

VACUUM CONDITIONS RESULTING IN DAMAGE TO LIQUID PROCESS TANKS

DESCRIPTION OF CIRCUMSTANCES

On January 31, 1977, at the Portland General Electric Company's Trojan Nuclear Station, a vacuum was pulled on a Chemical and Volume Control System holdup tank which caused the tank to buckle inwardly and crack at the junction of two buckled areas (LER 50-344/77-02). Radioactive cover gas escaped from the tank to the fuel building exhaust ventilation and ultimately through the auxiliary building ventilation stack to the environment. During the period of January 31 through February 7, 1977, (date of discovery) approximately 62.5 curies of noble gases were released to the environment. The occurrence was caused by malfunctions of both the primary (waste gas decay tank collection header) and the backup (nitrogen pressurization system) cover gas supply pressure regulators during pumpout of the tank contents. The malfunction of the primary regulator was due to moisture accumulation which led to the formation of a water column on the discharge side of the pressure regulator. The regulator in the backup nitrogen supply system malfunctioned at the same time, but the cause has not been determined. There were no alarms or remote indication for the holdup tank or the gas control header to indicate abnormal pressure or to indicate the operating status of the nitrogen supply system.

A similar event occurred at the Sacramento Municipal Utility District's Rancho Seco nuclear station wherein the Reactor Coolant System Drain Tank partially collapsed under vacuum conditions and in doing so cracked an inlet line attached to the tank (LER 50-312/77-03). The first indication of the condition was detected by the radiation monitor that samples the ventilation exhaust in an area adjacent to the room in which the damaged tank was located. Radioactive gases were released through the failed line between January 12 and February 16, 1977. During this period, approximately 9 curies of radioactive gas were released. The cause of this occurrence was attributed to the tank not being properly vented by the operator during discharge of its liquid contents.

It is recommended that you examine the systems of your reactor facility that contain low pressure process or holdup tanks and assure that adequate measures have been taken to protect against vacuum conditions that could result in tank inward buckling and failure with subsequent release of radioactive material or cause other detrimental effects with regard to the overall safety of plant operations. It is also recommended that you examine your capability to detect and locate possible leaks of radioactive material from such tanks.

No written response to this Circular is required. If you desire additional information regarding this matter, contact the Director of the appropriate NRC Regional Office.

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