INSERVICE TESTING PROGRAM
SECOND TEN-YEAR INTERVAL
SAN ONOFRE UNITS 2 AND 3

PUMP RELIEF REQUEST No. 13

SYSTEMS	Units 2 & 3 Emergency Chilled Water (ECW), Component Cooling Water (CCW), Diesel Generator Fuel Oil (DGFO), Containment Spray System (CSS), Low Pressure Safety Injection (LPSI)
COMPONENTS	ECW Pumps P160 and P162; CCW Seismic Make-up Pumps P1018 and P1019; DGFO Transfer Pumps P093, P094, P095, P096 CSS Pumps P012 and P013; LPSI Pumps P015 and P016;
CLASS	2 and 3
FUNCTION	To provide flow to safety systems.
TEST REQUIREMENTS	Per OM-6 4.6.1.1: The total loop accuracy for pressure and flow rate shall be ± 2% of full scale. Per OM-6 4.6.1.2.a: The full-scale range of each analog instrument shall not be greater than three times the reference value.
BASIS FOR RELIEF	**Chilled Water Pumps, CCW Seismic Makeup Pumps, and DGFO Transfer Pumps (See Table 1)** Relief is requested from the full scale range requirements of OM-6 4.6.1.2.a for the ECW Pumps, the CCW Seismic Make-up Pumps suction pressure gauges, and the DGFO Transfer Pumps discharge pressure guages. The instruments listed in Table 1 do not meet the OM-6 4.6.1.2.a requirement (e.g., the full-scale range of each instrument shall not be greater than three times the reference value). As seen in Table 1, the ratios of Range/Reference Value vary from 3.3 to 6.2. However, the manufacturer's stated accuracy for each pressure

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instrument listed in Table 1 exceeds the OM-6, paragraph 4.6.1.1, required accuracy (plus or minus two percent of full scale) for pressure instruments by a factor of four. The combination of range and accuracy yields a reading that is significantly better than the reading achieved from instruments that meet the minimum Code requirements. Thus, installing a gauge that meets the 4.6.1.2.a requirements results in unnecessary labor with little or no benefit in monitoring capabilities.

Containment Spray and Low Pressure Safety Injection Pumps (See Table 2)

Relief is requested from the full scale range requirements of OM-6 4.6.1.2.a under certain scenarios for CSS pump suction pressures and LPSI pump suction and discharge pressures. For routine quarterly tests, which are performed on miniflow, these gauges meet the Code required limits. However, during refueling outages, the water from the Refueling Water Storage Tanks (RWSTs), which provide suction head to the pumps, is transferred to the refueling canal. This lowers the water level in the RWSTs and thus the reference suction pressure for the Inservice Tests (ISTs). In these circumstances of reduced suction pressure, the gauges do not always meet the 4.6.1.2.a requirements (i.e., they read less than one-third of full scale, See Table 2).

The reference discharge pressure readings are greater than one-third of the instrument range during the miniflow tests conducted quarterly. However, additional full flow tests are conducted at cold shutdown intervals in accordance with NRC Generic Letter 89-04. During these full flow tests, due to the lower RWST level and the change in system line-up, the reference discharge pressure drops below one-third of full scale of the installed instrumentation. As a consequence, the limits of 4.6.1.2.a are not met during the full flow tests.

The manufacturer's stated accuracy for each pressure instrument listed in Table 2 exceeds the OM-6, paragraph 4.6.1.1, required accuracy (plus or minus two percent of full scale) for pressure instruments by a factor of eight. Again, the combination of range and accuracy yields a reading that is significantly better than the reading achieved from instruments that meet the minimum Code requirements. Thus,

installing a gauge that meets the 4.6.1.2.a requirements results in unnecessary labor and radiation exposure with little or no benefit in monitoring capabilities.

Summary

Even though the existing installed station instruments do not meet the Code range requirements of OM-6 4.6.1.2.a, their overall accuracy exceeds the Code requirements. Thus, the combination of range and accuracy of the installed instrumentation provides for the acquisition of repeatable data that meets the intent of the Code. The reference values listed in the Tables are based on historical data, and although future values may be lower than the values listed, the overall Code accuracy requirements would be met or exceeded under all conditions under which an IST would be performed.

The requirement to install temporary instrumentation to meet the letter of the Code requirements for range and accuracy imposes an undue burden on the plant staff resources, a risk of increased dose, and testing expense without a corresponding improvement in plant safety or quality.

ALTERNATE TESTING:

Use installed instrumentation for inservice testing as listed on the attached tables.

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TABLE 1

Pump	Parameter	Instrument	Reference Value[1]	Instr. Range (Range/Ref. Value)	Error Permitted by Code[2]	As Installed Accuracy at Full Scale (error at full scale)
Emergency Chilled Water Pumps						
P160 P162	Suction Pressure	PI-9883B PI-9883A	27 psig	0-160 (5.9)	1.62 psig	0.5% (0.8 psig)
Component Cooling Water Seismic Make-up Pumps						
P1018 P1019	Suction Pressure	PI-6566 PI-6565	9.0 psig	0-30 (3.3)	0.54 psig	0.5% (0.15 psig)
Diesel Generator Fuel Oil Transfer Pumps						
P093 P094 P095 P096	Discharge Pressure	PI-5973 PI-5975 PI-5976 PI-5974	9.7 psig	0-60 (6.2)	0.58 psig	0.5% (0.3 psig)

(1) Reference values are based on historical data for like pumps. Future values may be lower, but overall Code accuracy requirements would be met or exceeded under all conditions under which an IST would be performed.

(2) The information in this column represents the gauge error permitted by the Code (3 times reference value X Code required accuracy of 2%).

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TABLE 2

Pump	Parameter	Instrument	Nominal Quarterly Reference[1]	Worst Case Refueling Reference[1]	Instr. Range (Range/Ref. Value)[3]	Error Permitted by Code[2]	As Installed Accuracy at Full Scale (error at full scale)
Containment Spray System Pumps							
P012 P013	Suction Pressure	PI-9087 PI-9085	30 psig	19.7 psig	0-75 (3.8)	1.18 psig	0.25% (0.19 psig)
LPSI							
P015 P016	Suction Pressure	PI-9081 PI-9083	31 psig	13 psig	0-60 (4.6)	0.78 psig	0.25% (0.15 psig)
P015 P016	Disch Pressure	PI-9082 PI-9084	215 psig	149 psig	0-500 (3.4)	8.94 psig	0.25% (1.25 psig)

(1) Reference values are based on historical data for like pumps. Future values may be lower, but overall Code accuracy requirements would be met or exceeded under all conditions under which an IST would be performed.

(2) The information in this column represents the gauge error permitted by the Code (3 times reference value X Code required accuracy of 2%).

(3) For worst case refueling reference. Gauges all meet the Code requirements under "normal" quarterly conditions.

INSERVICE TESTING PROGRAM
SECOND TEN-YEAR INTERVAL
SAN ONOFRE UNITS 2 AND 3

PUMP RELIEF REQUEST No. 14

SYSTEM:	Units 2 & 3 Salt Water Cooling (SWC)
COMPONENTS:	SWC Pumps P112, 113, 114, and 307
CLASS	3
FUNCTION	To transfer heat from the Component Cooling System to the ultimate heat sink (Pacific Ocean) during normal and emergency conditions.
TEST REQUIREMENTS	OM-6 6.1 reads as follows: "If deviations fall within the Alert Range of Table 3, the frequency of testing specified in paragraph 5.1 shall be doubled until the cause of the deviation is determined and the condition corrected. If deviations fall within the Required Action Range of Table 3, the pump shall be declared inoperable until the cause of the deviation has been determined and the condition corrected." Table 3b places the Alert Range for Differential Pressure (DP) for vertical line shaft pumps at 0.93 to <0.95 of the Reference DP, and the Required Action Range at <0.93 (and >1.10).
BASIS FOR RELIEF:	Relief is requested from the lower level Alert Range and Required Action Range for vertical line shaft pump DP, as applicable to Salt Water Cooling Pumps P112, P113, P114, and P307. The SWC pumps operate well above the flow and pressure differential assumed in the safety analysis. The margin from the current reference DPs to the DP required by the safety analysis limits is shown in the following table. The design operability curve for the pump with the least margin (2P307) is also attached. It can be seen that any pump degraded by the 7% necessary to place it into the required action range per OM-6 (Column 3) would still be well above the safety analysis limits (Column 4).

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PUMP RELIEF REQUEST No. 14

PUMP	CURRENT REFERENCE DP (FT)	REQUIRED ACTION DP (FT)	SAFETY LIMIT DP (FT)	MARGIN FROM REFERENCE TO SAFETY LIMIT (1)
2P112	90.9	84.5	60.0	34%
2P113	82.2	76.4	59.0	28%
2P114	81.4	75.7	60.0	26%
2P307	78.0	72.5	60.0	23%
3P112	80.4	74.8	49.0	39%
3P113	81.2	75.5	48.5	40%
3P114	79.5	73.9	48.9	38%
3P307	88.7	82.5	47.5	46%

1) Margin to safety = (Reference DP - Safety Limit DP)/Reference DP

The maintenance and operation history of the SWC pumps show that the pumps will enter the Alert and/or Required Action Ranges very early in the life cycle following a pump overhaul. Normal flow through an operating pump is approximately 17,000 gpm, and Inservice Tests (ISTs) are typically performed at approximately 15,000 gpm. After normal conditions of pumping the highly dilute slurry of ocean salt water and entrained sand, DP degrades relatively quickly due to the expected erosion of pump internals and the opening up of internal clearances. On a rotating basis, one SWC pump per unit is operating continuously, so that these pumps accumulate many operating hours under these conditions between quarterly tests. This results in the pumps entering the Alert Range of <95% reference DP while using only a small portion of the margin to the safety limits, and with virtually no degradation from the intended safety function. Being in the Alert (or Required Action) Range results in a nonproductive cycle of increased surveillance testing and additional maintenance activity with no benefit in improved safety. The wear mechanism of the pumps is expected and well understood. The DPs (and other parameters, including vibration and spectra) are trended and analyzed to ensure that no additional problems are occurring.

The requirement to perform corrective action when the pump parameters reach the Code Alert limits imposes an undue burden on the plant staff resources and an undue expense without a corresponding improvement in plant safety or quality. Even in the worn condition, when the DP is below the Alert or Required Action limits of Table 3b, the SWC pumps are considered to be operating satisfactorily. Requiring repair or adjustment each time the lower limits of Table 3b are reached is unnecessary because the pumps can continue to operate satisfactorily for a substantial

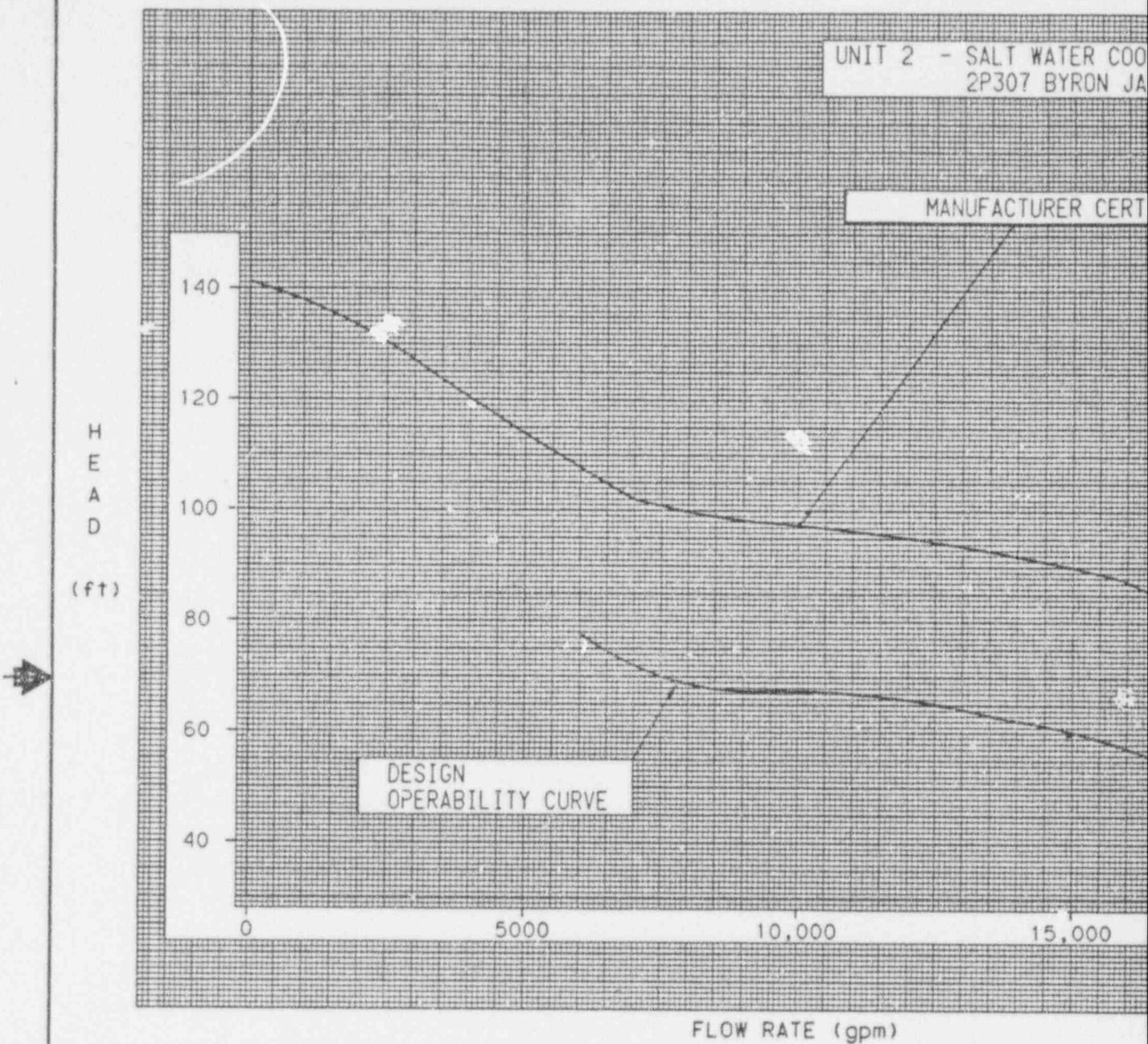
range below the Code limits and meet all safety performance requirements.

ALTERNATIVE TESTING:

Revise the evaluation ranges of these pumps as follows:

Alert Range:	0.87 to <.90 of reference DP
Required Action Range:	<0.87 (and >1.10) of reference DP

This would still maintain a minimum of 10% margin to the safety limits in the most conservative case (2P307). Vibration limits would remain as required in OM-6 Table 3a.



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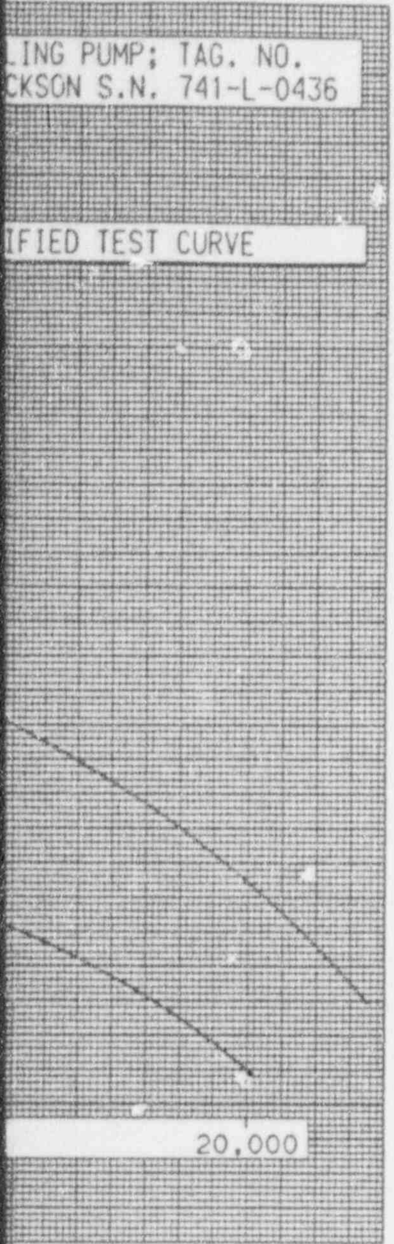

REFERENCES

1. MEMORANDUM FROM V.BARONE TO S.R.GOSSELIN, DATED JUNE 22,1992, (CDM #C920630S1057-4) SUBJECT: INSERVICE TESTING OF PUMPS, DESIGN INPUT FOR SALTWATER COOLING PUMP OPERABILITY.
2. VENDOR DOCUMENT NUMBER S023-405-3A-56-0.
3. MEMORANDUM FOR FILE, PUMP DESIGN OPERABILITY CURVES, SONGS 2/3, DATED OCTOBER 15,1992 (CDM #C921019S3006).

NOTES:

MIN. REQUIRED FLOW	13,750 GPM (REF.1)
MIN. REQUIRED TDH @ 13,750 GPM	62.73 FT (REF. 1)
MCTC HEAD @ 13,750 GPM	92.0 FT (REF.2)
DESIGN MARGIN @ 13,750 GPM	31.8%

THE DESIGN OPERABILITY CURVE WAS DEVELOPED IN ACCORDANCE WITH THE METHODOLOGY SPECIFIED IN REF.3 FOR THE AXIAL FLOW PUMPS, AND ENVELOPES THE MINIMUM DESIGN REQUIREMENTS SPECIFIED IN REF.1.

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QC II UNIT 2

LOCATION: SAN ONOFRE NUCLEAR GENERATING STATION

SALTWATER COOLING PUMP
TAG NO. 2P-307 IST CURVES

SCE Southern California Edison

DWG 41067 Sh.4 REV 1

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