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OFFICE OF INSPECTION AND ENFORCEMENT
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IE Circular No. 80-20: CHANGES IN SAFE-SLAB TANK DIMENSIONS

Description of Circumstances:

During a routine inspection at a fuel facility, an NRC inspector received a report of significant dimensional changes in safe geometry tanks. The tanks were used to store low-enriched uranium solutions from a scrap dissolver. The problem was first identified when a sight-glass mounted on the large face of one of three safe-slab tanks cracked from the strain of tank dimensional changes. Further investigation and measurements revealed that the large faces of two of the tanks had bulged and increased the thickness dimensions of the tanks.

The maximum bulge occurred at the center of one of the tanks, increasing the tank thickness 2 1/2 in. beyond the design thickness of 5 1/2 in. The bulge tapered from the tank centers to the designed 5 1/2 in. at the tank edges. The tanks were made of 1/8-in. type 304 stainless steel with the tank edges and large faces supported and stiffened by 3/16-in. angle iron.

The cause of the bulging was believed to be overpressurization due to partial plugging of the tank vent lines. Contributing factors may have been excessive transfer rates, metal fatigue aggravated by corrosion, and the high specific gravity of the stored solution.

Replacement tanks were provided with tie-bars and heavier 1/4-in. angle iron stiffeners to preserve the thickness dimensions. Conservative calculations, taking into account the weight of solution, tank dimensions, and tie-bar and stiffener strength, indicated that required dimensions would be maintained. A precondition for the calculations required that the tank vent system be designed to prevent accidental pressurization.

To prevent accidental pressurization, a 1-1/2-in. overflow line was connected to the 1-1/2-in. vent line to the process offgas (POG) system at a point immediately above each tank. This provided a positive overflow as well as a second vent in case a plug occurred in the main POG line. Additionally, each tank was provided with a 2" x 4" inspection port at the top with a cover free to "float" should pressurization occur.

The tank dimensions were approximately 62" x 62" x 5 1/2". The tank locations were parallel to and about 1 ft removed from the scrap recovery area walls. The visual detection of the 2-1/2-in. deflection of the large tank face from a point in front of the tank is usually difficult so that measurements should be made with calipers or similar equipment to assure detection of significant distortion.

Notice to Licensees:

All licensees using safe-slab tanks should be aware of the possible changes in tank dimensions resulting from hydraulic or pneumatic forces. Certain steps should be taken to prevent or detect changes in safe-slab tank dimensions. These actions include the following:

(1) Structural analyses should be reviewed for all vessels designed to be geometrically safe to assure that the possibility of pressurization has been adequately considered. The use of tie-bars and rigid steel supports should be considered in designs for new tanks.

(2) The possibility of vent lines becoming plugged should be studied and special overflow mechanisms should be provided if pressurization by vent line plugging is possible.

(3) Provision should be made for routine dimensional checks of geometrically safe vessels. These checks should be made whether or not the vessels are subject to pressurization.

No written response to this circular is required. If additional information regarding this subject is required, contact the Director of this office.

RECENTLY ISSUED IE CIRCULARS

Circular No.	Subject	Date of Issue	Issued to
80-19	Noncompliance with License Requirements for Medical Licensees	8/26/80	All medical licensees
80-18	10 CFR 50.59 Safety Evaluations for Changes to Radioactive Waste Treatment Systems	8/22/80	All power reactor facilities with an OL or CP
80-17	Fuel Pin Damage Due to Water Jet from Baffle Plate Corner	7/23/80	All holders of PWR OLs and PWR CPs
80-16	Operational Deficiencies In Rosemount Model 510DU Trip Units And Model 1152 Pressure Transmitters	6/27/80	All power reactor facilities with an OL or a CP
80-15	Loss of Reactor Coolant Pump Cooling and Natural Circulation Cooldown	6/20/80	All power reactor facilities with an OL or CP
80-14	Radioactive Contamination of Plant Demineralized Water System and Resultant Internal Contamination of Personnel	6/24/80	All holders of power and research reactor licenses (operating and construction permits), and fuel cycle licensees
80-13	Grid Strap Damage in Westinghouse Fuel Assemblies	5/18/80	All holders of reactor OLs and CPs
80-12	Valve-Shaft-To-Actuator Key May Fall Out of Place When Mounted Below Horizontal Axis	5/14/80	All holders of reactor OLs and CPs
80-11	Emergency Diesel Generator Lube Oil Cooler Failures	5/13/80	All holders of a power reactor OL or CP
80-10	Failure to Maintain Environmental Qualification of Equipment	4/29/80	All holders of reactor OLs and CPs
80-09	Problems With Plant Internal Communications Systems	4/28/80	All holders of a power reactor OL or CP