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Donald C. Shelton
Senior Vice President
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Docket Number 50-346

License Number NPF-3

Serial Number 2205

March 9, 1994

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Subject: Second 10-Year Interval Inservice Testing Program for Davis-Besse Nuclear Power Station

Gentlemen:

By letters dated December 2, 1991 (Log Number 3643), April 23, 1993 (Log Number 3981) and August 18, 1993 (Log Number 4055) the NRC reviewed and approved the "Second Interval Pump and Valve Inservice Testing Program" for Davis-Besse Nuclear Power Station (DBNPS) and associated requests for relief. Subsequent to the review and approval, an additional need for relief from the requirements of the American Society of Mechanical Engineers (ASME) Code has been identified.

Relief Request RP-7 is enclosed as Attachment 1. This relief request will allow the use of pump performance curves to determine acceptable pump performance in lieu of using fixed reference flowrates and differential pressures for the Component Cooling Water (CCW) pumps at DBNPS. Relief Request RP-7 is similar to a relief request for the Service Water Pumps at DBNPS (RP-4) which was previously approved in the December 2, 1991 letter.

In addition, during an inspection of the Inservice Testing Program in April 1993, the inspectors made an observation regarding pump testing methods used at DBNPS. The observation is documented in Inspection Report 50-346/93009 dated May 17, 1993 (Log Number 1-2851) and is summarized below.

It is the present practice at DBNPS to obtain multiple data points during a single pump test. This data is typically taken at five minute intervals with no adjustment of the equipment. Reference values for pump performance characteristics are determined in a like manner. The data points are then averaged to determine the

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pump performance characteristics for that test. Section XI of the ASME Code, IWP-3500 permits obtaining multiple data points during a single pump test, however, the ASME Code does not address averaging of the data. This was acknowledged in an the ASME Code Committee response to ASME Code Inquiry submitted by Toledo Edison following the inspection. Since the ASME Code does not prohibit averaging of multiple data points, relief is not being requested, nor is TE proposing an alternative test method to a Code-required method. Accordingly, TE intends to continue this present practice as it provides a more consistent and reliable indication of pump performance and degradation.

Should you have any questions regarding this submittal, please contact Mr. William T. O'Connor, Manager - Regulatory Affairs, at (419) 249-2366.

Very truly yours,

John K. Wood for DCS

MKP/eld

cc: J. B. Martin, Regional Administrator, NRC Region III
S. Stasek, DB-1 NRC Senior Resident Inspector
R. J. Stransky, NRC Project Manager
Utility Radiological Safety Board

PUMP RELIEF REQUEST

RP-7

SYSTEM: Component Cooling Water (CCW)

PUMPS: P43-1, P43-2, P43-3

CLASS: 3

FUNCTION:

Provides cooling water to transfer heat from safety-related equipment to the Service Water System.

TEST REQUIREMENTS:

IWP-3100 requires that each measured test quantity in Table IWP-3100-1 be compared to the reference value of the same quantity. Any deviations determined shall be compared to the limits given in Table IWP-3100-2, Allowable Ranges of Test Quantities.

BASIS FOR RELIEF:

The use of reference curves for pump evaluation in lieu of reference values for differential pressure, vibration, and flow are requested. The use of vibration velocity in lieu of vibration amplitude as a measured quantity is also requested. The difficulty of reproducing the same system flow resistances, the use of a more reliable measured quantity (i.e., vibration velocity) and man-rem exposure savings are the basis for this request.

During power operations, one component cooling train is aligned to service standby essential loads and is not in service. One component cooling train serves non-essential loads and is in service. During shutdown conditions, both component cooling trains are in service. The system also contains a third, spare train as a backup to either the essential or non-essential trains. Flow through the pump aligned to service essential loads remains essentially constant when the train is in service. Flow through the pump aligned to service the non-essential loads cannot be fixed because system resistances are continuously varying and flows to parallel loads are dependent on each other. Spent fuel cooling and boric acid evaporators have temperature control valves which vary demand on the CCW system according to heat load. Component cooling water flow to the reactor coolant pump coolers varies, dependent on as left throttle positions on the supply lines for the four pumps. Component cooling water flow to the control rod drive booster pumps passes through cleaning filters and flow will change dependent on filter loading. Thus, flow cannot be reliably throttled to a fixed reference value.

BASIS FOR RELIEF (Continued):

Presently, the quarterly pump test for each pump may be performed on either train, depending upon the plant conditions at the time of the test. Manual butterfly valves in each of the in-service trains are used to throttle flow during pump testing to achieve the same operating point for each test. These valves do provide control, however, repeatability is poor, as butterfly valves are not designed to throttle flow. In the essential train, these valves are located in an elevated radiation field and, dependent on plant conditions, a high radiation area. Entering this radiation area for up to 12 tests per year to monitor and throttle flow causes unnecessary radiation exposure. Based upon present radiation levels, estimated exposure for performing 12 tests is approximately 0.4 man-rem per year.

ALTERNATE TESTING:

As discussed above in the Basis for Relief section, it is extremely difficult to return to a specific value of flow rate or differential pressure for testing of these pumps. An alternative to using testing requirements of IWP-3100 is to base the acceptance criteria on pump reference curves. Pump performance curves, giving reference values for vibration velocity and differential pressure as functions of flow between 3000 gpm and 8000 gpm have been established. The flow ranges reflect normal and accident flow rate conditions. The differential pressure versus flow data was plotted and compared to established manufacturer's pump curves. The vibration velocity data was obtained at the same flow data points and was also plotted to establish reference curves. These curves will serve as the basis for the alert and required action levels to ensure pump degradation is identified. The alert level and required action level parameters, as defined in the ASME code, 1989 Edition, Section XI, OMa-1988, Part 6, Ranges for Test Parameters, are superimposed as curves.

The methodology employed for establishing a reference curve is similar to that for performing a comprehensive test being proposed by the ASME Code Committee. To reduce the uncertainty associated with the pump curves and the adequacy of the acceptance criteria, special test gauges ($\pm$0.5 % full scale accuracy or better) have been installed to obtain test data. Flow indicator damping devices were also installed to limit flow gauge oscillations. Measurements of vibration velocity and differential pressure at a minimum of six flow data points have been obtained for each pump, then plotted to compile the pump performance reference curves.

During pump testing, the flow will be established within the domain of the reference curve. As plant conditions permit, approximately the same operating point will be established. Vibration velocity and differential pressure will be measured and recorded. Pump performance will be considered acceptable if parameter values fall within the regions bounded by the defined alert and action level curves, rather than a specific value.

ALTERNATE TESTING (Continued):

The rated speed of these centrifugal pumps is 1100 rpm. Table IWP-3100-2, Allowable Ranges of Test Quantities, requires one vibration data point to be taken and this point is a measurement of amplitude. The ASME Code, 1989 Edition, Section XI, OMa-1988, Part 6, Ranges for Test Parameters, requires five vibration data points to be taken and these points are measurements of velocity. Use of vibration velocity measurements in lieu of vibration amplitude and additional data point evaluations will ensure an earlier and more reliable prediction of pump degradation.

After any maintenance or repair that may affect the existing reference pump curves, and new reference pump curves will be determined or the existing pump curves revalidated by inservice testing.

Using this alternative testing method, an acceptable level of quality and safety is provided.

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