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ACCESSION NBR:8408100115 DOC.DATE: 84/08/08 NOTARIZED: NO DOCKET #
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SUBJECT: Documents 840723 discussion re design of proposed gravity-feed auxiliary feedwater pump motor lube oil cooling sys as alternate to forced-feed design described in util 830307 ltr.Formal enorsement requested by 840821.

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August 8, 1984

Director, Office of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Branch Chief
Licensing Branch No. 3
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Auxiliary Feedwater Pump Motor Bearing Qualification
Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

The purpose of this letter is to formally document a July 23, 1984 discussion between SCE and the NRC regarding the design of the proposed gravity-feed auxiliary feedwater (AFW) pump motor lube oil cooling system. SCE's letter of April 2, 1984 provided a description of the proposed gravity-feed lube oil cooling system as an alternate to the forced-feed design described in SCE's March 7, 1983 letter. As requested by the NRC (H. Rood and N. Wagner), SCE provided clarification of the proposed gravity-feed lube oil cooling system design during the above discussion.

The following NRC concerns were addressed by SCE during the course of the above discussion:

1. Testing of the Fusible-link Valve

   The fusible-link actuated valve, which releases lube oil to the auxiliary feedwater pump motor bearings, may be tested in situ and does not require removal of the valve from the system. The fusible-link would be actuated by use of a heat gun or similar device for this test. The valve cap assembly, which includes the factory preset fusible-link, can then be replaced to restore the valve to a ready condition.

2. Lube Oil Cooling System Maintenance and Testing

   The following inspection, maintenance and test items will be performed for the AFW pump motor lube oil cooling system:

   Monthly

   - o Level check of supply and drain tanks
   - o Visual inspection of system (leak-tightness, etc.)
   - o Correction of anomalies as required

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Refueling

- o Functional test by actuation of the fusible-link valve
- o Proper valve operation and system flow check
- o Oil contamination check (water etc.)
- o Cleaning of orifices, and replacement of oil, fusible-link assembly, and valve O-rings as required

The frequency of these inspection, maintenance and test items is consistent with existing requirements for the AFW system and, for convenience, will be included in the appropriate AFW procedures. It would be inappropriate to include requirements addressing the AFW pump motor lube oil cooling system in the AFW Technical Specifications. As stated in an SCE to NRC letter dated January 11, 1983, the San Onofre Units 2 and 3 AFW systems meet the established reliability criteria for AFW without the addition of a lube oil cooling system. Operability of the SONGS 2/3 AFW systems is not dependent on availability of a lube oil cooling system, and should not be required by the Technical Specifications.

3. Design for Moderate Energy Pipe Cracks

The AFW pump motor lube oil cooling system piping is routed outside the pipe whip and jet impingement zones of postulated AFW turbine steam line ruptures and is designed to Seismic Category II/I criteria. It is therefore unlikely that failure of the lube oil system piping will occur. However, the lube oil system piping has been routed such that pressure boundary leakage, were it to occur, would drip onto the floor or the motor baseplate; the piping is not routed in the vicinity of any hot surfaces and the maximum obtainable lube oil system pressure (about 6 psig) is not sufficient to cause the lube oil to spray. The consequences of moderate energy pipe cracks in the AFW pump motor lube oil cooling system piping are therefore determined to be acceptable.

4. Effect of Outside Temperature on Lube Oil Cooling

The range of ambient temperatures postulated to occur at the San Onofre 2/3 site may result in AFW pump motor lube oil supply tank and piping temperatures of between 40°F and 100°F. Although the viscosity of the synthetic-based oil in the AFW motor bearings and cooling system changes by a factor of approximately 5 over this temperature range, the lube oil flow rate to each bearing will change by less than 10% (from 0.67 gpm at 100°F to 0.61 gpm at 40°F). The small change in calculated flow results from a relatively constant orifice coefficient over the applicable range of Reynolds number, and the relatively small change in static head at the orifice due to

piping losses. Because the available differential temperature between the oil supply and drain of the AFW motor will approximately double at the lower supply temperature, the lower oil flow rate/supply temperature will actually result in a significant net increase in cooling capability. The AFW pump motor lube oil cooling system will therefore provide adequate cooling over the range of postulated ambient temperatures at the San Onofre 2/3 site.

During the July 23, 1984 SCE-NRC discussion, the NRC informally indicated that the proposed gravity-feed auxiliary feedwater pump motor lube oil cooling system design would be acceptable based on receipt of the enclosed information. Based on the enclosed information, SCE considers that the proposed lube oil cooling system design is acceptable to the NRC and is proceeding with procurement activities for system construction during the first refueling outages of Units 2 and 3, respectively. SCE requests that the NRC provide formal endorsement of the proposed design by August 21, 1984.

If you have any further questions, please call me.

Very truly yours,

cc: Mr. H. Rood, Project Manager,
Licensing Branch 3

Mr. A. E. Chaffee, NRC Resident Inspector