REVISIONS TO THE DRAFT SAFETY EVALUATION REPORT
DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1
DOCKET NOS. 50-346

1. Delete the last paragraph of Section 6.2.1 and replace it with the following:

   "The applicant has analyzed the consequences of inadvertent actuation of the containment spray system to verify the adequacy of the external design pressure of the shield building. Vacuum breakers are used to draw air from the shield building to the containment. We have received the applicant's analysis and conclude that it was done in a reasonably conservative manner and the external design pressure of the shield building is acceptable."

   "We have evaluated the containment system functional design in accordance with the General Design Criteria stated in 10 CFR Part 50 of the Commission's Regulations and, in particular, Criteria 16 and 50. We are unable to conclude on the acceptability of the containment subcompartment analysis. We will report our findings on this matter in a supplement to the Safety Evaluation Report."

2. Delete the second and third paragraphs of Section 6.2.3 and replace them with the following:

   "The applicant has identified the potential containment leak paths which bypass the volumes treated by the emergency

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ventilation system. The bypass leak paths identified by the applicant and the total allowable leakage from these bypass leak paths have been included in the plant technical specifications. We, therefore, conclude that the applicant has properly identified the potential bypass leak paths in accordance with Branch Technical Position CSB 6-3."

"The applicant has analyzed the pressure response of the shield building following a LOCA. The applicant calculates that a negative pressure of 0.25 inches (water gauge) will be established in the annulus space approximately 740 seconds after the LOCA. The analysis considers both radiative and convective heat transfer from the primary containment structure to the shield building atmosphere. However, before we can conclude on the acceptability of the analysis, we will require additional information regarding such modeling assumptions as the emergency ventilation system fan actuation time, and the reduction in the annulus volume and the increase in the heat transfer surface area between the containment vessel and the shield building due to the thermal expansion of the containment vessel. The results of this analysis will be reported in a supplement to the Safety Evaluation Report."

"As part of the preoperational and periodic inservice inspection and test programs, the applicant will confirm the operability of the emergency ventilation system components and equipment, and the functional capability of the system to depressurize and maintain the prescribed negative pressure within the shield building and the other plant areas it serves. We will require that the periodic testing not only verify that the emergency ventilation system is capable of maintaining a negative pressure of 0.25 inches (water gauge) in the plant areas it serves, but that the tests also demonstrate that parameter values such as fan capacity, fan start time, and in-leakage rates are conservative when compared to the values assumed in the shield building analysis. We will review the applicant's proposed test program and conclude on its acceptability in a supplement to the Safety Evaluation Report."

3. Delete the last paragraph of Section 6.2.4 and replace it with the following:

"In our review of the containment isolation provisions, we noted that the applicant has indicated his intention to use the containment purge system during plant operation. We will require that containment purge system operation be limited to 1% of the time per year (about 90 hours) or meet the requirements of Branch Technical Position CSB 6-4, "Containment Purging During Normal Plant Operation."

"We have reviewed the containment isolation system for conformance to General Design Criteria 54, 55, 56 and 57. We conclude that the system meets the intent of the General Design Criteria. However, we will require additional analysis by the applicant of the consequences of using the containment purge system during normal plant operation. We will conclude on this item in a supplement to the Safety Evaluation Report."

4. Insert the following sentences at the end of the second paragraph of Section 6.2.5:

   "The combustible gas control systems are designed for remote-manual operation. The systems will be initiated from individual blower and valve control switches located in the control room when the containment hydrogen concentration reaches a predetermined value after a LOCA. Two redundant gas analyzer systems external to the containment vessel will be available to monitor the hydrogen concentration in the containment. The analyzer systems will alarm on excessive hydrogen concentration."

5. Delete the first sentence of the third paragraph in Section 6.2.5 and replace it with the following:

   "The containment hydrogen dilution (CHD) system consists of two full capacity, redundant, rotary, positive displacement type blowers to supply air to the containment. The CHD system controls the hydrogen concentration by the addition of outside atmospheric air, which has been filtered through a separator, to the containment vessel. This results in a pressurization of the containment and the suppression of the hydrogen volume fraction."

6. Change the following numbers in the sixth paragraph of Section 6.2.5:

   The number "44" should now be "37".

   The number "24" should now be "21".

DAVIS BESSE NUCLEAR POWER STATION, UNIT 1
CONTAINMENT SYSTEMS BRANCH
REQUEST FOR ADDITIONAL INFORMATION

1. In the revised shield building analysis, the emergency ventilation system fans are assumed to start in 16 seconds following a postulated loss of coolant accident. Discuss how the actuation time was established and justify that it is conservative. Consider loss of off-site power, startup and sequencing of diesels, the time delay for setpoints to be reached, and mode of fan actuation (manual or automatic). If the fan actuation time of 16 seconds is shown to be non-conservative, provide a reanalysis of the shield building pressure transient following a LOCA.

2. During a shield building pressure transient following a loss of coolant accident, thermal expansion of the steel containment vessel results in a reduction of the annulus volume and an increase in the heat transfer surface area between the containment and the shield building. Both of these effects tend to increase the pressure on the shield building. Provide justification for the assumption made in the revised shield building analysis (see Page 6-36b of the FSAR) that both of these effects are compensating and that their combined effect is negligible.

3. Identify the systems or portions of systems which will be vented and drained during a Type A test as required by Appendix J to 10 CFR 50, and include this information in the proposed Technical Specifications. Systems that will not be vented or drained should be identified and the reasons for not doing so should be provided.

4. The Containment Systems Branch has published a Branch Technical Position entitled, "Containment Purging During Normal Operation," (BTP CSB 6-4), which is attached. The BTP identifies certain analyses which should be done to justify the acceptability of operating the purge system during normal plant operation. Therefore, provide the analyses identified in Item 5 of the BTP.

5. The proposed Technical Specifications specify an overall air lock leakage rate limitation of 0.05 La at Pa (38 psig). Since the air lock is included as a potential bypass leak path, this limit conflicts with the maximum allowable bypass leakage rate of 0.015 La. Provide an acceptance criterion for the overall air lock leakage rate that does not conflict with the maximum allowable bypass leakage rate.

   In addition, the proposed Technical Specifications specify that periodic leak testing of the air lock door seals should demonstrate no detectable seal leakage when pressurized to Pa without the use of "strongbacks," and that leakage has been detected between the door seals when pressurized at a reduced pressure. Therefore, propose a method of leak testing the volume between the door seals at a reduced pressure and justify the test pressure. Provide the equations that will be used to extrapolate the leakage rate to Pa, and justify that it is a conservative method. In addition, specify and justify the maximum allowable, extrapolated leakage rate at Pa.

6. The proposed Technical Specifications require some testing of the emergency ventilation system. However, it is not clear that the testing will verify the acceptability of the system performance. Identify the parameters to be monitored and specify their limiting values, for the purpose of justifying the calculated 740-second depressurization time for the shield building. Propose a technical specification which identifies the criteria for the acceptable performance of the emergency ventilation system.

Branch Technical Position CSB 6-4

CONTAINMENT PURGING DURING NORMAL PLANT OPERATIONS

A. BACKGROUND

This branch technical position pertains to system lines which can provide an open path from the containment to the environs during normal plant operation; e.g., the purge and vent lines of the containment purge system. It supplements the position taken in Standard Review Plan 6.2.4.

While the containment purge system provides plant operational flexibility, its design must consider the importance of minimizing the release of containment atmosphere to the environs following a postulated loss-of-coolant accident. Therefore, plant designs must not rely on its use on a routine basis.

The need for purging has not always been anticipated in the design of plants, and therefore, design criteria for the containment purge system have not been fully developed. The purging experience at operating plants varies considerably from plant to plant. Some plants do not purge during reactor operation, some purge intermittently for short periods and some purge continuously.

The containment purge system has been used in a variety of ways, for example, to alleviate certain operational problems, such as excess air leakage into the containment from pneumatic controllers, for reducing the airborne activity within the containment to facilitate personnel access during reactor power operation, and for controlling the containment pressure, temperature and relative humidity. However, the purge and vent lines provide an open path from the containment to the environs. Should a LOCA occur during containment purging when the reactor is at power, the calculated accident doses should be within 10 CFR 100 guideline values.

The sizing of the purge and vent lines in most plants has been based on the need to control the containment atmosphere during refueling operations. This need has resulted in very large lines penetrating the containment (about 42 inc..es in diameter). Since these lines are normally the only ones provided that will permit some degree of control over the containment atmosphere to facilitate personnel access, some plants have used them for containment purging during normal plant operation. Under such conditions, calculated accident doses could be significant. Therefore the use of these large containment purge and vent lines should be restricted to cold shutdown conditions and refueling operations.

The design and use of the purge and vent lines should be based on the premise of achieving acceptable calculated offsite radiological consequences and assuring that emergency core cooling (ECCS) effectiveness is not degraded by a reduction in the containment backpressure.

Purge system designs that are acceptable for use on a non-routine basis during normal plant operation can be achieved by providing additional purge and vent lines. The size of these lines should be limited such that in the event of a loss-of-coolant accident, assuming the purge and vent valves are open and subsequently close, the radiological consequences calculated in accordance with Regulatory Guide 1.3 and 1.4 would not exceed the 10 CFR 100 guideline values. Also, the maximum time for valve closure should not exceed five seconds to assure that the purge and vent valves would be closed before the onset of fuel failures following a LOCA.

The size of the purge and vent lines should be about eight inches in diameter for PWR plants. This line size may be overly conservative from a radiological viewpoint for the Mark III BWR plants and the HTGR plants because of containment and/or core design features. Therefore, larger line sizes may be justified. However, for any proposed line size, the applicant must demonstrate that the radiological consequences following a loss-of-coolant accident would be within 10 CFR 100 guidelines values. In summary, the acceptability of a specific line size is a function of the site meteorology, containment design, and radiological source term for the reactor type; e.g., BWR, PWR or HTGR.

B. BRANCH TECHNICAL POSITION

The system used to purge the containment for the reactor operational modes of power operation, startup, and hot standby; i.e., the on-line purge system, should be independent of the purge system used for the reactor operational modes of hot shutdown, cold shutdown, and refueling.

1. The on-line purge system should be designed in accordance with the following criteria:
    a. The performance and reliability of the purge system isolation valves should be consistent with the operability assurance program outlined in MEB Branch Technical Position MEB-2, Pump and Valve Operability Assurance Program. (Also see Standard Review Plan 3.9.3.) The design basis for the valves and actuators should include the buildup of containment pressure for the LOCA break spectrum, and the purge line and vent line flows as a function of time up to and during valve closure.
    b. The number of purge and vent lines that may be used should be limited to one purge line and one vent line.
    c. The size of the purge and vent lines should not exceed about eight inches in diameter unless detailed justification for larger line sizes is provided.
    d. The containment isolation provisions for the purge system lines should meet the standards appropriate to engineered safety features; i.e., quality, redundancy, testability and other appropriate criteria.
    e. Instrumentation and control systems provided to isolate the purge system lines should be independent and actuated by diverse parameters; e.g., containment pressure, safety injection actuation, and containment radiation level. If energy is required to close the valves, at least two diverse sources of energy shall be provided either of which can affect the isolation function.
    f. Purge system isolation valve closure times, including instrumentation delays, should not exceed five seconds.
    g. Provisions should be made to ensure that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam.

2. The purge system should not be relied on for temperature and humidity control within the containment.

3. Provisions should be made to minimize the need for purging of the containment by providing containment atmosphere cleanup systems within the containment.

4. Provisions should be made for testing the availability of the isolation function and the leakage rate of the isolation valves, individually, during reactor operation.

5. The following analyses should be performed to justify the containment purge system design:
   a. An analysis of the radiological consequences of a loss-of-coolant accident. The analysis should be done for a spectrum of break sizes, and the instrumentation and setpoints that will actuate the vent and purge valves closed should be identified. The source term used in the radiological calculations should be based on a calculation under the terms of Appendix K to determine the extent of fuel failure and the concomitant release of fission products, and the fission product activity in the primary coolant. A pre-existing iodine spike should be considered in determining primary coolant activity. The volume of containment in which fission products are mixed should be justified, and the fission products from the above sources should be assumed to be released through the open purge valves during the maximum interval required for valve closure. The radiological consequences should be within 10 CFR 100 guideline values.
   b. An analysis which demonstrates the acceptability of the provisions made to protect structures and safety-related equipment; e.g., fans, filters and ductwork, located beyond the purge system isolation valves against loss of function from the environment created by the escaping air and steam.
   c. An analysis of the reduction in the containment pressure resulting from the partial loss of containment atmosphere during the accident for ECCS backpressure determination.

d. The allowable leak rates of the purge and vent isolation valves should be specified for the spectrum of design basis pressures and flows against which the valves must close.