies considered by ESP applications
- Compare fuel cycle requirements to those used to develop Tables S3 and S4
- Where the fuel cycle requirements are lower than the conditions assumed to develop Tables S3 and S4, use the current table impacts for the environmental evaluation
- Where any fuel cycle requirements are higher than the conditions assumed to develop Tables S3 and S4, evaluate potential impacts along with other fuel cycle technology changes that may have reduced environmental impacts

# 10 CFR 51.51, Table S-3

- Table S-3 developed based on fuel requirements for a model 1000 MWe LWR
- Uranium, SWU, and transport requirements will be compared with the values used as basis of current Table S-3 for the same energy output
- Technology improvements that have tended to reduce environmental impacts may offset any increase in fuel cycle and transportation requirements

# Fuel Cycle Technology Changes

- Higher fuel burnup
  - Reduces average annual fuel loading [lower number of fuel assemblies at higher enrichment]
  - Generally reduces average annual uranium ore requirements, but may slightly increase SWU
- Higher Operating Plant Capacity Factor
  - Increases both energy production and fuel requirements
- Improved enrichment processes
  - Lower emissions from electric generation
  - Improved energy efficiency [especially for centrifuge enrichment technology]
- No spent fuel reprocessing expected

# 10 CFR 51.52, Table S-4

- Current Table S-4 is based on the transportation of fuel and waste to and from a 1100 MWe LWR subject to the following conditions
  - Core power not to exceed 3,800 MWt
  - Uranium dioxide pellets of less than 4% enrichment encapsulated in zircaloy rods
  - Average irradiation of no more than 33,000 megawatt-days per metric ton, and no assembly shipped until at least 90 days after discharge

## 10 CFR 51.52, Table S-4 (cont.)

- The number, modes, types and radioactive inventories of shipments of spent fuel and wastes will be determined for a range of reactor technologies and compared to the values used as a basis of current Table S-4 for the same energy output
- Any increases of these values will be evaluated
- Technology improvements have tended to reduce transportation environmental impacts and may offset any changes in transportation conditions

# Changes in Fuel Cycle Transportation Technology

- Higher fuel burnup reduces spent fuel generation and reduces quantity of spent fuel
- New fuel types do not all use zircaloy rods
- Longer cooling time after discharge [minimum of 5 years - average of over 10 years] reduces source term at transport
- Transport casks for new fuel types and higher burnup fuel must meet same normal and accident dose limits

Background:

The difference in permit length of 10 years between a 10 and 20 year permit duration effectively extends the time frame that must be addressed in the ESP application from 50 to 60 calendar years, after adding the 40 year operating life of the reactor to be built to the ESP permit duration.

The NRC staff previously stated that during the rulemaking of 10 CFR Part 52, there was a request to specify a minimum and maximum duration for the ESP. The staff indicated that the basis for granting an ESP might be subject to changing conditions over time (for example, zoning). Additional consideration by the staff that may result in limiting the duration of the ESP includes the level of information provided in the application, how well information is known, and the potential for parameters to change over time. The staff expects the applicant to specify the duration for an ESP that it is seeking.

Concern:

Criteria for determining ESP duration is not contained in NRC guidance.

Industry Approach:

- \* The three pilot ESP applicants will each request a 20 year permit duration.
- \* The three pilot ESP applicants will project population changes to envelop the projected 20 year duration of the ESP.
- \* Other site characteristics, such as meteorology and seismology, do not change in the short time frame of 10 years.
- \* 10 CFR Part 52 specifically includes provisions that require significant changes to be evaluated in a Combined License proceeding that references an ESP. This provides appropriate recourse for addressing changes such as changes in land use and zoning around the site, construction of new industrial facilities, or existence of new and previously unanalyzed hazards. The potential for changes in conditions around the site should not impact the permit duration.

## Generic Topic ESP-12, NEPA Consideration of Severe Accidents (revised title)

### Background:

NRC's implementation of NEPA requires an analysis of severe accidents and for severe accident mitigation alternatives SAMAs. Guidance for these analyses is provided in NUREG-1555, Sections 7.2 and 7.3.

### Issue:

At issue is the extent to which NEPA consideration of severe accidents and the associated design and process alternatives for mitigation of such severe accidents is to be addressed as part of ESP. The industry has concluded that NEPA consideration of severe accident issues is addressed as part of design certification and/or combined license proceedings, not at ESP.

### Discussion:

Typically, severe accident issues are addressed as part of the design review and approval of standard design certifications. As stated in each of the design certification rules,

"[T]he Commission considers the following matters resolved [for purposes of future proceedings] involving plants referencing this appendix ... [A]ll environmental issues concerning severe accident mitigation design alternatives associated with the information in the NRC's final environmental assessment for the [design] ... for plants referencing this appendix whose site parameters are within those specified in the Technical Support Document."

Consideration of severe accidents and associated mitigation alternatives has been clearly defined as a design issue and is not practicable in ESP applications for which a specific design has not been chosen. In particular, the three pilot applicants have not selected a reactor technology and do not have sufficient design information to evaluate severe accidents and the associated mitigation alternatives. NEPA consideration of severe accident issues will be addressed at the COL stage to the extent not addressed in a referenced design certification.

At COL, if the applicants utilize an approved standard design, "all environmental issues concerning severe accident mitigation design alternatives" will be considered resolved pursuant to the limitations of the standard design certification and 10 CFR 52.63. The industry understands this to include the severe accident environmental evaluations of NUREG-1555, Section 7.2, "Severe Accidents," as well as Section 7.3, "Severe Accident Mitigation Alternatives." If an approved standard design is not referenced, the resolution of severe accident issues under NEPA would be accomplished as part of the COL proceeding.

### History:

1/10/02, NEI raised a question concerning how to perform a SAMA review if the design was not yet determined.

1/10/02, NRC staff indicated that the applicant is going to have to make some type of projection concerning the design of the plant, but agreed to continue to discuss this issue.

7/16/02, NEI distributed draft ESP-12 approach statement during the meeting.

8/19/02, NRC staff provided a response (via e-mail) to the NEI ESPTF draft ESP-12 approach statement distributed during the July 16, 2002 meeting.

8/22/02, NRC & NEI agreed that the staff would seek to perform SAMA analyses if the detail of the information available in the ESP application supported such analyses, i.e., the design details were provided. However, NEI and the pilot applicants continue to indicate sufficient design details may not be available in the applications utilizing a PPE approach, and that SAMA evaluations would have to be deferred to COL stage. Therefore, further discussion on this topic will be deferred until the resolution of the PPE issue (ESP-6).

11/19/02, For discussion on December 5, NEI provided a revised ESP-12 topic summary which reflects the industry conclusion that NEPA consideration of severe accidents and associated mitigation alternatives will be accomplished at DC and/or COL, not at ESP.

Revised August 21, 2002

[ELECTRICITY PRODUCTION COMPANY]  
DOCKET NO. 52-[###]  
[FUTURE NUCLEAR POWER SITE]  
EARLY SITE PERMIT

Early Site Permit No. ESP-[001]

*{Based on old construction permit wording and current Part 52 regulations}*

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for an early site permit filed by [Electricity Production Company] (the Applicant) complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in Title 10, Chapter I, Code of Federal Regulations (10 CFR), and all required notifications to other agencies or bodies have been duly made;  
  
*{Based on §52.24}*
  - B. The Applicant has sufficiently identified and assessed the site characteristics pertinent to the protection of the health and safety of the public and assessment of environmental impacts for the [Future Nuclear Power Site] (the site);
  - C. The Applicant has defined a sufficient set of ~~postulated~~ design parameters for purposes of assessing the safety and environmental impacts of a future nuclear facility or facilities having characteristics that fall within the set of design parameters defined in the application;  
  
*{Based on §52.17}*
  - D. On the basis of the foregoing, there is reasonable assurance that, taking into consideration the site criteria contained in 10 CFR Part 100, "Reactor Site Criteria," a reactor, or reactors, having characteristics that fall within the ~~postulated~~ site characteristics and design parameters in the application can be constructed and operated without undue risk to the health and safety of the public;  
  
*{Based on §§52.21, 52.18, and 52.17(a)(1)}*
  - E. The issuance of this early site permit will not be inimical to the common defense and security or to the health and safety of the public; and

*{Standard permit and license wording per §103 of the Act}*

- F. There is no significant impediment to the development of any emergency plan;

**alternatively include, (Option 1)**

and major features of the emergency plans submitted by the Applicant are acceptable;

**alternatively include, (Option 2)**

and the emergency plans submitted by the Applicant provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

*{Based on §§52.18 and 52.17(b)(1) and (2)}*

- G. After considering the environmental review of the site, including effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site characteristics and design parameters and the evaluation of alternative sites\* presented in the application, the issuance of this early site permit is in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and all applicable requirements have been satisfied.

*{Based on §§52.18 and 52.17(a)(2)}*

*\*reflects current 52.17(a)(2) requirement; Petition for Rulemaking PRM-52-2 is pending as discussed in cover letter*

2. Based on the foregoing findings regarding the site, pursuant to Section 103 of the Act, and 10 CFR Part 52, Subpart A, "Early Site Permits," [and pursuant to the Atomic Safety and Licensing Board's Initial Decision, dated [month, day, year],] the Commission hereby issues Early Site Permit No. ESP-[001] to [Electricity Production Company] for the site in [Town, County, State].
3. This permit shall be subject to all applicable provisions of the Act, and rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the conditions, terms, and limitations specified or incorporated below:
- A. [Electricity Production Company] is authorized to perform activities at the site allowed by 10 CFR 50.10(e)(1) as described in its application; [alternative: No authority to perform activities at the site allowed by 10 CFR 50.10(e)(1) is granted; and

*{Based on §52.25}*

- B. References to this early site permit shall be deemed to include the site characteristics and ~~postulated~~ design parameters identified in the permit application.

*{Based on §52.24 – Reflects proposed language in May 8, 2002, redline draft proposed rule}*

4. Except as provided in 10 CFR 52.25(b) and 52.27 (b) and (c), this permit expires on [20 years after issuance];

*{Based on §§ 52.25(b) and 52.27(a)}*

5. This permit is effective as of its date of issuance and shall expire as set forth in paragraph 4.

FOR THE NUCLEAR REGULATORY COMMISSION

Director, Division  
Office of Nuclear Reactor Regulation

Date of Issuance: [Month day, year]

## ESP-3 Quality Assurance (QA) Requirements for an ESP Application

Issue: Industry has advanced the position that ESP may apply 10 CFR Part 50, Appendix B, or they may apply non-Appendix B alternative quality processes. (See associated White Paper on ESP-3)

### Staff

Position: The staff is required under 10 CFR 52.18, *Standards for review of applications*, to review ESP applications according to the applicable standards set out in 10 CFR Part 50 and its appendices as they apply to construction permits under Part 50. The applicable ESP review areas are site safety, environmental impact and emergency preparedness. As noted in the Industry White Paper, appropriate quality assurance is necessary in order to facilitate efficient staff review. The staff does not hold that ESP applicants are required to have an Appendix B Program.

The staff intends to assess the ESP applicant's QA program to ensure that the appropriate QA elements are in place in order (1) to establish a baseline for future use during the COL process and (2) to assess any potential impact on the staff's findings. For example, we will use Appendix B to guide us in the assessment of the quality assurance used to develop site safety application information.

The site safety review area contains information (i.e., analyses, data) materially important to the satisfactory performance of safety-related structures, systems and components (SSCs) for a future reactor or reactors to be operated without undue risk to the health and safety of the public at the subject site. Because of the finality of the issues resolved as part the ESP process, the staff must assure as part of our review that the appropriate quality assurance elements for the site safety information are in place consistent with a comparable review of a construction permit applicant.

So to summarize, the staff intends to assess the ESP applicant's QA program to ensure that the appropriate QA elements are in place in order (1) to establish a baseline for future use during the COL process and (2) to assess any potential impact on the staff's findings. The staff will utilize Appendix B as necessary in order to guide us in that assessment.