

TABLE 1.8-1 (Continued)

<u>Regulatory Guide (Rev.;RRRC Category)</u>	<u>Degree of Conformance</u>	<u>Reference</u>
1.127 - (Revision 1 - 3/78;RRRC Cat. 3) Inspection of water control structures associated with nuclear power plants	PNPP conforms to this guide as it applies to the intake and discharge control structures.	-
1.128 - (Revision 1 - 10/78;RRRC Cat. 1) Installation Design and Installation of large lead storage batteries for nuclear power plants	Class 1E batteries are designed and installed in accordance with IEEE Standard 484-1975, as modified by Regulatory Guide 1.128, except that a hydrogen survey will not be performed. Calculations indicate that the maximum concentration in the battery area will be less than 0.001%.	8.1
1.129 - (Revision 1 - 2/78;RRRC Cat. 1) Maintenance, testing and replacement of large lead storage batteries for nuclear power plants	PNPP conforms to Regulatory Guide (R.G.) 1.129 with the following exceptions:  <ol style="list-style-type: none"> <li>1. Regulatory Guide 1.129 endorses IEEE 450-1975. PNPP is adopting IEEE 450-1980 in lieu of IEEE 450-1975.</li> <li>2. If scheduling of the 60 month battery performance discharge test coincides with the 18 month battery service test, only the 60 month battery performance discharge test will be performed.</li> <li>3. The performance discharge test of battery capacity for a battery that shows signs of degradation or has reached 85% of expected service life is performed every 18 months.</li> </ol>	8.1, Tech. Specs.

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## REACTIVITY CONTROL SYSTEMS BASES

### CONTROL ROD PROGRAM CONTROLS (Continued)

The RPCS provide automatic supervision to assure that out-of-sequence rods will not be withdrawn or inserted.

The analysis of the rod drop accident is presented in Section 15.4 of the FSAR and the techniques of the analysis are presented in a topical report, Reference 1, and two supplements, References 2 and 3.

The RPCS is also designed to automatically prevent fuel damage in the event of erroneous rod withdrawal from locations of high power density during higher power operation.

A dual channel system is provided that, above the low power setpoint, restricts the withdrawal distances of all control rods. This restriction is greatest at highest power levels.

### 3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

The standby liquid control system provides a backup capability for bringing the reactor from full power to a cold, Xenon-free shutdown, assuming that the withdrawn control rods remain fixed in the rated power pattern. To meet this objective it is necessary to inject a quantity of boron which produces a concentration of 660 ppm in the reactor core. To allow for potential leakage and imperfect mixing this concentration is increased by 25%. The required concentration is achieved by having a minimum available quantity of ~~4400~~ gallons of sodium pentaborate solution, ~~13.4%~~ by weight, containing a minimum of 5236 lbs. of sodium pentaborate. This quantity of solution is the net amount above the pump suction, thus allowing for the portion that cannot be injected. The pumping rate of 41.2 gpm provides a negative reactivity insertion rate over the permissible sodium pentaborate solution volume range which adequately compensates for the positive reactivity effects due to temperature and xenon during shutdown. The temperature requirement for the sodium pentaborate solution is necessary to ensure that the sodium pentaborate remains in solution.

With redundant pumps and explosive injection valves and with a highly reliable control rod scram system, operation of the reactor is permitted to continue for short periods of time with the system inoperable or for longer periods of time with one of the redundant components inoperable.

Surveillance requirements are established on a frequency that assures a high reliability of the system. Once the solution is established, boron concentration will not vary unless more boron or water is added, thus a check on the temperature and volume once each 24 hours assures that the solution is available for use.

Replacement of the explosive charges in the valves at regular intervals will assure that these valves will not fail because of deterioration of the charges.

1. C. J. Paone, R. C. Stirn and J. A. Woulley, "Rod Drop Accident Analysis for Large BWR's," G. E. Topical Report NEDO-10527, March 1972
2. C. J. Paone, R. C. Stirn and R. M. Young, Supplement 1 to NEDO-10527, July 1972
3. J. M. Haun, C. J. Paone and R. C. Stirn, Addendum 2, "Exposed Cores," Supplement 2 to NEDO-10527, January 1973

## CONTAINMENT SYSTEMS

### BASES

#### DEPRESSURIZATION SYSTEMS (Continued)

In addition to the limits on temperature of the suppression pool water, operating procedures define the action to be taken in the event a safety-relief valve inadvertently opens or sticks open. As a minimum this action shall include: (1) use of all available means to close the valve, (2) initiate suppression pool water cooling, and (3) if other safety-relief valves are used to depressurize the reactor, their discharge shall be separated from that of the stuck-open safety relief valve, where possible, to assure mixing and uniformity of energy insertion to the pool.

The containment spray system consists of two 100% capacity loops, each with three spray rings located at different elevations about the inside circumference of the containment. PWR pump A supplies one loop and RHR pump B supplies the other. RHR pump C cannot supply the spray system. Dispersion of the flow of water is effected by ~~345 nozzles in each loop~~, enhancing the condensation of water vapor in the containment volume and preventing overpressurization. Heat rejection is through the RHR heat exchangers. The turbulence caused by the spray system aids in mixing the containment air volume to maintain a homogeneous mixture for H<sub>2</sub> control. 46 nozzles in loop A and 344 nozzles in loop B,

The suppression pool cooling function is a mode of the RHR system and functions as part of the containment heat removal system. The purpose of the system is to ensure containment integrity following a LOCA by preventing excessive containment pressures and temperatures. The suppression pool cooling mode is designed to limit the long term bulk temperature of the pool to 185°F considering all of the post-LOCA energy additions. The suppression pool cooling trains, being an integral part of the RHR system, are redundant, safety-related component systems that are initiated following the recovery of the reactor vessel water level by ECCS flows from the RHR system. Heat rejection to the emergency service water is accomplished in the RHR heat exchangers.

The suppression pool make-up system provides water from the upper containment pool to the suppression pool by gravity flow through two 100% capacity dump lines following a LOCA. The quantity of water provided is sufficient to account for all conceivable post-accident entrapment volumes, ensuring the long term energy sink capabilities of the suppression pool and maintaining the water coverage over the uppermost drywell vents. During refueling, there will be administrative control to ensure the make-up dump valves will not be opened.

#### 3/4.6.4 CONTAINMENT ISOLATION VALVES

The OPERABILITY of the containment isolation valves ensures that the containment atmosphere will be isolated from the outside environment in the event of a release of radioactive material to the containment atmosphere or pressurization of the containment and is consistent with the requirements of GDC 54 through 57 of Appendix A to 10 CFR 50. Containment isolation within the time limits specified for those isolation valves designed to close automatically ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a LOCA.

## CONTAINMENT SYSTEMS

### BASES

#### 3/4.6.5 VACUUM RELIEF

##### 3/4.6.5.1 CONTAINMENT VACUUM RELIEF AND 3/4 6.5.2 CONTAINMENT HUMIDITY CONTROL

Vacuum breakers are provided on the containment to prevent an excessive vacuum from developing inside containment during an inadvertent or improper operation of the containment spray. Four vacuum breakers and their associated isolation valves are provided. Any two vacuum breakers provide 100% vacuum relief.

The containment vacuum relief system is designed to prevent an excessive vacuum from being created inside the containment following inadvertent initiation of the containment spray system. By maintaining temperature/relative humidity within the limits for acceptable operation shown on Figure 3.6.5.2-1, the maximum containment vacuum created by actuation of both containment spray loops will be limited to approximately -0.7 psig.

##### 3/4.6.5.3 DRYWELL VACUUM BREAKERS

Drywell vacuum breakers are provided on the drywell to prevent drywell flooding due to differential pressure across the drywell and to equalize pressure between the drywell and containment.

Two drywell vacuum breakers and their associated isolation valves are provided. Any one vacuum breaker can provide full vacuum relief capability.

#### 3/4.6.6 SECONDARY CONTAINMENT

Secondary containment is designed to minimize any ground level release of radioactive material which may result from an accident. The Shield Building provides secondary containment during normal operation when the containment is sealed and in service. At other times, the containment may be open and, when required, secondary containment integrity is specified.

Establishing and maintaining a vacuum in the annulus with the annulus exhaust gas treatment system, along with the surveillance of the doors, hatches, and valves, is adequate to ensure that there are no violations of the integrity of the secondary containment.

The OPERABILITY of the annulus exhaust gas treatment systems ensures that sufficient iodine removal capability will be available in the event of a LOCA. The reduction in containment iodine inventory reduces the resulting site

## 3/4.8 ELECTRICAL POWER SYSTEMS

### BASES

#### 3/4.8.1, 3/4.8.2 and 3/4.8.3 A.C. SOURCES, D.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for (1) the safe shutdown of the facility and (2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least Division 1 or 2 of the onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. or D.C. source. Division 3 supplies the high pressure core spray (HPCS) system only.

The A.C. and D.C. source allowable out-of-service times are based on Regulatory Guide 1.93, "Availability of Electrical Power Sources," December 1974 as modified by plant specific analysis and diesel generator manufacturer recommendations. When diesel generator Division 1 or Division 2 is inoperable, there is an additional ACTION requirement to verify that all required systems, subsystems, trains, components and devices, that depend on the remaining OPERABLE diesel generator Division 1 or Division 2 as a source of emergency power, are also OPERABLE. This requirement is intended to provide assurance that a loss of offsite power event will not result in a complete loss of safety function of critical systems during the period diesel generator Division 1 or Division 2 is inoperable. The term verify as used in this context means to administratively check by examining logs or other information to determine if certain components are out-of-service for maintenance or other reasons. It does not mean to perform the surveillance requirements needed to demonstrate the OPERABILITY of the component.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that (1) the facility can be maintained in the shutdown or refueling condition for extended time periods and (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The surveillance requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977 as modified by plant specific analysis and diesel generator manufacturer recommendations.

## ELECTRICAL POWER SYSTEMS

### BASES

#### A.C. SOURCES, D.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

The surveillance requirements for demonstrating the OPERABILITY of the unit batteries ~~are in accordance with~~ <sup>meet the intent of</sup> the recommendations of Regulatory Guide 1.129 "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants", February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations." <sup>Some surveillance intervals differ from those recommended in IEEE Std 450-1980, as identified in USAR Table 1.8-1.</sup>

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8.2.1-1 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts and not more than .015 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts and not more than .020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than .010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8.2.1-1 is permitted for up to 7 days. During this 7 day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than .020 below the manufacturer's recommended full charge specific gravity ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity ensures that an individual cell's specific gravity will not be more than .040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts, ensures the battery's capability to perform its design function.