

1.4 CLASSIFICATION OF BWR SYSTEMS, CRITERIA, AND REQUIREMENTS FOR SAFETY EVALUATION

1.4.1 Introduction

To fully evaluate the many aspects of the design and operation of the boiling water reactor plant, it is necessary to classify the various systems, criteria, design bases, and operating requirements in light of specified personnel (including the public) hazard considerations. A system has been developed which allows classification of any BWR aspect-criterion, system, design basis, or operating requirement-relative to either personnel hazard or the plant mission (the generation of electrical power).

Table 1.4-1 illustrates the concept used in the classification process. The concept applies to the total plant: design and operation. A major distinction is made between those BWR aspects which are most pertinent to personnel hazard and those which are most pertinent to the plant mission-the generation of electrical power. Those aspects most pertinent to personnel hazard would appear under the "safety consideration" side (left side) of the table, and the aspects most pertinent to the plant mission would appear under the "power generation" side (right). All plant components contribute in some measure to safety, but those classified under "power generation" considerations are considerably less important to safety than those items classified under "safety" considerations. Therefore, the right and left sides of the table represent a major difference in importance to safety.

Down the left side of Table 1.4-1 are listed the various types of plant operation, including events resulting in transients and accidents. An allowance is made for a special event in the left column to enable the classification of criteria, systems, and operational requirements not otherwise classifiable. The left-hand column is actually a gross probability scale. Planned operation is certain, abnormal operational transients are reasonably expected, and accidents are very improbable. Any special events would have to be fitted into the probability scale as appropriate. The left-hand column might ultimately develop into a quantified probability scale.

The rectangular spaces formed under the safety considerations heading and the power generation heading represent potential classification categories for BWR criteria, systems, and operational requirements. This classification concept, when applied, allows an accurate distinction between the importances of the various aspects of BWR design and operation.

1.4.2 Classification Basis

Tables 1.4-2A and 1.4-2B present the basis for classifying various BWR items. The format of the tables is similar to that used in Table 1.4-1, which presented the classification concept. A list of unacceptable results is given within each

classification category. The unacceptable results represent a set of master criteria, from which the design and operation of the BWR can be consistently evaluated.

The only unacceptable results listed for the power generation consideration (Table 1.4-2B) are those that are more restrictive than those for the safety consideration (Table 1.4-2A).

In the various columns inside each classification category, generic labels are assigned to the specific elements which appear or would appear, if listed, in the column. A generic label is given only to facilitate discussion and identification of a group of elements united by their common classification. Beneath the generic names are listed some of the more illustrative BWR items which can be classified in the different columns. Some of the listed items are the limits and restrictions found in the technical specifications. Technical specifications are limited to those concerns that are only on Table 1.4-2A.

Classification analyses have been performed to establish the essentiality of the various BWR systems to the avoidance or prevention of the listed unacceptable results. Such analyses consider any applicable criteria requiring redundancy or specified levels of functional reliability in the avoidance of unacceptable results. Once a system is classified, it is evaluated with reference to the criteria applicable to the group in which it performs an essential action. A classification analysis is not the same as a plant safety analysis. A classification analysis takes no credit whatever for the system under study; whereas, a plant safety analysis represents the true response of the whole plant to an event under specified analytical assumptions.

1.4.3 Use of the Classification Plan

Because Tables 1.4-2A and B permits the classification of any BWR criterion, system, or operational requirement into one or more of the classification categories, the plan facilitates a plantwide safety overview. The plan explains the reasons for the differences in the designs of apparently similar systems by relating the actions of the systems to specified unacceptable results. With the design complete, the classification plan is used to establish operational requirements and procedures whose differences are consistent with the different importances of unacceptable results.

It should be noted that a system may be classified in several categories. This occurs because classification is the result of a functional analysis of the plant. When classified in more than one category, a system must satisfy all of the requirements for each category with regard to its contributions to the various safety actions within each of the categories.