3.1.6.9 Loss of reactor coolant through reactor coolant pump seals and system valves to connecting systems which vent to the gas vent header and from which coolant can be returned to the reactor coolant system shall not be considered as reactor coolant leakage and shall not be subject to the consideration of Specifications 3.1.6.1, 3.1.6.2, 3.1.6.3, 3.1.6.4, 3.1.6.5, 3.1.6.6, or 3.1.6.7, except that such losses when added to leakage shall not exceed 30 gpm. If leakage plus losses exceeds 30 gpm, the reactor shall be placed in hot shutdown within 24 hours of detection.

3.1.6.10 Operating conditions of power operation, startup and hot shutdown apply to the operational status of the high pressure isolation valves between the primary coolant system and the low pressure injection system.

a. During all operating conditions in this specification, all pressure isolation valves listed in Table 3.1.6.1 that are located between the primary coolant system and the LPIS shall function as pressure isolation devices except as specified in 3.1.6.10b. Valve leakage shall not exceed the amount indicated in Table 3.1.6.1.(a)

b. In the event that integrity of any high pressure isolation check valves specified in Table 3.1.6.1 cannot be demonstrated, reactor operation may continue provided that at least two valves in each high pressure line having a nonfunctional valve are in and remain in, the mode corresponding to the isolated condition.(b)

c. If Specification 3.1.6.10a or 3.1.6.10b cannot be met, an orderly shutdown shall be accomplished by achieving hot shutdown within six hours and cold shutdown within an additional thirty hours.

Bases

Any leak of radioactive fluid, whether from the reactor coolant system primary boundary or not, can be a serious problem with respect to in-plant radioactive contamination and required cleanup or, in the case of reactor coolant, it could develop into a still more serious problem and, therefore, the first indications of such leakage will be followed up as soon as practical. The unit's makeup system has the capability to makeup considerably more than 30 gpm of reactor coolant leakage plus losses.

Water inventory balances, monitoring equipment, radioactive tracing, boric acid crystalline deposits, and physical inspections can disclose reactor coolant leaks.

(a) For the purpose of this specification, integrity is considered to have been demonstrated by meeting Specification 4.2.7.

(b) Motor operated valves shall be placed in the closed position and power supplies deenergized.

Bases (Continued)

If reactor coolant leakage is to the containment, it may be identified by one or more of the following methods:

a) The containment radiation monitor is a three channel monitor consisting of a particulate channel, an iodine channel, and a gaseous channel. All three channels read out in the Control Room and alarm to indicate an increase in containment activity.

   The containment particulate channel is sensitive to the presence of Rb-88, a daughter product of Kr-88, in the containment air sample. Since this activity originates predominantly in the Reactor Coolant System, an increase in monitor readings could be indicative of increasing RCS leakage. The sensitivity of the particulate monitor is such that a leakrate of less than 1 gpm will be detected within one (1) hour under normal plant operating conditions.

b) The mass balance technique is a method of determining leakage by stabilizing the Reactor Coolant System and observing the change in water inventory over a given time period. Level decreases in the Makeup Tank may also serve as an early indication of abnormal leakage.

c) The Reactor Building sump receives leakage from systems inside containment. Sump level readings are checked and recorded regularly for rate of water accumulation. High accumulation rates alert the operators to increase their surveillance of possible leak sources. Level is detected in one-half inch increments which correspond to a volume of ~56 gallons.

d) Humidity Monitoring: This system collects moisture condensed from the containment atmosphere by the cooling coils of the main recirculation units. The drain lines of these units are equipped with flow switches which alarm in the Control Room on high flow.

The leakage detection capability provided by the above methods can be used to determine potential pressure boundary faults. Such leakage, while tolerable from a dose point of view, could be indicative of material degradation which if not dealt with promptly, could develop into larger leaks.

This specification is concerned with leakage from the Reactor Coolant System (RCS) and Makeup and Purification System (MUPS). The methods discussed above provide a means of detecting, as early as possible, leakage which could be the result of a fault in the reactor coolant system pressure boundary. The primary method used at TMI-1 for quantifying RCS and MUPS leakage is the mass balance technique.

Bases (Continued)

The unidentified leakage limit of 1 gpm is established as a quantity which can be accurately measured while sufficiently low to ensure early detection of leakage. Leakage of this magnitude can be reasonably detected within a matter of hours, thus providing confidence that cracks associated with such leakage will not develop into a critical size before mitigating actions can be taken.

Total reactor coolant leakage is limited by this specification to 10 gpm. This limitation provides allowance for a limited amount of leakage from known sources whose presence will not interfere with the detection of unidentified leakage.

The primary to secondary leakage through the steam generator tubes is limited to 1 gpm total. This limit ensures that the dosage contribution from tube leakage will be limited to a small fraction of Part 100 limits in the event of a steam line break. Steam generator leakage is quantified by analysis of secondary plant activity.

If reactor coolant leakage is to the auxiliary building, it may be identified by one or more of the following methods:

a. The auxiliary and fuel handling building vent radioactive gas monitor is sensitive to very low activity levels and would show an increase in activity level shortly after a reactor coolant leak developed within the auxiliary building.

b. Water inventories around the auxiliary building sump.

c. Periodic equipment inspections.

d. In the event of gross leakage, in excess of 13 + 2 gpm, the individual cubicle leak detectors in the makeup and decay heat pump cubicles, will alarm in the control room to backup "a", "b", and "c" above.

When the source and location of leakage has been identified, the situation can be evaluated to determine if operation can safely continue. This evaluation will be performed by TMI-1 Plant Operations.

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TABLE 3.1.6.1

PRESSURE ISOLATION CHECK VALVES BETWEEN
THE PRIMARY COOLANT SYSTEM & LPIS

System	Valve No.	Maximum(a) Allowable Leakage
Low Pressure Injection		(≤5.0 GPM for all valves)
Train A	CF-V5A DH-V22A	(≤5.0 GPM for all valves)
Train B	CF-V5B DH-V22B	(≤5.0 GPM for all valves)

Footnote:

(a)

1. Leakage rates less than or equal to 1.0 gpm are considered acceptable.

2. Leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are considered acceptable if the latest measured rate has not exceeded the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.

3. Leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are considered unacceptable if the latest measured rate exceeded the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.

4. Leakage rates greater than 5.0 gpm are considered unacceptable.