



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION V

1450 MARIA LANE  
WALNUT CREEK, CALIFORNIA 94596-5368

April 12, 1993

TECHNICAL ISSUE SUMMARY

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ISSUE: 8-INCH AND 4-INCH SWING CHECK VALVE DOWEL TOO SHORT TO PERFORM  
DESIGN FUNCTION

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**BACKGROUND:** An inspection of Anchor Darling 8-inch swing check valves (Model 2588-5), during the Diablo Canyon Unit 2 fifth refueling outage, identified a nonconforming condition of the check valve internals. The bonnet hold-down dowel (Anchor Darling drawing 1027-3E item #15) did not protrude from the valve cover plate as required. The bonnet dowel length listed on the manufacturer drawing parts list was incorrect, specifying the dowel length to be the same as the depth of the receiver hole in the valve bonnet. A later revision of the Anchor Darling drawing increased the length of the dowel. Without the correct dowel fit, the potential exists for the hinge ring (item #5) to lift and not return to its required position. As a result the bonnet hold-down dowels are not capable of performing their intended design function of preventing upward (vertical) movement of the hinge ring under dynamic conditions, defined by Anchor Darling as a seismic event. The lifting of the hinge ring creates the potential for leakage as a result of improper orientation of the valve disc with the seat. The manufacturer's drawing for the subject valve applied to a total of twelve 8-inch valves, six on each of Units 1 and 2. All six of the 8-inch valves on Unit 2 have been inspected. Two valves were found with short hold-down dowels and four valves with the correct length hold-down dowels.

Further investigation by the licensee identified a similar Anchor Darling design 4-inch swing check valve (Anchor-Darling Model 2787-5, drawing 1026-3E) which also utilized bonnet hold-down dowels to prevent vertical movement of the hinge ring. The parts list for this design valve also specified the incorrect bonnet hold-down dowel length. This drawing applied to a total of sixteen 4-inch swing check valves, eight on both Units 1 and 2. Additional dimensional problems and assembly anomalies were found during the inspections that may have allowed valve internals to move excessively, resulting in seismic operability questions. Deficiencies noted include insufficient hinge ring locking pin length and receiver hole depth, and gasket groove and bonnet tongue dimensions outside of drawing tolerances.

There are a total of 28 Anchor Darling swing check valves of this design (both 4-inch and 8-inch), 16 of which are in safety-related applications, installed in Diablo Canyon Units 1 and 2. Affected valves are installed in the following systems: Containment Spray, Reactor Coolant, Chemical and Volume Control, Spent Fuel Cooling and the Refueling Water Storage Tank supply to Chemical and Volume Control and Safety Injection.

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**FINDINGS/SIGNIFICANCE:** Vertical or rotational movement of the hinge ring may prevent proper valve seating or restrict swing arm/disc movement, posing the potential for the check valve to become inoperable. Valve operability may affect associated system operability after a seismic event. The subject valves at Diablo Canyon were fabricated in the early 1970's for Westinghouse by Anchor Darling.

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**LICENSEE/NRC ACTION:** The licensee performed an operability assessment of this condition involving calculations to determine the magnitude of the seismic acceleration forces on affected valves and individual valve functions. These calculations showed that less than 1.0 G in the vertical direction would be experienced at affected valve locations for a seismic event of 0.2 G ground movement. Plant Emergency Operating Procedures currently require the plant be placed in a Cold Shutdown condition after a seismic event if a 0.2 G ground movement or greater occurs. At which point an inspection of the affected valves would be performed. The licensee is inspecting all affected valves in safety-related systems in Unit 2 during the current outage and will inspect Unit 1 valves during the next outage of sufficient duration or immediately following a seismic event of 0.2 G or greater.

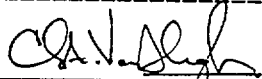
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**REFERENCES:** Anchor Darling Drawings 1026-3E, 1027-3E

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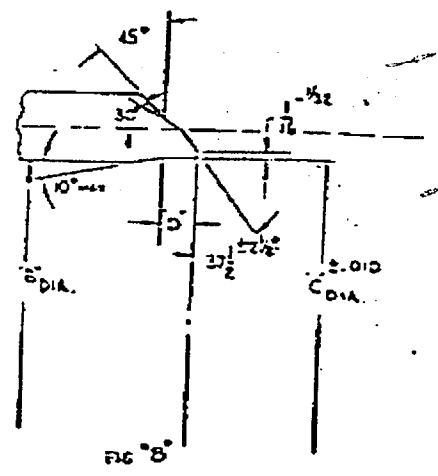
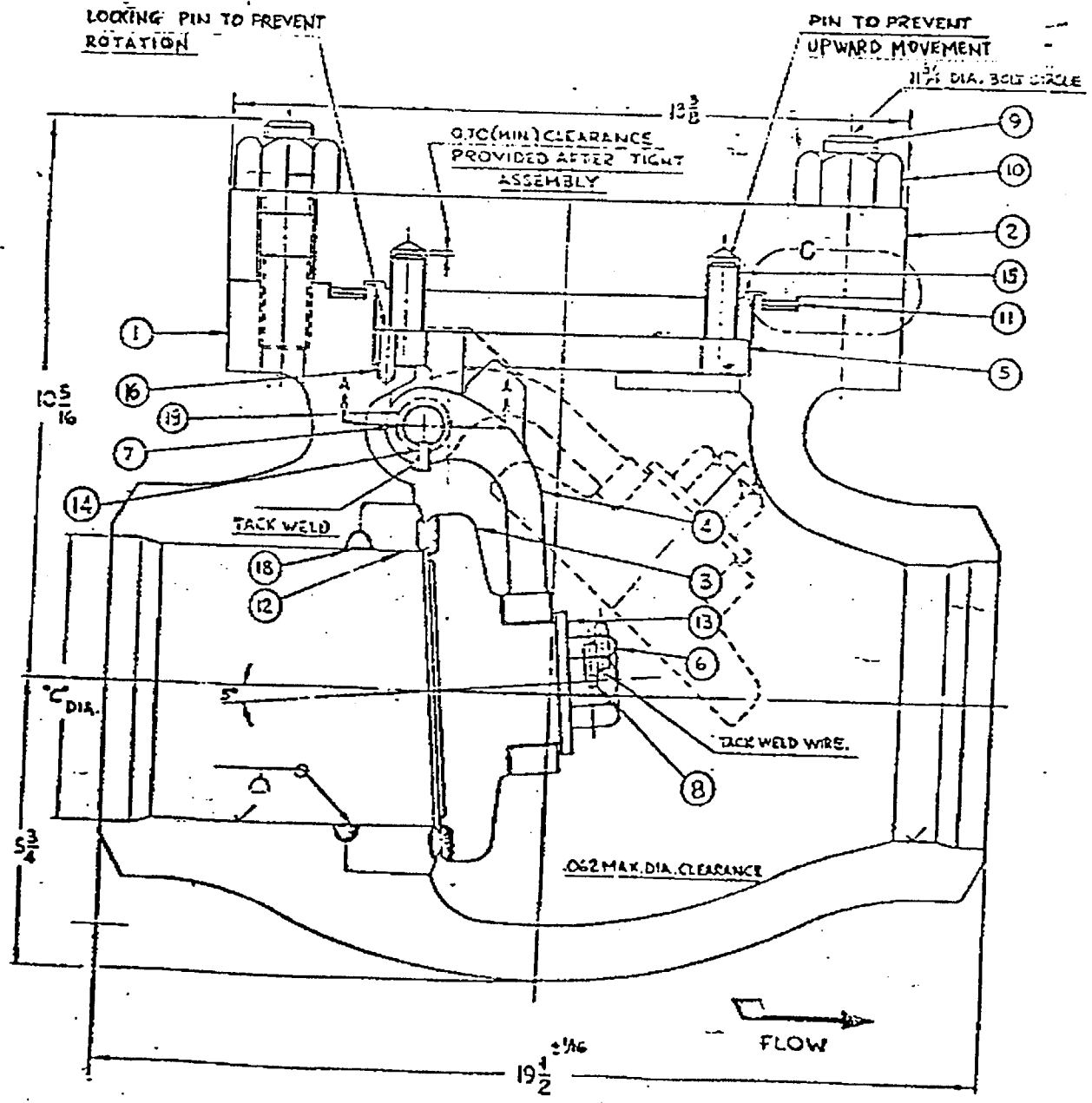
  
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