WASH 1341

PROGRAMMATIC INFORMATION FOR THE LICENSING OF STANDARDIZED NUCLEAR POWER PLANTS

U. S. ATOMIC ENERGY COMMISSION
REGULATION
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ABSTRACT

This document provides additional guidance by the Regulatory staff regarding the implementation of Options 1 (standard design) and 2 (duplicate plants) of the AEC's standardization policy for nuclear power plants. It presents a discussion of the standardization policy and includes the various aspects of the Regulatory processing of standard designs and duplicate plant designs. It also presents the current status of standardization application submittals.

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DEFINITION OF TERMS

BOP	- Balance-of-plant that includes all systems, structures, and components to comprise a total plant that are not included in the NSSS.
BOP applicant	- An applicant who submits a standard design for a "balance of plant" (BOP), generally an architect-engineering firm.
Custom plant	- A nuclear plant that is subject to complete review because of variations in design from prior plants or standard designs.
FDA	- Final Design Approval.
Utility-user	- A utility applicant who choses to incorporate physically or by reference a standard NSSS and/or BOP design in his application for licenses.
NSSS	- Nuclear steam supply system that includes components and piping within the reactor coolant pressure boundary and directly related auxiliary systems; corresponds to the usual NSSS scope of design.
NSSS applicant	- An applicant who submits a standard design for a nuclear steam supply system (NSSS), a reactor vendor.

Nuclear island	- A portion of a nuclear plant that includes the NSSS, engineered safety features, and associated auxiliary systems.
PDA	- Preliminary Design Approval.
SER	- Safety Evaluation Report.
SSAR	- Standard Safety Analysis Report.

I. STANDARDIZATION POLICY

The initial AEC policy statement on standardization of nuclear power plants was issued on April 28, 1972. It provided the impetus for both industry and the AEC to initiate active planning in their respective areas in order to realize the benefits of standardization while maintaining protection for the health and safety of the public and for the environment. These benefits were visualized to consist of better utilization of successful experience on nuclear plants already operational or under construction, improved focus of safety-related R&D activities, and more efficient use of available resources in industry and Government. In this statement, the AEC also encouraged and promised AEC assistance in the development and adoption of industry-wide nuclear engineering codes and standards. The full text of the April 28 statement is given in Appendix A to this document.

In a subsequent statement issued on March 5, 1973, the AEC announced its intent to implement a standardization policy for nuclear power plants. A discussion of the background and Regulatory philosophy which resulted in the evolvement of the standardization policy, and of the methods for achieving standardization is given in the attachment to the March 5 statement. These statements are attached as Appendices B and C to this document.

The standardization policy presents three procedural options for standardization applications as follows:

Option 1 - A "reference system" concept that involves the review of an entire facility design or major fractions of a facility design outside of the context of a license application. The standard design would be referenced

in subsequent license applications. (10 CFR Part 50, Appendix O, proposed, dated April 16, 1974)

Option 2 - A "duplicate plant" concept in which a limited number of duplicate plants are to be constructed within a limited time span. All the duplicate plants would be reviewed simultaneously by the staff. This option also provides for the replication of plant designs, a subject scheduled for additional Commission description. (10 CFR Part 50, Appendix N, proposed, dated April 16, 1974)

Option 3 - A "License to Manufacture" concept in which a number of identical plants would be manufactured at one location and moved to a different location for operation. (10 CFR Part 50, Appendix M, dated November 5, 1973)

The Commission policy statement on standardization dated March 5, 1973 placed an upper limit on license reactor power level. This limit of 3800 MW thermal has been implemented in Regulatory Guide 1.49 and Revision 1. Revision 1 of this guide is attached as Appendix D to this document.

Implementation of the AEC's standardization policy by the Regulatory staff has necessitated consideration of the effect of reviews of standardization applications on the licensing process. A number of these effects have been identified; they are discussed in Chapter II of this document. Regulatory organizational considerations for standardization and the current status of standardization application submittals, under review and anticipated for submittal in the near future are presented in Chapter III.

Only Options 1 and 2 of the policy are addressed in this document. Less attention is devoted to Option 2 since it does not present a significant departure from the procedures currently in use for licensing nuclear power plants. Replication of custom plant designs, considered to be an alternate interim approach to standardization, will be discussed in a separate document.

II. IMPLEMENTATION OF THE STANDARDIZATION POLICY

This chapter presents further definition for several aspects of standardization and describes acceptable approaches for the implementation of the Commission's standardization policy.

A. Mechanics of the Review

The reviews of SSARs submitted under Option 1 will be generally similar to those of Safety Analysis Reports (SAR) for custom plants. As in the case of a PSAR, a preliminary SSAR must include all the information identified in "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants" and in information guides (Regulatory Guides 1.70.X) currently being issued to update this document, in those areas included within the scope of the standard design. The preliminary SSAR must also undergo an acceptance review for completeness, and the technical content must satisfy the Regulations and must address the provisions in the Regulatory Guides.

1. Phases of the Licensing Review

A standard design consists of an NSSS, a BOP, a nuclear island, or a total plant. The review of the standard design as described in an SSAR will be carried out by the staff using a similar procedural sequence as is used for custom plant reviews. This is shown in Figure 1.

The initial phase is analogous to the normal construction permit stage of review except that the conclusion of the review does not result in the granting of a construction permit. Instead, a Preliminary Design Approval (PDA) is issued following the completion of the staff and ACRS reviews.

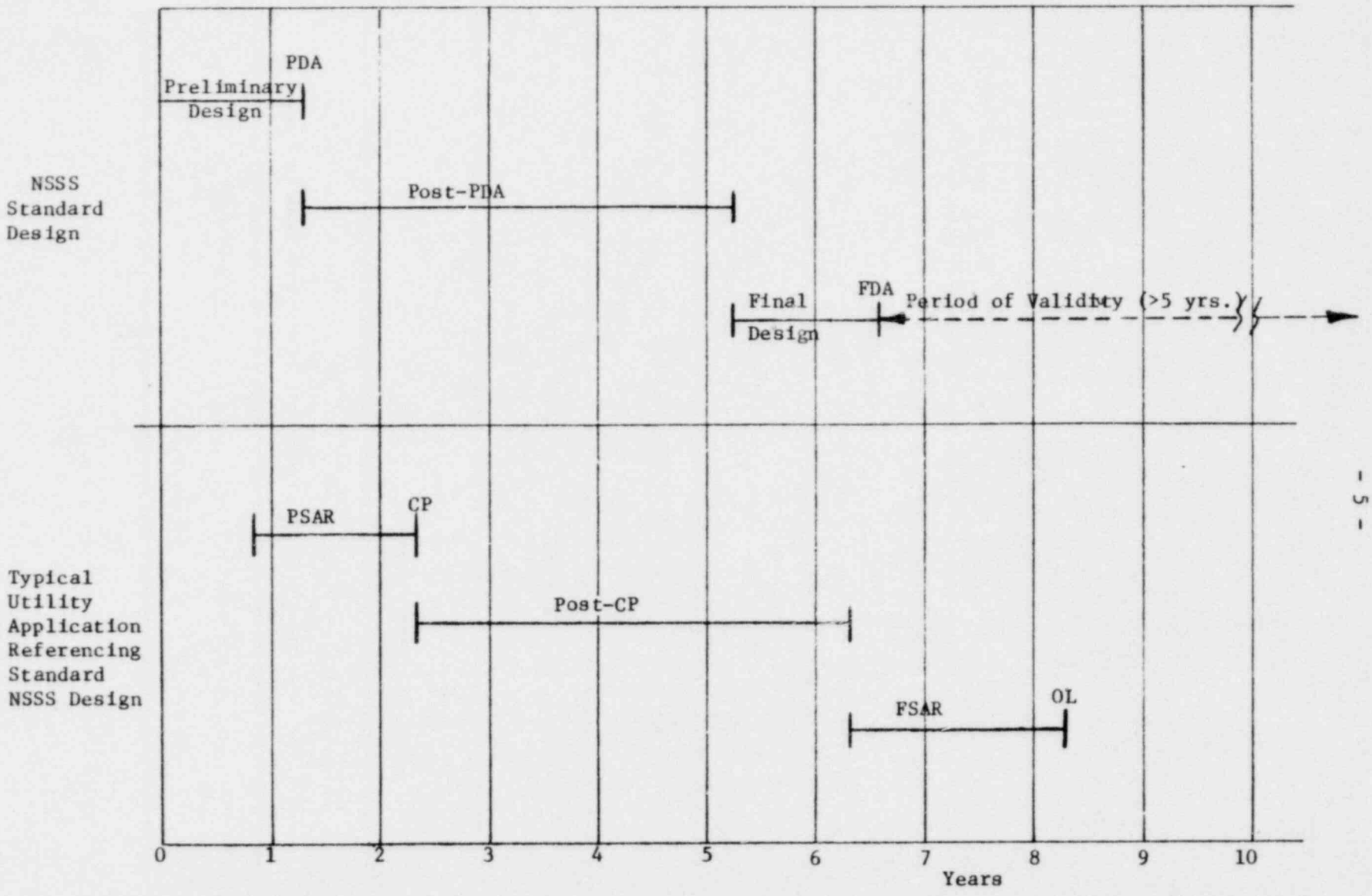


Figure 1
Phases of Licensing Review

Applications for licenses may be submitted by utilities for specific plants that utilize a standard design by making an appropriate reference to the standard design docket. Such applications may reference a standard design after it has been docketed by the staff for the preliminary design phase of review. In using this procedure, the utility is committed to accepting whatever modifications may evolve during the staff review of the standard design, and is expected to maintain that commitment at least until the construction permit is issued. It should be noted that issuance of the SER for the utility application must await the completion of the review of the referenced standard design, since those review results become a part of the staff conclusions for the utility application.

The situation for a utility-user that references standard designs for both the NSSS and the BOP is shown in Figure 2. The staff review for safety will normally entail only the site itself, and the area of interfaces among the standard designs and the site.

It is anticipated that standard designs may include a number of features that are novel or different from prior designs in order to provide improvements. This arises from the desire of standard design applicants to modernize their designs, since the design, once approved, will remain static for a relatively long period of time. These new features will very likely require experimental and/or analytical verification to provide the needed confidence in the design. The results of the verification effort must then be translated into a preliminary design which is submitted for staff review. It is likely that this sequence of events will extend into the post-design approval phase. Note that for these features appropriate criteria plus commitments for

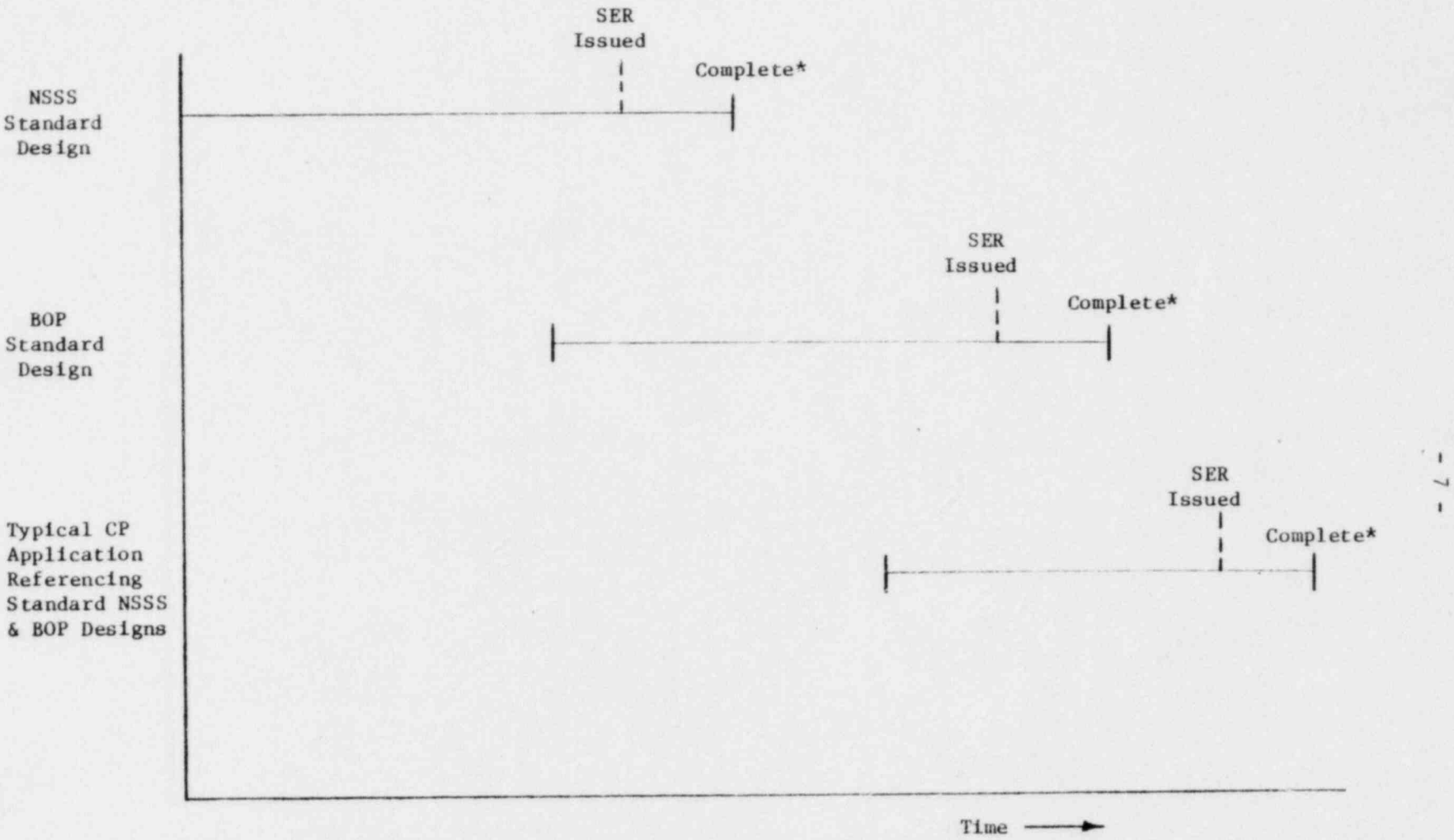


Figure 2
Relationship Between Reviews of Standard
NSSS and BOP Designs and a CP Application

*Issuance of Supplemental SER

additional design detail are necessary in the PDA stage of review. Also, any needed research and development to verify such features must be described as required by the Commission's rules. It is anticipated therefore that a fairly heavy review effort by the staff may be necessary during the post preliminary design approval phase.

The staff will process such post-PDA review items in the context of the standard design docket. Utility-users who reference the standard design are expected to incorporate the resolutions of such items into their plant designs. It is obviously desirable to minimize the number and extent of such items to avoid uncertainties and possible delays in the schedule for construction of the plants referencing a standard design.

A standard design receiving preliminary design approval will be available for referencing by utility-users for construction permits without re-review by the staff except in the following areas:

a. As noted previously, any items not resolved in the preliminary design review phase must be treated as soon as the standard design applicant can supply the needed information.

b. All site-specific areas including interfaces must be considered in the license application.

c. Any significant safety issues arising subsequent to the PDA must be resolved, and appropriate measures incorporated in the standard design. These measures must be adopted by utility-users currently adopting the standard design, as well as by construction permit holders who referenced the standard design in their applications for licenses. Backfit considerations (10 CFR 50.109) would apply to these changes.

d. At an agreed-upon interval (e.g., about every two years), the standard design applicant may propose modifications to the design, and the staff may require the adoption of new codes or changes to existing codes, Regulatory Guides, and other Regulatory positions issued after the PDA. These "updating" items would be discussed and, as appropriate courses of action were determined in each case, amendments would be made to the standard design docket and supplementary staff safety evaluations issued. The "updating" items would not, in general, apply to utility applications (at the PSAR stage) docketed before the formal adoption of these items into the standard design.

e. Any requirements arising from AEC rules or directives promulgated after the PDA would have to be incorporated in the standard design and adopted by utility applicants as directed by the AEC in the same manner as described in item c above.

Design changes arising from items c, d, and e above should be based on significant new information which substantially affects the earlier PDA determination or other good cause.

The final review stage for a standard design is analogous to the normal operating license stage of review. When the applicant has prepared final design information, a final SSAR is submitted by amendment for staff review to upgrade the preliminary design. At the conclusion of the review, a Final Design Approval (FDA), rather than an operating license, is granted. At this point, the preliminary SSAR, as most recently amended, becomes defunct and all subsequent utility-users must now reference the final SSAR. The FDA should remain valid for a fixed period oftime at least five years, during which time no re-review of the

design should be necessary other than to account for the potential areas of re-review resulting from safety or economic considerations.

2. Technical Content of the Preliminary SSAR

An application submitted for review under the standardization policy is subject to additional requirements relative to an application for a custom plant by virtue of the need to identify and define interface conditions, and due to the important objective of minimizing the need for backfitting. In addition to meeting the requirements of "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," the preliminary SSAR must present complete preliminary design information, solutions to outstanding generic issues, and precise and extensive identification of interfaces, to the maximum extent possible as discussed in the previous subsection. In addition, standard designs must be utilized in accordance with specific procedures.

a. Extent of Completeness

To the extent possible for the PDA stage of review, the design and arrangement of safety-related systems, components, and structures should be described at a level comparable to that of preliminary design. For custom reviews, the staff has been leaning heavily in this direction. However, in many instances, the staff has accepted a general description of an item including design criteria. More definitive information was then obtained during subsequent stages of review. For a standardization application, however, it is desirable to obtain more complete and definitive information at this initial stage of review to minimize the potential for later design changes. This does not apply to off-the-shelf items (e.g., switchgear, motors, most valves, etc.) where statements of design and performance criteria, and operability assurance should be acceptable.

For the final stage of review, the applicant should provide final design information in his SSAR by amendment, and the granting of the FDA should be based on this final design, with all issues resolved. Although it may become a requirement sometime in the future, it does not appear desirable at present to require design information in the final SSAR one component name-plate level. Rather, the standard design applicant should provide design details, performance characteristics, and operability assurances to the extent necessary for assurance that the final design aspects important to safety will be incorporated in the constructed facility. It is anticipated that there may be certain components where the specification of details to the nameplate level may be the only way to assure that a component fulfills the staff's needs regarding safety. These should be few in number and the words "or equivalent" must be added to preclude a limited source of supply.

Plants built to the final design will require an inspection by Regulatory Operations of the constructed facility to assure conformance to that design, and to assure that no significant deviations exist in construction details in safety-related areas between plants built to the same approved design.

b. Solutions to Generic Issues

An objective of the review of a standard design is to minimize the number of unresolved safety considerations. The hoped-for gains from standardization will not fully materialize if each subsequent utility application that relies on the SSAR must address an excessive number of these issues. An issue should

not be left open if a guide, criterion or other position has been established by the staff.

c. Interfaces

Since standard design applications normally will be submitted by reactor vendors and architect-engineering firms, it is likely that none will encompass the entire nuclear facility. Consequently, it will be necessary to precisely and extensively describe the safety-related interfaces between the portion of the facility submitted for review and approval and the portion to be submitted in a utility application or submitted as a separate standard design package. The interface information should address the pertinent safety-related design requirements including the dimensional, structural, operating environment, inputs to transient and accident analysis, and performance requirements necessary to assure the compatibility of the standard design to its mating portion of the plant. In some cases, ranges of interface parameters may be desirable to provide a sufficiently broad envelope and thereby reduce the possibility of re-review. This may mean that "worst case" combinations will need to be considered, although judgment will need to be applied since these can sometimes lead to unrealistic conclusions.

Care must be exercised in selecting the particular parameters that are specified as interfaces. An interface parameter should be established by the standard design applicant to whom that parameter is important for proper operation of equipment within his scope of design or whose scope of equipment design determines the value of that parameter. However, the

applicant for a standard NSSS design, for example, should not be required to specify the detailed design parameters for a system that is provided by the BOP designer, even though that system is the means by which an interface parameter is controlled. The detailed design of that system is the responsibility of the BOP designer. The interface parameters specified by the standard design applicant, however, should include requirements imposed on systems, components and structures not addressed in the SSAR as well as requirements imposed by those latter items on systems, components, and structures addressed in the SSAR.

In general, only the interface parameter value need be specified by the NSSS applicant with the burden of providing a suitable system to achieve the value falling on the BOP designer (or utility applicant), or vice versa as the specific situation may dictate. In certain cases, a range or an upper limit for an interface parameter must be specified to clearly define the interface. The staff, of course, can and should judge the appropriateness of the selected values for the interface parameters based on its prior experience with similar plants.

As an example, consider the analysis of offsite doses due to postulated design basis accidents to determine the acceptability of the plant design with regard to 10 CFR Part 100 guidelines. The only factors in this analytical chain normally provided by an standard NSSS design applicant are the source characteristics.* The remaining factors for dose

*NSSS standard design applicants may include the remaining factors in the offsite dose calculation, but only as a typical example, not as interface information.

reduction are determined from system designs normally provided by a BOP designer. Therefore, in order for the staff to conclude that a standard NSSS design is acceptable for use at a large number of sites (regarding offsite doses only), the SSAR need only state that the NSSS design must be mated with a standard BOP design that can provide an adequate reduction in the amount of fission products released to assure that the dose guidelines of Part 100 are met. There is no need for the standard NSSS design applicant to delve into the details of the systems (containment, filters, sprays, etc.) that are needed to accomplish the reduction in fission product release. The interface as far as the NSSS applicant is concerned is, therefore, simply the source term (and the bases for it). Demonstration that an adequate reduction can be obtained in fission product release falls on the BOP designer.

Another example involves the maintenance of an acceptable activity level and coolant chemistry in the secondary side of the steam generators. The activity level is important to the standard NSSS design applicant for the analysis of offsite doses due to a steam line rupture. Coolant chemistry is important in minimizing corrosion potential. Therefore, the standard NSSS design applicant should specify the values that must not be exceeded as interfaces since the steam generator is within his scope of design. These interface values would be utilized by the BOP designer in the design of the systems, within his scope, that assure the maintenance of these values. Again, the staff, based on previous experience, can judge the reasonableness of the interface values selected by the standard NSSS design applicant and draw a conclusion regarding design acceptability in that area of concern.

In summary, the staff must be assured through the review process that all safety-significant interfaces have been identified by the applicant in the SSAR, and that these interfaces have been properly defined. Proper definition includes the establishment of rather sharp lines of demarcation between the scopes of the design efforts for the standard NSSS and BOP design applicants to assure proper meshing, and clear identification of the subject matter that has received staff approval.

d. Presentation of Information

(1) Standard Design Applications

As stated previously, all standard design applications must address the areas identified in "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants" prior to docketing. For a particular standard design that is concerned with only a portion of a plant, all chapters of that document will not be applicable. These items must be listed in the SSAR, however, with a notation that the information will be provided by other(s) in an application for licenses.

In a standard design application for a BOP, it is claimed by some design firms that a single application can be utilized for a PWR type plant by making appropriate design revisions to account for the differences in the various PWR NSSSs. The design revisions would affect a relatively small part of the BOP design with the bulk of the design remaining

identical. This is a desirable situation since the bulk of the design need only be reviewed once, and the portions applicable to each PWR vendor once each, to provide a standard design useful for each PWR vendor. A convenient means for presenting the necessary information in this kind of an application is a different page color technique, or equivalent, to distinguish among the various reactor vendor-related blocks of information and the common portion.

(2) Utility Applications

In order to qualify as a standard plant, the utility-user should understand that he is committing, at the outset, to adoption of the standard design in its entirety, even though the standard design may be undergoing review at the time with some of its final characteristics unknown. The applicant must understand that any exceptions to the basic package (defined as the normal scope of design for the NSSS vendor or BOP designer) taken subsequently will result in appropriate modification to the review schedule commensurate with the extent of the exception and the availability of staff manpower. For the case of referencing a standard design that is still under review, the utility-user's commitment should include a statement of the method for informing the staff on a timely basis regarding the incorporation in his application of subsequent amendments to the standard design.

The utility-user is free to choose the method for incorporating the standard design information into his PSAR and still qualify his design as a standard plant.

(a) Incorporation by reference is the desirable method since it completely avoids the potential for re-review. The applicant is encouraged to follow this approach. Note that at the conclusion of the utility application review, the standard design information must be made a physical part of the PSAR to provide a record of the design in the construction permit proceeding.

(b) Incorporation by physically including the standard design information in the PSAR at the outset is also acceptable providing an approach is used that clearly identifies the standard design information. This information should be reproduced directly without retyping and should be printed on different color paper or otherwise identified. This holds for the original material as well as subsequent amendments to the standard design.

In order to qualify as a standard plant application, the utility applicant must also understand that staff questions on the standard design portion (for the case of the standard design still under review) will be addressed to the standard design applicant for response. The staff will send copies of question lists and other correspondence with the standard design applicant to the utility applicant for information.

(3) Duplicate Plant Applications

For duplicate plant applications submitted under Option 2, a single SAR should be submitted that presents the common

plant design, the appropriate number of site descriptions (one for each site involved), and the appropriate number of site-specific design aspects. When more than one utility is involved, the appropriate number of repeated SAR chapters (for each utility) must be included depending upon the difference between the utilities in areas such as quality assurance, conduct of operations, etc.

3. Sharing of Facilities

From the viewpoint of standardization in the licensing process, sharing of safety related systems, components, or structures in standard designs in a multi-unit facility is not considered desirable. Sharing introduces potential changes in design that require re-review within the context of the utility application, since SSARs most likely will be submitted for review based on a single unit facility. For multi-unit facilities, duplicate units should be utilized with each unit remaining completely independent of the other(s) and with no "mirror images" to facilitate sharing.

4. Scheduling of the Review

Scheduling of the staff review of a standard design application differs somewhat from that for a custom plant. It does not entail environmental (other than safety-related environmental aspects), antitrust, or financial qualification reviews. Further, although a final determination will be made on a case-by-case basis, the preliminary design review will likely only be carried through the ACRS review stage with any public hearing proceeding taking place on each utility application. If the approved final design is made into a rule, which is a more likely prospect than for the preliminary design, this step in the licensing procedure will need to be factored into the schedule, along with the

requirement for an environmental impact review. In any event, the resulting project schedule is somewhat simplified relative to a custom plant review. The overall span time of the standardization review is expected to be the same as that of a custom plant review.

For a utility application that references a standard design (e.g., a standard NSSS design), the Regulatory processing of the application will encompass a somewhat shorter span time than for a comparable custom plant review. The review entails all the aspects associated with a custom plant review except that the standard design portion is not re-reviewed. For a utility application that references standard designs for the NSSS and the BOP, a greater reduction in span time results since only the site aspects and interface requirements need to be reviewed to complete the safety assessment, and the environmental considerations reviewed to assure conformance to the requirements of the National Environmental Policy Act (NEPA). For the latter case, the reduction in staff review time relative to custom plants is expected to be 4 to 6 months.

5. Site-Related Considerations

A standard design application under the reference system approach should address a substantial portion of the nuclear plant design (i.e., portions no smaller than the NSSS and the BOP), but should not address those aspects pertinent to the NEPA review. Only a review relative to radiological safety considerations will be performed and, therefore, no Environmental Report should be included in the application, as would be the case for a custom plant review (unless the standard design is subjected to a rulemaking proceeding). The standard design, nevertheless,

does depend upon several site-related factors, and values or ranges of values for these must be specified in the preliminary SSAR. These factors include:

a. Seismology
b. Hydrology
c. Meteorology
d. Geology
e. Heat sink parameters
f. Other site-related aspects impacting on plant design.

Appropriate values for site-related factors must be specified in the preliminary SSAR that are used to determine the plant design requirements for seismic events, flood protection, tornado and wind loads, foundations, heat sink characteristics, and effluent releases. For utilization of the SSAR in a maximum number of utility applications, the values for the site-related factors must be carefully selected so as to encompass the maximum number of potential sites. Site parameter envelopes will be developed by the Regulatory staff in conjunction with those design firms preparing standard designs.

Other site-specific aspects such as the proximity of aircraft activity, explosion hazards and toxic gases, ship traffic, and nearby military facilities should, in general, be considered in the context of the utility applications. For some of these aspects, the selection of an envelope-type value appropriate for many potential sites may be warranted. This should be decided during the review of the standard design, but at a minimum, the SSAR must state whether or not, and to what extent, the standard design accommodates such situations.

6. Assurance of Multiple Vendors for Specific Components

Since standardization demands the establishment of standard designs to the preliminary design level of detail, the possibility exists that staff approval of a design may dictate the use of a particular vendor's component to the exclusion of other vendors in the same marketing field. An example is the reactor coolant circulating pump where a number of analyses important to safety are strongly dependent upon the specific characteristics of the pump. Another area where the staff's review involves a specific vendor's components is instrumentation and control. To avoid potential problems during both the preliminary and final design reviews, the design information presented should be directed to the use of envelopes of component design criteria, performance characteristics, and assurances of proper operation, or other means that would allow a number of vendors to qualify and still assure the incorporation of design features important to safety. Where the only approach possible is to select a particular product design, applicants should submit alternate analyses and/or qualification information involving the component of each of the potential suppliers, thereby making a number of suppliers eligible to bid. This latter situation is expected to occur rarely. For those cases where only one supplier is eligible, adequate justification must be provided by the applicant. With regard to the off-the-shelf items (electrical hardware, piping, cabling, etc.) the information in the SSAR should address only the required characteristics for safety, with no need to specify a particular vendor's product.

7. Results of the Standardization Review

The results of the review of a standard design application will be thoroughly and extensively documented in order to provide a

clear understanding of the specific subject matter reviewed, the resulting conclusions, and the basis for the conclusions. The best vehicle for reporting the results is the SER as is the practice for custom plant reviews.

Consistent with the nature of the review and the greater extent of applicability, as previously discussed, the SER for a standard design application will be a self-sufficient document to the extent practicable and will present a more comprehensive discussion of the subjects reviewed, thereby providing a firm and clear baseline for utility application reviews during later time periods. The SER for the standard design will eventually become a significant portion of the SER for a subsequent utility application, either by reference or by incorporation as the situation may dictate, and therefore will become staff testimony at a hearing. Should the standard design be subject to a rulemaking proceeding, the SER again becomes an important document that specifies the review performed and the conclusions reached, and that serves as a reference point for changes.

Following ACRS review, a supplement to the SER will be issued in order to address the ACRS advice to the extent necessary. In addition, the SER supplement must address the staff review of any modifications to the SSAR submitted at this stage of review. Additional SER supplements will also be issued to address subsequent design changes that may arise as discussed in Section II.A.1.

8. ACRS Interfaces

As a part of the review of a standard design, an ACRS review will be performed. This procedure is not expected to depart significantly from that for custom plant reviews except that

earlier and more frequent ACRS subcommittee meetings may be necessary to keep the ACRS informed of the progress of the review and major issues involved (particularly the acceptability of novel or different design features and the schedule for resolution of generic issues pertinent to the standard design).

B. Post-Review Aspects

1. Mode of Approval

A mechanism has been established to signify to the standard design applicant, to the staff, and to other interested parties, that the standard design has been evaluated and approved for subsequent referencing by utility-users without further review for some period of time. This mechanism is designated as a "Preliminary Design Approval" (PDA) at the initial stage of review. At the final stage of review when the final design information becomes available, reviewed and approved, a Final Design Approval (FDA) is issued. The staff design approval would be issued at the completion of the review of the standard design by the staff and the ACRS. This action could be followed by a rulemaking hearing, if the latter is decided to be appropriate. The design approval would consist of a letter from the Regulatory staff to the applicant presenting the results of the review (the SER and its supplements, including the ACRS letter report) including identification of any matters remaining for later resolution, any special conditions that may have arisen during the course of the review, a condition that the Regulatory staff will require or permit design changes based on significant new information which substantially affects the earlier determination or other good cause, and assurance that the SSAR may be referenced in applications for licenses without further review.

2. Duration of Approval

One of the considerations important to the review of a standard design application is the extent of time for which the results of the review are valid. Staff approval of a preliminary design is expected to be effective until the final design is submitted and approved. During this period (as well as during the review of the preliminary design), utility-users may apply for construction permits based on the standard preliminary design (as modified for the reasons identified in Section II.A.1.). Within a reasonable time, the standard design applicant is expected to submit by amendment an updated SSAR based on final design information. Staff approval of the final design is expected to be valid for an additional period of at least five years.

3. Change Procedure

Following the approval of the standard design and issuance of the PDA, it is anticipated that changes in the standard design, based on significant new information which substantially affects the earlier determination or other good cause, may be necessary for the following specific reasons:

a. New and significant safety considerations requiring resolution on a timely basis. The resolutions to these safety items may also need to be incorporated in utility applications for which construction permits have already been issued, by the application of backfit considerations.

b. Significant design modifications initiated by the standard design applicant, also requiring incorporation on a timely basis.

c. Updating of the standard design due to other design modifications of lesser significance resulting from applicant-initiated proposals and from staff requirements regarding the adoption of new codes (or changes to existing codes), Regulatory Guides, and other Regulatory positions. These standard design modifications would be incorporated at an agreed-upon interval (e.g., about every two years).

It is important that the number of these changes be held to a minimum.

As considerations for design changes arise, all directly affected parties will be appropriately informed. With regard to staff-initiated changes, the staff will initially determine the significance and applicability of the new consideration, and request the standard design applicant to submit an acceptable resolution by amendment. With regard to applicant-initiated changes, the staff will again determine the significance and applicability of the proposed design changes following discussions with the applicant. The applicant will be requested to submit those design changes judged to be acceptable and necessary by amendment. With regard to the changes of lesser significance that fall in the "updating" category, the staff in concert with the standard design applicant will determine the areas to be updated and the timing for submittal of an amendment by the applicant. In no event will any design change described in an amendment to the SSAR become effective on utility applications until the staff and ACRS have performed their reviews and a supplemental SER issued. Further, design changes resulting from significant new safety considerations will be implemented on all utility applications referencing that standard design

and undergoing a construction permit review, and, where appropriate, by using backfit considerations on utility applications that have already received construction permits. The "updating" items will not apply to those utility applications already docketed.

Utility applicants should not request design changes to the referenced SSAR that would apply to a particular plant only. Such design changes will result in additional review effort by the staff and attendant schedule delays, thereby characterizing the application as custom rather than standard. Design changes should be made to the SSAR only, and not to the utility application.

In the interest of obtaining the maximum benefits from standardization, it is most desirable that all changes to the standard design be adopted uniformly, with no exceptions by any utility-user. If a utility-user makes such an exception, he may be judged to be disqualified from the standardization program and must accept the consequences to his review schedule.

4. Standard Design Models Resulting from Changes

Changes to a standard design subsequent to issuance of the first construction permit that references that design may give rise to a series of standard designs that could grow in number as more and more changes are made, and more and more utilities reference the design in their applications for licenses. As stated previously, the number of these changes must be kept to a minimum to obtain the maximum benefits of standardization, particularly in view of the potential logistics problem of keeping track of the specific standard design model that applies to each plant.

Model 1 of a standard design will be the version referenced by those utility applicants who receive construction permits prior to the incorporation of any changes in the standard design. If the changes made are also backfitted, Model 1 continues in effect for subsequent utility applications. If the changes are not backfitted, Model 2 is created and must be referenced in new utility applications (Model 1 remains viable for those applications that originally referenced it). All subsequent utility-users would then reference Model 2 until design changes force the creation of Model 3, in which case the process is repeated.

With regard to final design information for the operating license stage of review, each standard design model will require its own final SSAR. This means that an FDA will be necessary for each model. Changes arising during construction that are pertinent to a single utility only can be presented for review in the utility's FSAR on a custom basis, similar to the treatment given to site-related designs and information.

For those utilities that choose to reference the standard design in a construction permit application subsequent to issuance of the FDA, the only standard design model permitted to be referenced will be the one which includes all changes (i.e., the latest version - Model n), all other models becoming defunct for new applicants.

Depending upon the extent of the changes that force the creation of Model 2, as as example, it may be more appropriate in some cases simply to provide an amendment to the SSAR that clearly

describes the design change and designates its applicability. A single SSAR document would then contain Models 1 and 2. Such an approach could be utilized for the situation in which the changes are few and not extensive. The specific approach adopted will need to be decided on a case-by-case basis.

5. Additional Procedures for Design Acceptance

As one of the possible means for fixing a standard design in order to minimize design changes and associated re-reviews, rule-making procedures may be used for designs that have received staff and ACRS approval. This would preclude the need to re-consider this portion of the plant design in the public hearing proceeding for the utility application, except in accordance with 10 CFR 2.758.

As discussed in Section II.A.1., standard designs at the preliminary design stage are anticipated to include a number of novel or different features relative to prior designs that will likely require experimental and/or analytical verification to provide the needed confidence in the design. This verification information is likely to become available in some cases only during the post-PDA phase. This aspect in combination with the preliminary design nature of the remaining features mitigates the potential advantages that may accrue from a rulemaking proceeding at this stage of review. It is, therefore, concluded that the advisability of conducting a rulemaking procedure for a standard design at the preliminary design step is doubtful and should be decided on a case-by-case basis. The rulemaking procedure would be more appropriate for the FDA stage of review.

6. Public Hearing Requirements

As in custom plant licensing activities, a utility application that references a previously reviewed and approved standard design must be subjected to the public hearing process prior to award of a construction permit. The public hearing for each such utility application will be concerned with the SSAR (for the NSSS, for the BOP, or both) that was previously approved in the standard design application. There will be a need to provide additional sets of records, in addition to that in the main Public Document Room (PDR), for each local PDR established for each utility application. Each local PDR must contain appropriate records for the standard design application that was referenced, including all amendments and the SER and its supplements.

C. Other Considerations

1. Fairness to All Standard Design Applicants

To assure fair treatment to each actual and potential applicant, it is necessary that a system be established to provide an equal opportunity for any applicant to submit a standard design for staff review and approval. The system should permit applicants to submit a single design, but not a second design, until all applicants who desire to participate on a timely basis have had their opportunity in the first round. Subsequent rounds would be conducted in a similar manner. It should be noted that, for this purpose, applicants will be categorized in accordance with similar specialities. For example, the submission of a second NSSS standard design by a reactor vendor will be permitted when all other reactor vendors have had a reasonable opportunity for their first design submittal.

A "second design" is defined as one that would contain significant, drastic, and extensive changes from the design previously approved. Examples of such changes include power level, containment design, significant plant module rearrangement, and an accumulation of many small changes. In general, a "second design" provides an additional commercial offering by the same firm that submitted the "first design", not a replacement for the first design. In contrast, relatively minor modifications made to a design result in a new design that makes the original design defunct (i.e., no longer referenceable) for new utility applicants.

2. Options for Scope of Standard Design

Standard design applicants may desire to submit SSARs that encompass a variable portion of the total plant design. In these cases, the standard design would consist of the basic package of the designs for systems, components, and structures normally supplied by the applicant, plus the design of additional items that on occasion have been supplied by the applicant on prior custom plant designs or are planned for sale on future plants. These kinds of standard design submittals are discouraged since they tend to reduce the benefits of standardization by creating standard designs that may be customized.

The inclusion of optional items in a SSAR introduces complications to the staff review of that standard design. Appropriate interfaces must be identified and defined for the standard design with and without each optional item. For cases where the optional item is not supplied in its entirety by the applicant (e.g., the design of the system and components are supplied, but layout drawings including piping runs are not), the interface complications may become particularly severe. Also, in order to

preclude the need for re-review of a standard BOP design, the BOP SSAR must likewise include the design of the same optional items and appropriate interfaces to assure compatibility of the various basic packages and optional items selected by the utility-user.

Accordingly, provisions for optional items in a standard design are discouraged. Rather, submittal of such information for staff review is encouraged through the topical report program that was previously established and that forms a vital part of the standardization program. Additional guidance will be made available in the near future regarding the line of demarcation between the NSSS and BOP scopes of design to clearly define those items regarded as options.

3. Quality Assurance

The quality assurance (QA) aspects of the review of a standard design are expected to parallel, in general, those for a custom plant review. The primary difference is that information regarding plant construction and operation is not needed in the SSAR. For a standard NSSS design applicant, the QA information in the SSAR should address design, procurement, and fabrication of items that fall within his scope of design. For a standard BOP design applicant, the QA information similarly should address design, procurement, and fabrication of the items that fall within his scope of design. All these areas should be addressed in the SSAR for the preliminary design review, with inspection by Regulatory Operations (RO) to assure proper implementation. The only additional QA input during the final design review ought to be the incorporation of changes that may have occurred since the PDA was issued. The QA programmatic information regarding

construction and operation of the plant should be provided by the utility-user in his application.

In a custom plant review, the applicant provides copies of the QA manuals (policies and procedures, and means for their implementation) to RO for detailed inspection. This will also be necessary for the standard design applicant. The manuals, of course, are not made part of the SSAR.

For a custom plant review, the initial inspection for QA program availability and completeness is performed as part of the acceptance review of the tendered application. For a standard design application, this kind of early inspection is equally as important and will be performed also as part of the acceptance review.

Utility Participation During Preparation and Review of Standard Designs

The preparation and Regulatory processing of a standard design application primarily involve the design applicant and the Regulatory staff. The eventual owner and operator of the plant that uses the design may not be involved in the decisions made during the preparation and review of the standard design. Even though one of the primary objectives of a standard design applicant is to produce a design that has wide acceptance by utilities in all aspects, utility needs regarding operation, maintenance, and performance requirements still may not be properly accounted for without their participation. Once the standard design is approved, it will be difficult to incorporate such design modifications without incurring penalties in cost and schedule.

The solution to this concern lies in the establishment of a mutually acceptable approach that will permit utilities to review and comment on proposed standard designs prior to and during their review by the Regulatory staff. The primary responsibility for obtaining utility participation rests with the standard design applicants. During the preparation of the design, standard design applicants should solicit the views and comments of known and prospective utility clients. This process should continue during the staff review of the standard designs. The staff will include utilities on the distribution list for copies of all pertinent information developed during its review, and utilities may submit comments to the staff on these designs in accordance with the provisions of 10 CFR 2.110(b) (proposed). The staff is also prepared to discuss generic problems regarding standard designs with utilities. Utilities are encouraged to consider the formation of representative bodies with the objective of reviewing standard designs for all utilities. Implementation of the latter approach appears feasible under the cognizance of one of the many existing utility management organizations.

The staff encourages the participation of utilities during the preparation and review of standard designs to facilitate the usefulness of these designs by improving their responsiveness to utility needs.

III. REGULATORY ORGANIZATION AND STANDARDIZATION PROJECTS

A. Regulatory Organization

Implementation of the standardization policy by the Regulatory staff will be carried out within the Directorate of Licensing using the same basic organization utilized for previous plant reviews. A standardization application is assigned to a Licensing Project Manager within an already existing Reactor Projects branch. The existing branches (Technical Review and Reactor Projects) will perform the safety reviews in accordance with their established responsibilities. With regard to environmental reviews, these will be performed only on the utility applications (not on the reviews of standard designs unless rulemaking is utilized) in the same fashion as for previous plant reviews.

The major organizational change involves the creation of an additional staff assistant position within the office of the Deputy Director for Reactor Projects. This staff assistant, Special Assistant for Standardization, is responsible for the development and coordination of procedural and policy matters necessary to foster standardization and to facilitate standardization reviews. In addition, the staff assistant will assess the progress of standardization reviews in order to assure the expected benefits to Regulatory.

B. Standardization Projects

The standardization applications that are currently under active review and those that are anticipated for future submittal are shown in Tables 1 and 2, respectively.

TABLE 1

STANDARDIZATION APPLICATIONS CURRENTLY UNDER ACTIVE REVIEW

Project	Applicant	Option	Date Docketed	Date of Issuance of SER Supplement	Comments
GESSAR	General Electric	1	7-30-73	12- 2-74	Nuclear island standard design
CESSAR	Combustion Engineering	1	12-19-73	2-14-75	NSSS standard design
Floating Nuclear Plant (FNP)1-8	Offshore Power Systems	3	7- 5-73	3- 4-75	Entire plant design
Atlantic 1 & 2	Public Service Electric and Gas Co.	3	3- 1-74	--	Reference FNP, review schedule not available as yet
Byron/Braidwood	Commonwealth Edison	2	9-20-73	12-27-74	Two duplicate units at each of two sites
RESAR-41	Westinghouse	1	3-11-74	5-23-75	NSSS standard design
B-SAR-241	Babcock & Wilcox	1	5-14-74	--	NSSS standard design; review schedule not available as yet
WNP-3	Washington Public Power Supply System	1	--	--	References CESSAR: tendered on March 5, 1974
Duke 1-6	Duke Power	1/2	5-24-74	--	Six units located at two sites, references CESSAR; review schedule not available as yet

TABLE 1 (Cont'd)

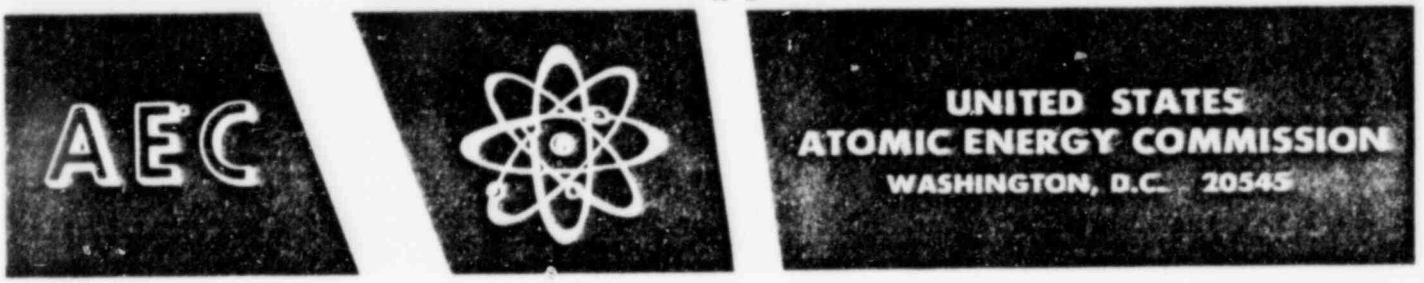
STANDARDIZATION APPLICATIONS CURRENTLY UNDER ACTIVE REVIEW

Project	Applicant	Option	Date Docketed	Date of Issuance of SER Supplement	Comments
SNUPPS	Kansas Gas & Electric Union Electric Northern States Power Rochester Gas and Electric	2	--	--	Six duplicate units located at four sites; tendered on April 30, 1974 (PSAR)
SWESSAR	Stone & Webster	1	--	--	Standard BOP designs to mate with NSSS designs; tendered on April 25, 1974
South Texas 1&2	Houston Light & Power	1	--	--	References RESAR-41; tendered on May 17, 1974

TABLE 2

STANDARDIZATION APPLICATIONS ANTICIPATED FOR SUBMITTAL

Projects	Applicant	Option	Anticipated Tendering Date	Comments
WUMS (Wisconsin 1 & 2)	Wisconsin Electric Power Madison Gas & Electric Wisconsin Power & Light Wisconsin Public Service	2	June 1974	As many as six units to be located on three sites
Hartsville 1-4	Tennessee Valley Authority	1	August 1974	TVA/STRIDE, single site, to reference GESSAR
Palo Verde 1-3	Arizona Public Service	1	July 1974	To reference CESSAR
GASSAR	General Atomic	1	August 1974	NSSS standard design
C.F. Braun SSAR	C.F. Braun	1	~September 1974	Standard BOP design for the BWR nuclear island
Public Service 1 & 2	Public Service Electric & Gas	3	October 1974	To reference FNP
Erie 1 & 2	Ohio Edison	1	February 1975	To reference GASSAR
Gilbert SSAR	Gilbert Associates	1	~July 1975	Standard BOP design to mate with NSSS designs
Jacksonville 1 & 2	Jacksonville Electric Authority	3	October 1975	To reference FNP



COMMISSION POLICY STATEMENT ON STANDARDIZATION OF NUCLEAR POWER PLANTS

It is the policy of the Atomic Energy Commission to encourage, support, and give priority consideration to activities leading to greater standardization of nuclear power plants in terms of their design, fabrication, construction, testing, and operation. It is expected that the activities leading to greater plant standardization, including the standardization of balance-of-plant systems and components, would take full advantage of progress to date in the standardization of reactor systems and components and in the development of codes, criteria, and standards applicable to nuclear systems and components. The Commission believes that considerable benefits to the national energy program and to the public will be derived from such standardization, including:

--Maintaining and improving the protection to be provided to public health and safety and the environment.

--Permitting maximum use of successful experience with resultant improvements in plant reliability, availability, and overall economy.

--Improving the focus of safety-related research and development activities. In this connection, the Commission believes that desirable improvements should continue to be pursued in plant systems and components affected by such activities.

--Permitting more efficient use of resources in industry and in Government.

A prerequisite to achieving the benefits of standardization upon which the Commission intends to place increased emphasis is the development and adoption of a comprehensive base of industry-wide engineering codes, standards, and criteria. An effort toward this end has been organized under the auspices of the American National Standards Institute (ANSI) and associated professional societies and standards

groups. Although many standards now exist which can be adapted for nuclear applications and although some progress is now apparent in the preparation of nuclear standards, response to developing needed industry-wide standards is still too slow to meet the needs. Strengthened leadership by industry and the prompt participation of highly qualified industrial technical personnel in the area of standards development is an essential requirement to advance related standardization activities. As in the past, the AEC is prepared to continue to assist in these efforts to augment industry participation, apply the benefits of AEC and industrial experience, and help accelerate these efforts.

In this regard, the AEC has assigned a group of highly qualified engineers to develop, on a full-time basis, urgently needed regulatory standards and criteria, a number of which have recently been published.

In addition, the AEC established the RDT Standards Program for application to priority AEC reactor development programs. These RDT Standards have been made available to the industry and could be used as a basis for developing industry-wide standards for commercial nuclear applications.

For some time, the Commission has offered to conduct evaluations of commercial nuclear power plants, reactor systems and major plant components in advance of a formal filing of an application. The Commission encourages the use of this procedure for advancing plant standardization and will continue to be responsive to further industry proposals and initiatives in this regard. To achieve the maximum benefits of the procedure, however, as large a portion of a plant design as is practical, including balance-of-plant systems and components, should be standardized and the standardized component, system, or plant should remain unchanged for a reasonable long period of time to derive meaningful experience, recognizing that such experience may both dictate the need for changes and also provide a basis for making such changes or other product improvements. The Commission notes that the use of standardized plants, systems, or components on subsequent license applications would importantly accelerate the technical review of these applications and the entire Regulatory processes. Thus, the Commission expects the utility industry, as the owner of these plants, to assume the leadership role in these efforts to achieve greater standardization.

The Commission encourages other actions and suggestions for the development of programs or policies for advancing the standardization of nuclear power plants. Such actions could include the development of enveloping criteria for critical site and plant parameters, such as site seismological characteristics or reactor power level; the development of a procedure for according priorities in the Regulatory process to the review of standardized plants or plant features; or other methods of encouraging and rewarding greater standardization.

The Commission would appreciate receiving comments and suggestions on these and other possible programs, and methods of carrying them out, that might be taken collectively or individually to achieve a greater degree of desirable standardization in nuclear power plant design, construction, and operation. After review of these suggestions, the Commission expects to be able to provide more definitive guidance on desirable additional programs or procedures to augment the actions already taken and under way to advance nuclear power plant standardization. Comments should be sent to the Director of Regulation, U. S. Atomic Energy Commission, Washington, D. C. 20545.

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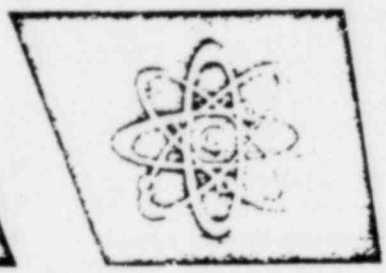
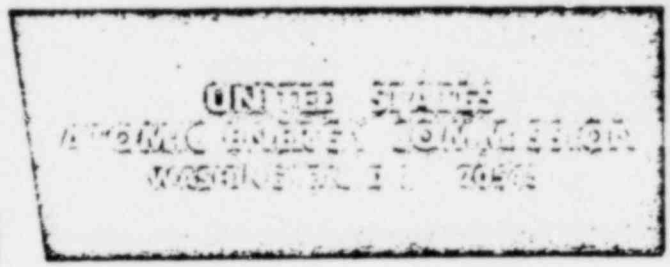
April 28, 1972

No. R-85
Contact: Frank Ingram
Tel. 301/973-7771

FOR IMMEDIATE RELEASE
(Monday, March 5, 1973)

AEC TO IMPLEMENT STANDARDIZATION POLICY FOR NUCLEAR POWER PLANTS

Atomic Energy Commission Chairman Dixy Lee Ray today announced a major step in implementing the Commission's goal, announced in May 1972, of standardizing nuclear power plants and their components. Effective immediately, the AEC's Regulatory Staff will be prepared to consider applications for review and licensing of standardized designs for nuclear power plants and for major plant systems important to safety.

Three procedural options will be available for processing applications for standardized designs. Under the "Reference System" concept an entire facility design or major fractions of it can be identified as a standard design to be used in multiple applications. Other major parts of the plant will be accepted for review if a significant contribution to plant safety can be demonstrated. The review can be performed either within or outside the context of an individual application.

Under the second option, if a limited number of duplicate plants are to be constructed within a limited time span by either a utility or a group of utilities, the AEC Regulatory Staff will review, simultaneously, the safety-related parameters for all the plants.

The final option would involve a standard design and an envelope of assumed site conditions for a specified number of plants to be manufactured at a location which is different from the location where the plants will eventually be operated. In this case, a License to Manufacture could be issued, following review by the Staff and the ACRS and authorization by an Atomic Safety and Licensing Board following a public hearing.

Only plants reviewed under one of these options will qualify as a standard design for construction permit reviews. A design used on an individual plant that already is under

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construction or licensed for operation does not qualify as a standard design, though accelerated review of such plants should be possible.

In addition, the size of all new plants accepted for licensing review under the standardization policy, as well as in connection with a specific construction permit application will be limited to power levels of about 1300 megawatts electric or less.

Copies of the Regulatory Staff's Study may be obtained by writing to the Director, Directorate of Licensing, U. S. Atomic Energy Commission, Washington, D. C. 20545. Comments on the study or suggestions for other procedural options for processing applications for standardized designs should be sent to the Director, Directorate of Licensing.

METHODS FOR ACHIEVING STANDARDIZATION OF NUCLEAR POWER PLANTS

I. BACKGROUND

On April 28, 1972, the Atomic Energy Commission adopted a policy statement on standardization of nuclear power plants in which it stated that its goal was "to encourage, support and give priority consideration to activities leading to greater standardization of nuclear power plants in terms of their design, fabrication, construction, testing and operation." In response to the Commission's statement, letters of comment were received from various companies and groups representative of the nuclear industry and the public. A number of meetings were held with the various groups involved to discuss their comments and the general subject of standardization. The present statement is an outgrowth of these meetings and of the Regulatory Staff's consideration of how the Commission's policy statement can best be implemented.

II. PRESENT STATUS OF STANDARDIZATION

Nuclear power plant designs have in the past been reviewed by the AEC Staff on an individual plant basis; however, the significant projected increase in the number of facilities requiring licensing review has prompted the Commission to examine the process of standardization as a method of making the licensing process more effective and efficient.

During the past several years, the nuclear industry has been moving gradually to ad hoc standardization, impelled by such factors as the need to bring plants on line as quickly as possible, the savings that result from use of a standard product line, and the expectation that

licensing time would be reduced. This movement toward standardization has occurred without industry-wide planning or direction. Many representatives of the nuclear industry expected the AEC to provide leadership in this area · ile the AEC, until recently, suggested that prime responsibility lay with utilities, manufacturers, and other segments of the nuclear industry.

What was clearly needed was a concerted effort by all. This concerted effort must recognize the basic objective of securing added assurance of the safety of nuclear power plants, while at the same time optimizing the expenditure of industry and AEC manpower in the licensing process. The AEC is prepared to accelerate the development of procedures, methods, and regulations to this end.

III. DISCUSSION

In the past, there has been no great incentive to standardize, since each new plant has tended to be larger than the last one ordered. Th's increase in reactor plant capacity has resulted in a need for review in increasing depth to maintain a consistent level of safety. The result has been a steady growth in the required licensing review time.

The major advantages in the standardization of nuclear power plants include the following points.

The most important advantage is the enhancement of reactor safety due to concentration of Regulatory Staff effort on the in-depth review of standardized systems and on the resolution of generic safety-related

issues that arise in the review, as well as in later construction and operation of the plant. Further, construction, start up, and operating experience will be applicable to all plants of any given design. In view of the AEC's belief that standardized plants can lead to a higher level of confidence in reactor safety, priority in scheduling and additional experienced staff manpower will be allotted to standardized plants that are submitted for licensing review.

For the nuclear industry, the advantages of standardization of the nuclear power plants are apparent in both economy and safety. The total design and licensing effort that is presently expended can be lessened with no compromise to safety. Because of the additional effort required for the in-depth review and concurrent detailed documentation of that review along with the resolution of any generic safety issues that arise, the first models of the standard plants that are submitted for review will require more manpower per review. However, the total expenditure of manpower for several plants of a given model will be less than the total time that would be expended on individual custom plants. The AEC anticipates an ultimate review-time savings without loss of review quality.

The likelihood of later escalation of licensing requirements will also be reduced for the standardized design by virtue of an exceptionally thorough review, thoroughly understood by all reviewers. Should the Regulatory staff in the future identify the need for safety-related changes

to approved standardized designs, the industry will be notified of the new requirements. The staff will determine the extent to which the required modifications need to be backfit to plants already licensed. If the parties affected question the desirability for the design modifications, then the parties will have the opportunity to have the matter reviewed at a higher staff level.

A potential disadvantage of the standardized design is that utility staffs and technical management may not be intimately involved in the technical review of the plant at the construction permit stage. It is the utility that will ultimately be responsible for the safe operation of the reactor and a high level of technical competence in the utility will continue to be required by the AEC before an operating license is granted. Because of this potential disadvantage the AEC will need to scrutinize more closely the staffing of utilities, particularly those without previous experience in the nuclear field.

Development of more Regulations and Regulatory Guides are necessary to implement effectively a standardization policy. The AEC will provide manpower to work with professional societies in the development of these standards. The AEC commitment is made in anticipation of a strong commitment of experienced and effective manpower on the part of all segments of the nuclear industry.

The use of any of the procedural options discussed later for

obtaining AEC review of a standardized design will require a careful definition of the interfaces with other parts of the facility. This must include consideration of each of the site parameters and systems outside the standardized design envelope that can influence the design of the standardized part of the plant. If site parameters are found to fall outside the range of conditions for which the standardized part of the plant is designed, the result may well be a requirement for resubmittal and review as a custom plant. It should be recognized that while the designs for the standardized portions of the plant may remain frozen for several years, review of systems with which the standardized part will interface will continue on individual construction permits.

IV. STANDARDIZATION APPROACHES

At present, the following approaches to standardized licensing review will be entertained by the AEC. Because of the need for an in-depth review for each proposed "standard" facility or part, the following restrictions will be applied to applications accepted under this standardization policy.

1. Only applications for light-water reactors will be accepted for review as a standardized plant.
2. Only applications covering the entire facility, the nuclear steam supply system alone or in conjunction with containment, or the containment alone will be accepted in the near future. The acceptance of other major parts of the facility for review will depend on the availability of specialized

manpower and the relative importance of the system to the safety of the plant.

3. The latest edition of the "Standard Format and Contents for Safety Analysis Reports for Nuclear Power Plants" must be followed, including the physical presentation requirements, for those standardized designs for which a review is sought. All interface conditions with the remainder of the plant must be clearly identified and specified.
4. Designs for plants or major parts of plants reviewed in a standardized licensing review will remain in effect for a specified time period. To justify the expenditure of the additional staff manpower to be allotted to the review of the standardized design, reasonable assurance should be provided that the design will be applied to several units within this time frame.

Topical reports supporting specific analytical models or documenting design details of a specific system that is common in several license applications provide important mechanisms for in-depth staff review and "approval" of methods or system designs. This type of report will be accepted, as it has in the past, for review only within programs that are established with individual nuclear steam supply vendors or architect engineers. These reports will form part of the technical bases for standardized plant designs.

The size of all new plants accepted for licensing review (both those proposed for review under this standardization policy and those proposed for review in connection with a specific application for a construction permit) will be limited to power levels of less than 3800 megawatts thermal, approximately 1300 megawatts electric. In the past the continual increase in proposed plant size (from about 600 megawatts electric in 1965 to 1250 megawatts electric in 1972) has resulted in plant design modifications and a large expenditure of AEC staff review effort to assure the maintenance of a consistent level of safety. The numerous plant design variations and the rapidly increasing number of applications have contributed to the steady growth in the required licensing review time. Until sufficient experience is gained with the design, construction and operation of larger plants, the AEC will limit the size of plants to current levels.

Only plants or major parts of plants which are processed through one of the procedural options described below will qualify as a standardized design for construction permit reviews. The fact that a design was used on an individual plant that previously received a construction permit or operating license does not qualify it as a standardized design, although accelerated review of such plants should be possible.

License fees for standardized reviews will be set with the objective of full cost recovery.

V. PROCEDURAL OPTIONS FOR STANDARDIZED DESIGN REVIEWS

The following procedural options reflect a consolidation of proposals made to the Regulatory Staff. As experience is gained with these procedures, a modification of these options may result. If requested by an applicant, and agreed to by the AEC, the standardized design can be reviewed by the ACRS. It is also possible that these designs could furnish the basis for appropriate rulemaking.

1. Reference Systems

The largest use of this standardized design approach is expected to be by nuclear steam supply vendors and architect engineers. The reference system approach is an outgrowth and expansion of the topical report concept and previous proposals by vendors for a separate review of Nuclear Steam Supply System designs. Under the reference system concept, a large fraction of the facility design can be identified as a standardized design, to be used in conjunction with multiple facility applications. The review can be performed either within or outside the context of a review of an individual application. The design cannot be referenced as a standardized design in other facility applications until the staff review of the initial submittal is substantially complete and until the staff has determined that all site and facility interfaces have been identified and the standardized design envelope defined.

Approval of a reference system can be obtained at the construction permit stage of licensing, provided detailed design is available for comprehensive staff review.

2. Duplicate Plants

This standardized design approach, which is under consideration by several utility companies, consists of construction and operation of several duplicate plants at one or more sites. The individual site characteristics would be treated in each of the several construction permit proceedings, but the facility design would undergo a single review by the Regulatory Staff. As in the case of the reference systems, this will require a careful definition of the site-related interfaces. The design will, of course, have to meet the most restrictive site conditions imposed by any one of the several sites in question.

The staff will, in addition, provide accelerated reviews for new applications to construct plants that are duplicates of plants that have received construction permits subsequent to June 30, 1974.

3. License to Manufacture

In some cases construction of a complete facility may take place at a location remote from the site where it will be operated. Review of this standardized facility design can culminate in a License to Manufacture. This requires

review of the design by the ACRS and authorization by an Atomic Safety and Licensing Board. As in the other options for standardized design reviews, the site-related interfaces would have to be identified and interface requirements established. A construction permit will still be required for each site where the plants are to be installed, but the construction permit review will focus on site-related matters and the adequacy of the design basis interface conditions, rather than on the details of the previously approved design. An operating license would have to be obtained for each of these plants.

Conclusion

The primary objective of the Commission in encouraging standardization is to better assure the safety of nuclear power plants while maintaining the maximum efficiency in the utilization of manpower in the licensing process. Implementing the approaches to standardization defined above is expected to help achieve this dual objective. The Commission hopes to obtain experience with these approaches over the next several years and to subsequently modify its licensing process or procedures as appropriate.

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POWER LEVELS OF NUCLEAR POWER PLANTS

A. INTRODUCTION

Section 50.34 of 10 CFR Part 50 requires that each application for a construction permit include a summary description and discussion of the facility with special attention to, among other things, the design and operating characteristics at the projected initial power level (proposed licensed power level).

Section 50.34 also requires that the application include an analysis and evaluation of the major structures, systems, and components of the facility which bear significantly on the acceptability of the site, under the site evaluation factors identified in 10 CFR Part 100, at the ultimate power level contemplated by the applicant.

It is the policy of the Atomic Energy Commission to encourage, support, and give priority consideration to activities leading to greater standardization of nuclear power plants. In a statement issued on March 5, 1973, announcing its nuclear plant standardization policy, the Commission stated that the size of all new plants accepted for licensing review (both those proposed for review as standardized plants and those proposed for review in connection with a specific application for a construction permit) would be subject to a maximum * power limit.[1]

This guide describes acceptable maximum power levels for all nuclear power plants.

[1] The Regulatory staff study referred to in the Commission Policy Statement stated that only applications for light-water reactors would be accepted for review as standardized plants. The Regulatory staff has now determined that applications for standardized plants will *not* be limited to light-water-cooled reactors.

* Lines indicate substantive changes from previous issue

B. DISCUSSION

The design power levels of nuclear power plants have increased from about 600 megawatts electric in 1965 to slightly above 1300 megawatts electric in 1973. The continual increase in the size of these plants has resulted in many plant design modifications and in a large expenditure of AEC staff review effort to assure the maintenance of a consistent level of safety. These numerous plant design variations, coupled with the rapidly increasing number of applications, have contributed to the steady growth in the required licensing review effort to evaluate such applications. The increase in plant power levels, and the associated design modifications, have made standardization of designs difficult to achieve.

The intent of the AEC policy on plant power levels is also to stabilize the maximum size of nuclear plants until sufficient experience is gained with design, construction, and operation of large plants. The first plants in the 1100-megawatt electric class are now in the startup phase. The Regulatory staff believes that a substantial time period should elapse before maximum licensed core thermal power levels are changed. Accordingly, construction permit applications should not be submitted for plants of core thermal power levels greater than 3800 megawatts before January 1, 1979, at the earliest. The AEC will issue notice of its intent to consider applications at core thermal power levels greater than 3800 megawatts at least two years prior to acceptance of such applications. In determining, subsequent of January 1, 1979, the acceptability of any increase in the maximum licensed power level, the operating history of large plants will be carefully reviewed.

Some of the analyses in support of the proposed licensed power level are made for a slightly higher assumed power level to allow for possible instrument

errors in determing the power level. The Regulatory staff has determined that a margin of two percent of the licensed power level is adequate for this purpose.

Analyses of the possible offsite radiological consequences of postulated design-basis accidents made to demonstrate acceptability of the site in accordance with 10 CFR Part 100 should be performed for at least 1.02 times the proposed licensed core power level or may, at an applicant's discretion, be made at a somewhat higher power level to account for the margin which may be provided in turbine-generator designs above rated capacity. The Regulatory staff believes that a reasonable maximum allowance for this additional capacity and for instrument error is provided by a limit of 4100 megawatts thermal on ultimate core power level for Part 100-related analyses. The staff will regard such analyses as supporting operation of the facility at a proposed licensed core power level no greater than 3800 megawatts thermal.

C. REGULATORY POSITION

1. The proposed licensed power level of all nuclear power plants for which a construction permit application is filed pursuant to Section 50.34 of 10 CFR Part 50 should be limited to a reactor core power level of 3800 megawatts thermal or less until January 1, 1979, at the earliest.

2. Analyses and evaluation in support of the application should be made at an assumed core power level equal to 1.02 times the proposed licensed power level (with a maximum acceptable value of 1.02 times 3800, or 3876 megawatts thermal) for (a) normal operating conditions, (b) transient conditions anticipated during the life of the facility such as load changes, control rod malfunctions and improper operations, loss of forced coolant flow, loss of load or turbine trip, loss of normal a-c power, primary system depressurization, etc., and (c) accident conditions necessary to evaluate the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.

3. Analyses of the possible offsite radiological consequences of postulated design-basis accidents made to demonstrate acceptability of the site in accordance with 10 CFR Part 100 should be performed for an assumed core power level equal to 1.02 times the proposed licensed power level or may, at an applicant's discretion, be made at a higher power level, not to exceed 4100 megawatts thermal. Analyses made at an assumed core power level greater than 1.02 times the proposed licensed power level should be regarded as supporting operation of the facility at a proposed licensed core power level no greater than 3800 megawatts thermal.