

SEPARATION OF CONTAMINATED WATER SYSTEMS FROM NON-CONTAMINATED PLANT SYSTEM

This circular describes an event which occurred at a nuclear power facility; however, the generic implications may be applicable to test reactors, fuel cycle facilities, and major by-product material processors.

In June, 1977, the licensee for Beaver Valley 1 reported that make up water from a primary water storage tank (PWST) contaminated the plant water treatment system, which in turn supplies the in-plant domestic (potable) water system. The plant domestic water became contaminated with a tritium concentration of 7×10^{-3} uCi/ml. The domestic water was contaminated for approximately six hours before the condition was detected by the licensee and controls were established over the use of in-house water. No significant exposure of plant personnel resulted from the event; however, five individuals showed positive levels of tritium by urinalysis. No release to the offsite environment above maximum permissible occurred.

The PWST receives processed reactor coolant water from the Boron Recovery System which has been purified through evaporation, degasification and demineralization to remove radioisotopes other than tritium. The PWST is used to supply primary grade water to the reactor coolant system and is normally kept separated from the water treatment system. The cross connection between the primary grade water system and the water treatment system occurred when an isolation valve was inadvertently left open during valve line-up operations to recirculate the PWST. The procedure which specified the required line-up was being used for the first time since preoperational testing and did not list the subject valve.

In addition to the valving error, however, a design error resulted in connecting a line from the PWST to a water treatment system line at a position upstream of two series stop-check valves. In the proper configuration, the line would have been connected downstream of the stop-check valves, which would have prevented back flow of water from the primary grade water system to the water treatment system even with the isolation valve left open. Corrective actions taken

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by the licensee were to: (1) correct identified procedural deficiencies which led to the valving error; (2) modify the piping installation to the intended configuration; and (3) add two series isolation valves upstream of the stop-check valves in a "tell-tale" arrangement to provide an air break between the primary water and water treatment lines. The above corrective actions are being reviewed for suitability with design separation criteria.

Section 10.5.3 of the National Standard Plumbing Code requires double check valves or siphon breaker between potable and nonpotable systems. Section 9.2.4 of the Standard Review Plan (NUREG-75/087) states that the acceptance criteria for design of the potable and sanitary water systems (PSWS) is acceptable if there are no interconnections between the PSWS and systems having the potential for containing radioactive materials.

A somewhat similar incident had previously occurred in March, 1975, at Millstone Units 1 and 2, when an improperly wired conductivity cell instrument permitted the return of high activity water to the house heating boiler makeup system. Overflow from the deaerating feed tank and surge tank, which are components of the house heating boiler makeup system, resulted in an unfiltered and unmonitored release of contaminated water.

It is recommended that you review your systems and as-built (or design) drawings, identify all interconnections between contaminated and non-contaminated water systems, and review the interconnection design to assure that separation has been provided. Operating procedures which could lead to inadvertent contamination of domestic water systems should be reviewed to verify that proper valve lineup and administrative controls are provided to prevent contamination of the domestic water supply and the subsequent intake of radioisotopes by plant personnel.

No written response to this Circular is required. Your review of this matter to determine its applicability to your facility and any corrective and preventive actions taken or planned, as appropriate, will be reviewed during a subsequent NRC inspection. If you desire additional information regarding this matter, contact the Director of the appropriate NRC Regional Office.

LISTING OF IE CIRCULARS ISSUED IN 1977

CIRCULAR NO.	SUBJECT	FIRST DATE OF ISSUE	ISSUED TO
77-01	Malfunctions of Limitorque Valve Operators	1-4-77	All holders of Operating License (OL) or Construction permit(CP)
77-02	Potential Heavy Spring Flooding	2-15-77	All affected holders of OLs
77-02A	Potential Heavy Spring Flooding	2-16-77	All affected holders of CPs
77-03	Fire Inside a Motor Control Center	2-28-77	All holders of OLs and CPs
77-04	Inadequate Lock Assemblies	3-17-77	Safeguard Group I, II, IV, V, Licensees
77-05	Liquid Entrapment in Valve Bonnets	3-24-77	All holders of OLs and CPs
77-06	Effects of Hydraulic Fluid on Electrical Cable	4-1-77	All holders of OL's and CPs
77-07	Short Period During Reactor Startup	4-12-77	Holders of BWR OLs
77-08	Failure of Feedwater Sample Probe	4-13-77	All holders of OLs
77-09	Improper Fuse Coordination In BWR Standby Liquid Control System Control Circuits	5-25-77	All holders of BWR OLs or CPs
77-10	Vacuum Conditions Resulting in Damage to Liquid Process Tanks	7-15-77	All holders of OLs

Enclosure 2
IE Circular 77-14
Date: November 22, 1977

LISTING OF IE CIRCULARS ISSUED IN 1977 (Continued)

CIRCULAR NO.	SUBJECT	FIRST DATE OF ISSUE	ISSUED TO
77-11	Leakage of Con- tainment Isolation Valves with Resilient Seats	9-6-77	All holders of OLS and CPs
77-12	Dropped Fuel Assem- blies at BWR Facili- ties	9-15-77	All holders of BWR OLS or CPs
77-13	Reactor Safety Signals Negated During Testing	9-22-77	All holders of OLS and CPs