ENCLOSURE 1

PROCEDURE SO23-V-3.4, INSERVICE TESTING OF PUMPS

INSERVICE TESTING OF PUMPS PROGRAM

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INSERVICE TESTING OF PUMPS PROGRAM

1.0 OBJECTIVES AND SCOPE

1.1 This Program Procedure establishes the requirements for San Onofre preservice and inservice testing to assess the operational readiness of certain centrifugal and positive displacement pumps used in Units 2 and 3 in accordance with the requirements of Reference 2.1.2. [Ref. 2.1.7, Para. 1.1]

1.1.1 Test results are used in assessing operational readiness of pumps during their service life to perform a specific function in shutting down the reactor, bringing it to cold shutdown or in mitigating the consequences of an accident.

1.2 This Program Procedure identifies the pumps, establishes test intervals, parameters to be measured and evaluated, acceptance criteria, corrective action, and records requirements. This guidance is used in the implementing procedures, References 2.3.1 through 2.3.11. These procedures shall be used for the various pump inservice tests. [Ref. 2.1.7, Para. 7.2]

1.3 This Program Procedure provides the requirements for response time testing of pumps in the IST Program. This testing is required by the Technical Specifications, Section 3.3.2, *ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION*. Specific acceptance criteria are identified from Reference 2.3.16.

1.4 Scope

1.4.1 The pumps covered in this program are those, provided with an emergency power source, which are required in shutting down a reactor to the cold shutdown condition, maintaining the cold shutdown condition, or in mitigating the consequences of an accident. [Ref. 2.1.7, Para. 1.1]

1.4.2 Components subject to the Inservice Testing Program for Pumps in accordance with reference 2.1.7 are identified in Attachment 4. Attachment 4 also identifies the parameters to be measured for each pump and the test frequency (additional information is provided by means of notes in Attachment 4 also). Pump Relief Request No. 12 is provided in Attachment 8. This is the only pump relief request currently issued for this program. Parameters required to be measured during the Inservice Tests are identified in Attachment 2.

1.4.3 This Procedure may include the testing of components in addition to those listed in accordance with References 2.5.1 and 2.1.6 (Paragraph IWA-1200), but shall, as a minimum, require testing of at least all of the components (meeting the above scope description) in those references.

1.0 OBJECTIVES AND SCOPE (Continued)

1.4.4 Our strategy for determining the pump IST program scope and implementation of the recommendation of the NRC in Reference 2.1.5, Attachment 1, Position 11 includes planned and systematic reviews of design changes by the Nuclear Engineering Design organization (NEDO) System Design Engineers (SDE) with a backup review by the IST Coordinator, see Reference 2.3.18.

.1 Additional information and criteria used for determining IST Program scope is included in References 2.5.1, 2.1.7, 2.1.5, 2.5.2 and Regulatory Guide 1.26. Engineering judgement and prudence are applied when reference criteria are not directly applicable.

1.5 Exclusions

1.5.1 The following are excluded from the scope of this program provided that the pumps are not required to perform a specific function as discussed above (Ref. 2.1.7, Para. 1.2]:

.1 drivers, except where the pump and driver form an integral unit and the pump bearings are in the driver;

.2 pumps that are supplied with emergency power solely for operating convenience.

1.6 The Inservice Testing of Pumps Program delineated herein covers a ten (10) year interval commencing on August 18, 1993, implemented on approximately April 1, 1994, and terminating on August 17, 2003.

1.7 Responsibilities for the Program

1.7.1 In accordance with Reference 2.2.1, The Manager, Station Technical Division is responsible for this program and its implementation at the San Onofre Site.

2.0 REFERENCES

2.1 NRC Commitment(s)

2.1.1 10CFR50, § 50.55a, **Codes and Standards**

2.1.2 Units 2 and 3 Technical Specification 4.0.5, (Subject: *Surveillance Requirements for inservice inspection and testing of ASME Code Class 1, 2 and 3 components*)

2.1.3 Technical Specifications, Units 2 and 3, Section 1.0 DEFINITIONS.

2.0 REFERENCES (Continued)

2.1.4 Topical Quality Assurance Manual (TQAM), Chapter 7, ASME Code Program Scope, Responsibilities and Program Controls, Rev. 7, September 24, 1992

2.1.5 NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing programs, April 3, 1989.

2.1.6 ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition (July 1, 1989), Rules for Inservice Inspection of Nuclear Power Plant Components

2.1.7 ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants, Part 6, Inservice Testing of Pumps in Light-Water Reactor Power Plants (including ASME/ANSI OMa-1988 ADDENDA to ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants, and, ASME/ANSI OMb-1989 ADDENDA to ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants)

2.1.8 Draft NUREG 1482, Guidelines for Inservice Testing at Nuclear Power Plants, November 1993

2.2 Order(s)

2.2.1 SO123-IN-1, Inservice Inspection Program

2.3 Procedure(s)

2.3.1 SO23-V-3.4.1, Auxiliary Feedwater Inservice Pump Test

2.3.2 SO23-V-3.4.2, Component Cooling Water Inservice Pump Test

2.3.3 SO23-V-3.4.3, Diesel Fuel Transfer Inservice Pump Test

2.3.4 SO23-V-3.4.4, High Pressure Safety Injection Inservice Pump Test

2.3.5 SO23-V-3.4.5, Low Pressure Safety Injection Inservice Pump Test

2.3.6 SO23-V-3.4.6, Containment Spray Inservice Pump Test

2.3.7 SO23-V-3.4.8, Saltwater Cooling Inservice Pump Test

2.3.8 SO23-V-3.4.9, Emergency Chill Water Inservice Pump Test

2.3.9 SO23-V-3.4.10, Boric Acid Makeup Inservice Pump Test

2.3.10 SO23-V-3.4.11, Reactor Charging Inservice Pump Test

2.3.11 SO23-V-3.4.13, Component Cooling Water Makeup Pump Inservice Pump Test

2.0 REFERENCES (Continued)

2.3.12 S0123-V-5.21, VISION PC Based Pump Inservice Test Monitoring

2.3.13 S0123-V-5.15, Inservice Testing (IST) Coordination and Trending

2.3.14 S0123-VI-1.0.3, Methods of Handling Invalid Steps/Sections

2.3.15 S0123-XV-5, Nonconforming Material, parts or Components

2.3.16 S023-XV-6, Technical Specification Response Time Surveillance Implementing Procedure Master List

2.3.17 S0123-XXI-1.11.11, Engineering Training and Qualification Program Description

2.3.18 S0123-XXIV-10.15, Preparation Review and Approval of Facility Change Evaluations (FCE's) for SONGS 1, 2 and 3 (including the Site Procedures Impact Assessment, Form 26-404)

2.4 Operating Instructions

2.4.1 S0123-0-20, Use of Procedures

2.4.2 S0123-0-23, Control of System Alignments

2.5 Other

2.5.1 Inservice Testing Topical Report, *Design Bases Document*, DBD-S023-TR-IS2, Rev. 0, August 21, 1993

2.5.2 Letter, J. G. Partlow, NRC, to All Licensees, etc, Minutes of the Public meetings on Generic Letter 89-04, October 25, 1989.

2.5.3 Memo, P. Croy to Cognizant Supervisors and Cognizant Engineers, Vibration Velocity Measurement and Evaluations During inservice Testing of Pumps, February 3, 1992

2.5.4 EG(123) 53, Inservice Pump Test Record

2.5.5 Letter, W. C. March to USNRC, ASME Code Update for the Second Ten-Year Interval, Inservice Testing Program, August 17, 1993

3.0 PREREQUISITES

NOTE: Reference to SDMS, ON-LINE, with a PC is the preferred method to verify which version of the Procedure and TCN's are current.

CAUTION CDM-SONGS Controlled copies are updated as soon as their resources permit, however, this might sometimes mean that controlled copies in the Technical Library, for example, are several days late getting updated. This is not the case with the on-line SDMS system.

3.1 Prior to use of a user-controlled copy of this document, it is the user's responsibility to verify the revision and any TCNs are current by using one of the following methods:

3.1.1 Access the San Onofre Document Management System (SDMS) [San Onofre local area network (SLAN) or online system] (preferred methods).

3.1.2 Check it against a Corporate Documentation Management-SONGS (CDM-SONGS) controlled copy and any TCNs.

3.1.3 Contact CDM-SONGS by telephone or through counter inquiry.

3.1.4 Obtain a user-controlled copy of this procedure from CDM-SONGS or SDMS SLAN.

3.2 The implementing procedures (References 2.3.1 through 2.3.11) should be updated, as necessary, prior to the next test involving the changed information in the program. The Managers of Operations, and Maintenance shall receive a copy of the revision from the IST Coordinator to serve as notification of a revision.

3.3 Instrumentation used for Inservice Testing shall meet the requirements of ASME Code, Section XI and OM-6. See Section 6.4.6, Below.

3.3.1 Prior to commencing an Inservice Test, the Engineer conducting the test shall ensure that required instrumentation, both installed plant instrumentation and Measuring and Test Equipment, is available, calibrated and calibration date not expired.

3.0 PREREQUISITES (Continued)

NOTE: The Maintenance Division procedures allow a 25 % calibration interval extension to be applied to the calibration due date. Where instruments used for IST are in this "25 % grace period" these instruments are acceptable for IST.

3.3.2 The Engineer conducting the test shall verify that instrumentation meets the range and accuracy requirements of ASME Code, Section XI, OM-6, and Pump Relief Request No. 12 (see Attachment 8). See Paragraph 6.4.6, below. This is required for each new instrument or loop (CFMS, temporary instruments, etc.) used if not done and documented previously.

3.4 Reference Data: It is recommended that reference data on the pump under test be available in the field during the performance of the IST to facilitate initial evaluation of test results.

4.0 PRECAUTIONS

4.1 Testing required in this program procedure shall not be conducted in Modes or under circumstances that place the Plant in an unsafe condition. Likewise, care shall be exercised that no test will be conducted so a failure of the test would put the plant in an unsafe condition.

4.2 Special care must be exercised to ensure that the allowed test interval is not exceeded. For pumps routinely tested at one or three month intervals, a test interval extension is allowed. This extension shall not exceed twenty-five percent of the test interval.

4.2.1 The twenty-five percent (25%) interval extension is allowed to accommodate plant conditions that may not be suitable for conducting a surveillance (such as transient conditions or other surveillance in progress). It also provides flexibility for refueling interval surveillance. Consequently, the twenty-five percent extension is not to be viewed as a routine scheduling tool. It is for exceptional situations only.

5.0 CHECKLIST(S)

5.1 None

6.0 PROCEDURE

6.1 Terminology

NOTE: Terms defined in this section correspond to Reference 2.1.7, Para. 1.3. The consistency with this Reference provides a common basis for understanding among ourselves, as the owner, the ASME documents with which we must comply and the individuals who audit our program, such as the NRC, ANII, etc.

6.1.1 *Inservice Test* - a test to determine the operational readiness of a pump.

6.1.2 *Instrument Accuracy* - the allowable inaccuracy of an instrument loop based on the square root of the sum of the squares of the inaccuracies of each instrument or component in the loop.

6.1.3 *Instrument Loop* - two or more instruments or components working together to provide a single output (e.g., a vibration probe and its associated signal conditioning and readout devices).

6.1.4 *Operational readiness* - the ability of a pump to perform its intended function.

6.1.5 *Preservice test period* - the period of time following completion of construction activities related to the pump, and prior to first electrical generation by nuclear heat in which component and system testing takes place.

6.1.6 *pump* - a mechanical device used to move liquid.

6.1.7 *reference values* - one or more values of test parameters measured or determined when the equipment is known to be operating acceptably.

6.1.8 *routine servicing* - the performance of planned, preventive maintenance (e.g., replacing or adjusting valves in a reciprocating pumps, changing oil, flushing the cooling system, adjusting packing, adding packing rings or mechanical seal maintenance or replacement).

6.1.9 *system resistance* - the hydraulic resistance to flow in a system.

6.1.10 *SRO Operations Supervisor* - Any Operations individual holding an SRO license (active or inactive) who has qualified to the position of Shift Superintendent or Control Room Supervisor [See 2.4.1, Attachment 1, Definitions].

6.0 PROCEDURE (Continued)

6.1.11 *Test Interval* - This program uses the same test interval definitions as those used in the Technical Specifications, namely, one month is defined as 31 days and one quarter is defined as 92 days [Ref. 2.1.3].

6.2 Reference Information

6.2.1 Detection of Change: The hydraulic and mechanical condition of a pump relative to a previous condition can be determined by attempting to duplicate by test a set of reference values. Deviations detected are symptoms of changes and, depending upon the degree of deviation, indicate need for further tests or corrective action. [Ref. 2.1.7, Para. 2.1]

6.3 Design Requirements

6.3.1 Owner's Responsibility

.1 Design changes shall include in both the pump and plant design all necessary valves, instrumentation test loop, required fluid inventory, or other provisions which are required to fully comply with the rules of this program procedure. [Ref. 2.1.7, Para. 3.1(a)]

.2 Each pump to be tested in accordance with the rules of this program procedure is identified in Attachment 4. [Ref. 2.1.7, Paras. 3.1(b) and 7]

6.3.2 Bypass Loops

.1 Bypass test loops (sometimes called miniflow lines or miniflow recirculation lines) are used on certain pump tests identified in the program procedure, see Attachment 4. Pump bypass loops shall be designed to accommodate the pump manufacturer's operating conditions for minimum flow operation. [Ref. 2.1.7, Para. 3.2]

6.4 Test Requirements

NOTE: Since this is the second IST interval (second 120 months), preservice testing applies to newly added design changes.

6.4.1 Preservice Testing: Each pump shall be tested during the preservice test period. This testing shall be conducted under conditions as near as practicable to those expected during subsequent inservice testing. Only one preservice test of each pump is required, except that the requirements of 6.4.4, below shall be met. [Ref. 2.1.7, Para. 4.1]

6.0 PROCEDURE (Continued)

6.4.2 Inservice Testing: Inservice Testing in accordance with this program procedure shall commence when the pump(s) is required to be operable. [Ref. 2.1.7, Para. 4.2]

6.4.3 Reference Values: Reference values shall be determined from (1) the results of preservice testing, (2) from the results of the first inservice test (following initiation of this program), or alternatively, (3) from the results of the previous reference inservice or preservice test (conducted prior to implementation of the second 120 month IST interval, provided the correct parameters and acceptance criteria were applied to comply with the current program procedure). [Ref. 2.1.7, Para. 4.3]

.1 Reference values shall be at points of operation readily duplicated during subsequent tests.

.2 All subsequent test results shall be compared to these initial reference values or to new reference values established in accordance with 6.4.4, below, or, 6.4.5, below. [Ref. 2.1.7, Para. 4.3]

.3 Reference values shall only be established when the pump is known to be operating acceptably.

.4 If the particular parameter being measured or determined can be significantly influenced by other related conditions, then these conditions shall be analyzed.

.5 To document the new reference in the VISION software program, use the "Comments" field during the upload section of the test. See Reference 2.3.12 for more information.

.6 Prior to establishing an additional set of reference values, the Cognizant Engineer shall inform the IST Coordinator. This notification is necessary so that the VISION software program, Reference 2.3.12, is updated with a new route specifically designed for the new (additional) reference condition.

NOTE: Vibration measurements of pumps may be foundation, driver, and piping dependent. Therefore, if initial vibration readings are high and have no obvious relationship to the pump, then vibration measurements should be taken at the driver, at the foundation, and on the piping and analyzed to ensure that the reference vibration measurements are representative of the pump and that the measured vibration levels will not prevent the pump from fulfilling its function.

6.0 PROCEDURE (Continued)

6.4.4 Effect of Pump Replacement, Repair, and Maintenance on Reference Values

.1 When a Reference value or set of values may have been affected by repair, replacement, or routine servicing of a pump, a new reference value or set of values shall be determined or the previous value reconfirmed by an inservice test run prior to declaring the pump operable. [Ref. 2.1.7, Para. 4.4]

.2 Deviations between the previous and new set of Reference values shall be identified.

.2.1 Whenever an additional set of reference values is established, the reasons shall be fully explained and documented.

.2.2 The Cognizant Engineer conducting the test shall verify that the new values represent acceptable pump operation and shall document this in the IST files for that pump.

.1 Use the "Documentation of New Reference" provided in each Pump Test Procedure (References 2.3.1 through 2.3.11). [Ref. 2.1.7, Paras. 4.4 and 7]

6.4.5 To Establish an Additional Set of Reference Values

.1 If it is necessary or desirable, for some reason other than stated above to establish an additional set of Reference values, an inservice test shall first be run at the conditions of an existing set of reference values and the results analyzed. If operation satisfies the applicable acceptance criteria, a second test run at the new reference conditions shall follow as soon as practicable. The results of this second test constitute as acceptable additional set of Reference values.

NOTE: If an additional set of Reference values is being established under this section, the previous quarterly test (when the pump was known to be operating satisfactorily) may be used as the first of the pair of tests when establishing a new reference <u>if</u> the Engineer provides an analysis showing that the pump performance trends indicate continued satisfactory pump condition.

.2 Paragraphs 6.4.4.2, 6.4.4.2.1 and 6.4.4.2.2 apply. [Ref. 2.1.7, Para. 4.5]

6.0 PROCEDURE (Continued)

6.4.6 Instrumentation

.1 General

.1.1 Quality: Instrument accuracy shall be within the limits of Attachment 1. Station instruments meeting these requirements are acceptable. [Ref. 2.1.7, Para. 4.6.1.1]

.1.2 Range:

NOTE: Vibration instruments are excluded from the following two range requirements. [Ref. 2.1.7, Para. 4.6.1.2(c)]

.1.2.1 The full-scale range of each analog instrument shall be not greater than three times the reference value. [Ref. 2.1.7, Para. 4.6.1.2(a)]

.1.2.2 Digital instruments shall be selected such that the Reference value shall not exceed 70 % of the calibrated range of the instrument. [Ref. 2.1.7, Para. 4.6.1.2(b)]

.1.3 Instrument Location:

.1.3.1 The sensor location shall be established by the Owner, documented in the plant records, see Section 7.0, and shall be appropriate for the parameter being measured. [Ref. 2.1.7, Para. 4.6.1.3]

.1.3.2 The same sensor location shall be used for subsequent tests.

.1.3.3 Instruments that are position sensitive shall be either permanently mounted or provision shall be made to duplicate their position during each test. [Ref. 2.1.7, Para. 4.6.1.3]

.1.4 Calibration: Instruments and instrument loops shall be calibrated in accordance with the program existing here at the SONGS station [Responsibility: Maintenance Division]. New or repaired instruments shall be calibrated prior to use in an inservice test. [Ref. 2.1.7, Para. 4.6.1.4]

.1.5 Fluctuations: Symmetrical damping devices or averaging techniques may be used to reduce instrument fluctuations. Hydraulic instruments may be damped by using gauge snubbers or by throttling small valves in instrument lines. [Ref. 2.1.7, Para. 4.6.1.5]

6.0 PROCEDURE (Continued)

6.4.6.1.6 Frequency Response Range: The frequency response range of the vibration measuring transducers and their readout system shall be from one-third minimum pump shaft rotational speed to at least 1000 Hz. [Ref. 2.1.7, Para. 4.6.1.6]

.2 Pressure Measurement

.2.1 Gage Lines: If the presence or absence of liquid in a gage line could produce a difference of more than 0.25 % in the indicated value of the measured pressure, means shall be provided to assure or determine the presence or absence of liquid as required for the static correction used. [Ref. 2.1.7, Para. 4.6.2.1]

.2.2 Differential Pressure: When determining differential pressure across a pump, a differential pressure gauge, a differential pressure transmitter that provides direct measurement of pressure difference or the difference between the pressure at a point in the inlet pipe and the pressure at the point in the discharge pipe, may be used. [Ref. 2.1.7, Para. 4.6.2.2]

.3 Rotational Speed Measurements: Rotational speed measurements of variable speed pumps shall be taken by a method which meets the requirements of Paragraph 6.4.6 and Attachment 1. [Ref. 2.1.7, Para. 4.6.3]

.4 Vibration Measurements

NOTE: All of the San Onofre Pumps in the Inservice Testing Program fall into three groups:

Centrifugal Pumps	All pumps except those identified below
Reciprocating Pumps	Charging Pumps S2(3)1208MP190, 191 and 192
Vertical Line Shaft Pumps	Salt Water Cooling Pumps S2(3)1413MP112, 113, 114 and 307, Diesel Fuel Oil Transfer Pumps S2(3)2421MP092, 093, 094, and 095, Containment Spray Pumps S2(3)1206MP012 and 013, and LPSI Pumps S2(3)1204MP015 and 016

6.0 PROCEDURE (Continued)

6.4.6.4.1 On centrifugal pumps, measurements shall be taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions on each accessible pump bearing housing. Measurement also shall be taken in the axial direction on each accessible pump thrust bearing housing. [Ref. 2.1.7, Para. 4.6.4(a)]

.4.2 On vertical line shaft pumps, measurements shall be taken on the upper motor bearing housing in the three orthogonal directions, one of which is the axial direction. [Ref. 2.1.7, Para. 4.6.4(b)]

.4.3 On reciprocating pumps, the location shall be on the bearing housing of the crankshaft, approximately perpendicular to both the crankshaft and the line of plunger travel. [Ref. 2.1.7, Para. 4.6.4(c)]

.4.4 If a portable vibration indicator is used, the reference points must be clearly identified on the pump to permit subsequent duplication in both location and plane. [Ref. 2.1.7, Para. 4.6.4(d)]

.4.5 The location of test points for individual pumps are shown in references 2.3.1 through 2.3.11.

NOTE: See Attachment 3 for Acceptance Ranges for Vibration Parameters.

.5 Flow Rate Measurement: When measuring flow rate, use a rate or quantity meter installed in the pump test circuit. If a meter does not indicate the flow rate directly, the record shall include the method used to reduce the data. [Ref. 2.1.7, Para. 4.6.5]

6.5 Testing Methods

6.5.1 Frequency of Inservice Tests:

.1 An inservice test shall be run on each pump, nominally every 1 or 3 months, except as provided in Paragraph 6.5.3, and 6.5.4 below. See Attachment 4 for details of pump testing frequency. [Ref. 2.1.7, Para. 5.1]

.2 Attachment 5 identifies certain pumps for which the response time must be measured at least every 24 months. This measurement is part of the individual implementing procedures for affected pumps, references 2.3.1 through 2.3.11.

6.0 PROCEDURE (Continued)

6.5.1.3 This program uses the same test interval definitions as those used in the Technical Specifications, namely, one month is defined as 31 days and one quarter is defined as 92 days.

NOTE: (1) Operability of a redundant pump must often be assured prior to testing the second pump. It is suggested that testing be done on a staggered basis, where possible.

(2) Compliance with Paragraph 4.2 is mandatory.

6.5.2 Test Procedure

.1 The preferred method of data collection is using MICROLOG data collectors as outlined in Reference 2.3.12.

.2 The alternate method of obtaining measurements is to use an IRD instrument or equivalent with a hard copy of Form EG (123) 53, Inservice Pump Test Record.

.3 An inservice Test shall be conducted with the pump operating at specified test reference conditions. The test parameters shown in Attachment 4 shall be determined and recorded as directed in this section. The test shall be conducted as follows:

.3.1 The pump shall be operated at nominal motor speed for constant speed drives and at a speed adjusted to the reference speed for variable speed drives. [Ref. 2.1.7, Para. 5.2(a)]

.3.2 The resistance of the system shall be varied until the flow rate equals the reference value. The pressure shall then be determined and compared to its reference value. Alternatively, the flow rate can be varied until the pressure equals the reference value and the flow rate shall be determined and compared to the reference flow rate value. [Ref. 2.1.7, Para. 5.2(b)]

.3.2.7 Flow should be established as near to the reference flow value as is practical for the test and in no case should it vary more than ± 2 %. (Ref. 2.1.8)

.3.3 Where system resistance cannot be varied, flow rate and pressure shall be determined and compared to their respective reference values. [Ref. 2.1.7, Para. 5.2(c)]

6.0 PROCEDURE (Continued)

6.5.2.3.4 Changes in the pump test alignment described in the individual pump test procedures, References 2.3.1 through 2.3.10, changes in the pump test instrumentation and changes in the "As Left" valve alignment following the test may be made, provided:

.3.4.1 The changes are documented on the Pump Test Procedure (the remarks section may be used).

.3.4.2 The Engineer conducting the test and the SRO Operations Supervisor, or designee, signify approval by signing the pump test procedure, and shall be responsible for ensuring that exceptions and/or changes do not invalidate the test or violate the Technical Specifications and other operational constraints.

.3.4.2.1 Any changes in the test flow path shall be reviewed and approved by the Engineer conducting the test to assure that the pump test remains valid.

.3.4.2.2 Any changes in the valve lineup shall be documented and approved by Operations using procedures available for this such as Reference 2.4.2.

.3.5 Pressure, flow rate, and vibration (displacement or velocity) shall be determined and compared with corresponding reference values. All deviations from the reference values shall be compared with the limits given in Attachment 3, *RANGES FOR TEST PARAMETERS* and Attachment 10, *MINIMUM PUMP PERFORMANCE TO ACHIEVE SAFETY ANALYSIS COMPLIANCE* corrective action taken as specified in 6.6.1, below. [Ref. 2.1.7, Para. 5.2(d)]

.4 Vibration measurements are to be broad band (unfiltered). If velocity measurements are used, they shall be peak. If displacement amplitudes are used, they shall be peak-to-peak. [Ref. 2.1.7, Para. 5.2]

6.5.3 Pumps in Regular Use: Pumps that are operated more frequently than every 3 months need not be run or stopped especially for inservice testing provided the plant records show each such pump was operated at least once every 3 months at the reference conditions, and the quantities specified were determined, recorded, and analyzed as discussed in 6.6, below. [Ref. 2.1.7, Para. 5.3]

6.0 PROCEDURE (Continued)

6.5.4 Pumps in Systems Out of Service:

.1 For a pump in a system declared inoperable or not required to be operable, the test schedule need not be followed.

NOTE: Maintaining the test interval is recommended, however, as this facilitates scheduling the testing on a staggered basis as previously addressed.

.2 If not tested during plant shutdowns, the pump shall be tested prior to entering the Mode in which it is required to perform a safety function. Within 3 months prior to placing the system in an operable status, the pump shall be tested and the test schedule followed in accordance with the requirements of this program procedure.

.3 Pumps which can only be tested during plant operation shall be tested within 1 week following plant startup. [Ref. 2.1.7, Para. 5.4]

6.5.5 Duration of Tests: After pump conditions are as stable as the system permits, each pump shall be run at least 2 minutes. At the end of this time at least one measurement or observation of each of the quantities required shall be made and recorded. [Ref. 2.1.7, Para. 5.6]

6.5.6 Test Control

.1 Control, direction and scheduling of the Test shall be the responsibility of the Cognizant Engineer conducting the test.

.2 Collection of data may be delegated to any individual approved by the Cognizant Supervising Engineer, provided this individual meets the training and qualification requirements of References 2.1.4 and 2.3.17.

.3 Inservice Testing of pumps shall be coordinated with other operational testing, when possible.

.4 Operator responsibilities, including independent verification, are addressed in the individual pump IST implementing procedures, References 2.3.1 through 2.3.10 and 2.4.1.

6.0 PROCEDURE (Continued)

6.5.7 Inservice Pump Test Record

.1 The Inservice Pump Test Record (Attachment 6) shall be completed by the Cognizant Engineer conducting the test. Other documentation required to be completed is identified in the individual Pump Test Procedures, References 2.3.1 through 2.3.10.

.2 If the preferred method of data collection is available, refer to Reference 2.3.12, otherwise, complete the Inservice Pump Test Record using available instrumentation in accordance with the Key Points listed on Attachment 6 and Reference 2.3.14.

.3 A record shall be completed and provided to the IST Coordinator, even when the pump is not tested during a given pump test interval. In this case it shall identify the reason for omitting the test.

.3.1 The reason for this "dummy" record is to provide an audit trail in the Pump IST records to show why a pump test interval was exceeded. Typical reasons are:

.3.1.1 Pump and system cleared for maintenance or modifications

.3.1.2 Pump not required to be operable in this mode (plant in Mode 5 or refueling).

.3.2 Complete as much of the Pump Test Record, as possible. Mark the mechanical and hydraulic data "Not Used" and note the reason for skipping the test.

6.6 Analysis and Evaluation

NOTES: 1. The requirements to initiate an NCR apply to the IST Program. See Reference 2.3.15 for NCR initiation criteria and Attachment 9 for guidance on use of the NCR as a documentation and notification tool.

2. The VISION software program, is used together with a MICROLOG Data Collector in obtaining and analyzing IST Data. VISION prints out (upon request) a hard copy Inservice Pump Test Record for documentation. Additional data collected is processed by VISION for tracking and trending for engineering information only. Additional information is available in Reference 2.3.12.

6.6.1 Acceptance Criteria

.1 When evaluating pump performance, verify that the pump meets the minimum requirements of the Safety Analyses as discussed in Attachments 3 and 10 of this procedure and related references discussed therein.

6.0 PROCEDURE (Continued)

6.6.1.2 Acceptance Ranges

.2.1 The ranges of test quantities for each pump tested shall be specified in the Inservice Pump Test Record used for the test. See Attachment 6.

.2.2 The allowable ranges of inservice test quantities which are based on reference values are shown on Attachment 3. [Ref. 2.1.7, Table 3]

NOTE: Measured test quantities must also meet or exceed the values discussed in Attachment 10, *MINIMUM PUMP PERFORMANCE TO ACHIEVE SAFETY ANALYSIS COMPLIANCE*.

.2.3 If the allowable ranges for test quantities are more restrictive in the Technical Specifications, or other similar governing document, the more restrictive ranges shall be used and the source of the more restrictive requirements shall be referenced in the record of tests.

.3 See Attachment 9 for guidance on analysis of tests and time allowed for review.

NOTE: If during a test it is obvious that a test instrument is malfunctioning, the test may be halted and the instruments promptly recalibrated or replaced.

.4 During a test, anomalous data with no clear indication of the cause must be attributed to the pump under test. For this occurrence, a prompt determination of operability is appropriate with follow-on corrective action as necessary. [See NRC Generic Letter 91-18, "Information to Licensees Regarding ...Operability"]

.5 If deviations fall within the ALERT RANGE of Attachment 3, Ranges of Test Parameters, the frequency of testing specified in Attachment 4, shall be doubled until the cause of the deviation is determined and the condition corrected. [Ref. 2.1.7, Para. 6.1]

.5.1 The test frequency may be returned to normal after the requirements of this section (6.6) have been met and a successful retest is completed demonstrating operation in the acceptable range.

6.0 PROCEDURE (Continued)

6.6.1.6 If deviations fall within the REQUIRED ACTION RANGE of Attachment 3, and/or do not meet or exceed the values discussed in Attachment 10, ***the pump shall be declared inoperable until the cause of the deviation has been determined and the condition corrected.*** [Ref. 2.1.7, Para. 6.1]

.6.1 When a test shows deviations outside of the acceptable range of Attachments 3 and/or 10, *following the inoperability declaration*, the instruments involved may be recalibrated and the test rerun.

6.6.2 Limits may not be modified without a Pump Relief Request, even though when operating normally a pump does not perform consistently within the ranges identified in Attachment 3. [Ref. 2.1.7, Para. 6.1]

NOTE: Measured test quantities must also meet or exceed the values discussed in Attachment 10, *MINIMUM PUMP PERFORMANCE TO ACHIEVE SAFETY ANALYSIS COMPLIANCE.*

6.6.3 Time Allowed for Analysis of Tests is discussed in Attachment 9.

7.0 RECORDS AND REPORTS

7.1 Pump Records: Records shall be maintained in CDM and shall include the following for each pump covered by this Program Procedure:

7.1.1 The manufacturer and the manufacturer's model; serial and/or other identification number;

7.1.2 A copy or summary of the manufacturer's acceptance test report if available;

7.1.3 A copy of the pump manufacturer's operating limits.

7.2 Inservice Test Plans: Inservice Testing Plans are issued as pump test procedures, References 2.3.1 through 2.3.10. The Inservice Testing Records for the Pumps in the Program shall be maintained and shall include:

7.2.1 The hydraulic circuit used;

7.2.2 The measurement location and type of measurement for the required test parameters;

7.0 RECORDS AND REPORTS (Continued)

7.2.3 The reference values;

.1 Reference values of test parameters are recorded on the preservice tests, or other reference test records and are transcribed to the current test each time a test is conducted.

.2 Only one reference test shall be used for a given pump test, that is, a single pump test may not use reference numbers from more than a single reference test.

NOTE: In evaluating a single pump IST, this eliminates the poor practice of using one reference test for hydraulic limits and another reference test for the mechanical or vibration limits.

7.2.4 The method of determining reference values which are not directly measured by instrumentation (such as calculations).

7.3 Records of Tests: There shall be one Inservice Pump Test Record, Attachment 6, for each pump test. The Inservice Pump Test Record shows the test results for each test and, along with its attachments or referenced documents, such as NCR's, indicates corrective action needed. This record of shall be maintained in CDM and shall include:

7.3.1 Pump identification (the Equipment Identification Number from PEDMS);

7.3.2 Date of test;

7.3.3 reason for test (e.g., post-maintenance, routine inservice test, establishing reference values);

7.3.4 values of measured parameters;

7.3.5 Identification of instruments used;

7.3.6 Comparisons with allowable ranges of test values and analysis of deviations;

7.3.7 requirements for corrective action;

7.3.8 evaluation and justification for changes to reference values;

7.3.9 signature of the person or persons responsible for conducting and analyzing the test.

7.0 RECORDS AND REPORTS (Continued)

7.4 Record of Corrective Action

7.4.1 Records of corrective action shall be maintained and shall include a summary of the corrections made, the subsequent inservice tests and confirmation of operational adequacy (see Para. 6.4.4, above), and the signature of the individual responsible for corrective action and verification of results.

7.4.2 Corrective action performed on a pump in the Inservice Testing Program shall be documented on Maintenance Orders (either hard copy or SOMMS), NCRs and/or memoranda for file to provide a record of corrective action. Records of corrective action shall be filed in CDM-SONGS when completed. If on electronic media, such as NCRS or SOMMS, they may be retained in that format.

7.5 Program Calendar and Test Status

7.5.1 Attachment 7, Summary of Current Test Status, shall be maintained to provide a current record of the test dates and current test status of each pump. In addition, a schedule of tests, the IST Calendar, shall be maintained and distributed as appropriate by the IST Coordinator in accordance with Reference 2.3.13.

NOTE: This hard copy of the "IST Log" is maintained in addition to the Computer records to provide a method of determining the test status of IST pumps even if the host or network server should become temporarily inoperative.

INSERVICE TESTING OF PUMPS PROGRAM

ACCEPTABLE INSTRUMENT ACCURACY

(From Reference 2.1.7, Table 1)

Quantity	Percent (Percent of full scale for individual analog instruments, percent of total loop accuracy for a combination of instruments, or over the calibrated range for digital instruments.)
Pressure	± 2
Flow Rate	± 2
Speed	± 2
Vibration	± 5
Differential Pressure	± 2

INSERVICE TESTING OF PUMPS PROGRAM

INSERVICE TEST PARAMETERS

(From Reference 2.1.7, Table 2)

The parameters identified in this table shall be determined for each pump identified in Attachment 4 and recorded as directed in paragraph 6.5.2.3 of this procedure.

Quantity	Remarks
Speed: N	If variable Speed
Differential Pressure: ΔP	Centrifugal Pumps, including vertical line shaft pumps
Discharge Pressure: P	Positive Displacement Pumps
Flow Rate: Q	Each Pump (exceptions in Att. 4)
Vibration:	See Ref's 2.3.1 through 2.3.11 for test point locations
Displacement, V_d	Peak-to-Peak
Velocity, V_v	Peak

INSERVICE TESTING OF PUMPS PROGRAM

RANGES FOR TEST PARAMETERS

(From Reference 2.1.7, Table 3 and 3b)

Part 1

Pump Type	Pump Speed	Test Parameter	Acceptable Range	Alert Range	Required Action Range
Centrifugal and Vertical line shaft	< 600 rpm	V_d or V_v	≤ 2.5V_r	> 2.5 Vr to 6 v_r or > 10.5 mils	> 6 V_r or > 22 mils
	≥ 600 rpm	V_v or V_d	≤ 2.5V_r	> 2.5 Vr to 6 v_r or > 0.325 in./sec	> 6 V_r or > 0.70 in./sec
Reciprocating		V_d or V_v	≤ 2.5V_r	> 2.5 Vr to 6 v_r	> 6 V_r

Part 2

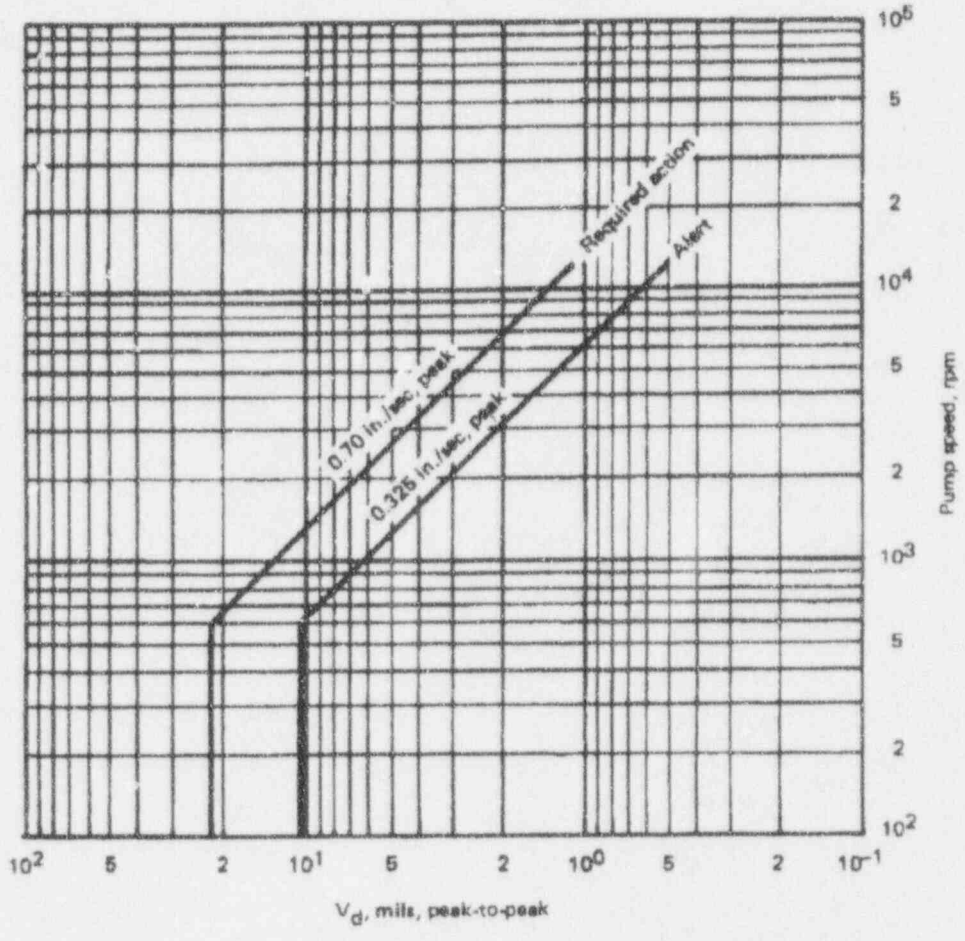
Test Parameter	Acceptable Range	Alert Range		Required Action Range	
		Low	High	Low	High
P (Positive displacement pumps)	0.93 to 1.10 P_r	0.90 to < 0.93p_r	...	< 0.90 P_r	> 1.10 P_r
ΔP (Vertical line shaft pumps)	0.95 to 1.10 ΔP_r	0.93 to < 0.95 ΔP_r	...	< 0.93 ΔP_r	> 1.10 ΔP_r
Q (Positive displacement vertical line shaft pumps)	0.95 to 1.10 Q_r	0.93 to < 0.95 Q_r	...	< 0.93 Q_r	> 1.10 Q_r
ΔP (Centrifugal Pumps)	0.90 to 1.10 ΔP_r	...	...	< 0.90 ΔP_r	> 1.10 ΔP_r
Q (Centrifugal Pumps)	0.90 to 1.10 Q_r	...	...	< 0.90 Q_r	> 1.10 Q_r

NOTES: a) **GENERAL NOTE:** The subscript r denotes reference value. The subscript d denotes displacement vibration. The subscript v denotes Velocity vibration.

b) Refer to Figure 1 of this attachment to establish displacement limits for pumps with speeds ≥ 600 rpm or velocity limits for pumps with speeds < 600 rpm.

FIGURE 1

RANGES FOR TEST PARAMETERS



PUMPS TESTED WITHIN THE INSERVICE TESTING PROGRAM

INTRODUCTION:

Components subject to the Inservice Testing Program for Pumps in accordance with Reference 2.1.7 and 2.5.1 are identified herein. This attachment also identifies the parameters to be measured, test frequency and notes. Pump Relief Request No. 12 is provided in Attachment 8.

GENERAL NOTES:

1. All testing is done on a quarterly interval unless otherwise noted.

2. All parameters listed in Attachment 2 are required to be measured during each pump test.

PUMP NAME AND EQUIPMENT TAG NUMBER	P&ID/ Coordinates	Test Parameters					NOTES
		Speed	ΔP	Disch Press.	Flow Rate	Vibration	
Containment Spray Pumps							
S2(3)1206MP012	40114A/C-5	N/A	Yes	Yes	Yes	Yes	These pumps are tested quarterly on mini-flow recirculation without flow measurement and with full flow at cold shutdown intervals.[1]
S2(3)1206MP013	40114A/G-4	N/A	Yes	Yes	Yes	Yes	
Low Pressure Safety Injection Pumps							
S2(3)1204MP015	40112B/G-4	N/A	Yes	Yes	Yes	Yes	These Pumps are tested quarterly on mini-flow recirculation. without flow measurement and with full flow (using the shutdown cooling system flow path) each cold shutdown intervals.[1] Testing shall be in accordance with T-S 4.5.2.
S2(3)1204MP016	40112B/E-4	N/A	Yes	Yes	Yes	Yes	
High Pressure Safety Injection Pumps							
S2(3)1204MP017	40112A/G-4	N/A	Yes	Yes	Yes	Yes	Testing shall be in accordance with T-S 4.5.2.
S2(3)1204MP018	40112A/E-4	N/A	Yes	Yes	Yes	Yes	
S2(3)1204MP019	40112A/C-4	N/A	Yes	Yes	Yes	Yes	

[1]This testing is in compliance with Reference 2.1.5, Attachment 1, Position 9.

PUMPS TESTED WITHIN THE INSERVICE TESTING PROGRAM (Continued)

PUMP NAME AND EQUIPMENT TAG NUMBER	P&ID/ Coordinates	Test Parameters					NOTES
		Speed	ΔP	Disch Press.	Flow Rate	Vibration	
Component Cooling Water Pumps							
S2(3)1203MP024	40127A/G-4	N/A	Yes	Yes	Yes	Yes	None
S2(3)1203MP025	40127A/D-5	N/A	Yes	Yes	Yes	Yes	
S2(3)1203MP026	40127A/B-5	N/A	Yes	Yes	Yes	Yes	
Diesel Fuel Oil Transfer Pumps							
S2(3)2421MP093	40116A/B-7	N/A	Yes	Yes	Yes	Yes	These are vertical line shaft pumps and are tested in accordance with Reference 2.1.7 for this style of pump.
S2(3)2421MP094	40116A/B-4	N/A	Yes	Yes	Yes	Yes	
S2(3)2421MP095	40116A/B-3	N/A	Yes	Yes	Yes	Yes	
S2(3)2421MP096	40116A/B-6	N/A	Yes	Yes	Yes	Yes	
Salt Water Cooling Pumps							
S2(3)1413MP112	40126A/F-5	N/A	Yes	Yes	Yes	Yes	These are vertical line shaft pumps and are tested in accordance with Reference 2.1.7 for this style of pump.
S2(3)1413MP113	40126A/D-5	N/A	Yes	Yes	Yes	Yes	
S2(3)1413MP114	40126B/D-5	N/A	Yes	Yes	Yes	Yes	
S2(3)1413MP307	40126B/G-5	N/A	Yes	Yes	Yes	Yes	
Auxiliary Feedwater Pumps							
S2(3)1305MP140	40160A/E-5	Yes	Yes	Yes	Yes	Yes	These Pumps are tested ***MONTHLY*** on mini-flow recirculation, without flow measurement and with full (or substantial) flow (using the Emergency AFW flow path to the Steam Generators) each cold shutdown if it has been more than one quarter since the last full flow test.[1] Testing shall be in accordance with T-S 4.7.1.2.1.1.a
S2(3)1305MP141	40160A/B-5	N/A	Yes	Yes	Yes	Yes	
S2(3)1305MP504	40160A/G-5	N/A	Yes	Yes	Yes	Yes	
Aux. Building Emergency Chill Water Pumps							
SA1513MP160	40180A/D-6	N/A	Yes	Yes	Yes	Yes	These pumps are common to both Units 2 and 3 and are grouped under "Unit 2 and Common" for tracking purposes.
SA1513MP162	40179A/E-5	N/A	Yes	Yes	Yes	Yes	
Boric Acid Makeup (BAMU) Pumps							
S2(3)1218MP174	40125B/D-7	N/A	Yes	Yes	Yes	Yes	None
S2(3)1218MP175	40125B/B-7	N/A	Yes	Yes	Yes	Yes	

[1] This test is in compliance with Reference 2.1.5, Attachment 1, Position 9.

PUMPS TESTED WITHIN THE INSERVICE TESTING PROGRAM (Continued)

PUMP NAME AND EQUIPMENT TAG NUMBER	P&ID/ Coordinates	Test Parameters					NOTES
		Speed	ΔP	Disch Press.	Flow Rate	Vibration	
Reactor Charging Pumps							
S2(3)1208MP190	40124B/G-3	N/A	No	Yes	Yes	Yes	These are reciprocating pumps and are tested in accordance with Reference 2.1.7 for this style of pump. Testing shall be in accordance with T.S 4.5.2.
S2(3)1208MP191	40124B/E-3	N/A	No	Yes	Yes	Yes	
S2(3)1208MP192	40124B/C-5	N/A	No	Yes	Yes	Yes	
Component Cooling Water Makeup Pumps							
S2(3)1203MP1018	40127J/E-4	N/A	Yes	Yes	Yes	Yes	None
S2(3)1203MP1019	40127J/C-4	N/A	Yes	Yes	Yes	Yes	

PUMPS REQUIRING RESPONSE TIME MEASUREMENT

1 Response time are measured in accordance with the requirements of Reference 2.3.16.

Pump Equipment Number	Response Time Requirement
Auxiliary Feedwater Pump S2(3)1305MP140	39.0 sec
Auxiliary Feedwater Pumps S2(3)1305MP141 and S2(3)1305MP504	11.0 sec
Component Cooling Water Pumps S2(3)1203MP024, S2(3)1203MP025 and S2(3)1203MP026	4.5 sec
High Pressure Safety Injection Pumps S2(3)1204MP017, S2(3)1204MP018 and S2(3)1204MP019	20.0 sec
Low Pressure Safety Injection Pumps S2(3)1204MP015 and S2(3)1204MP016	24.5 sec
Containment Spray Pumps S2(3)1206MP012 and S2(3)1206MP013	3.9 sec
Reactor Charging Pumps S2(3)1208MP190, S2(3)1208MP191, and S2(3)1208MP192	20.0 sec

EG(123) 53, INSERVICE PUMP TEST RECORD AND KEY POINTS
EG(123) 53, INSERVICE PUMP TEST RECORD

CDM Encode No. _____
Record No. _____
Test Procedure Used _____
Test Date _____
Unit _____

1 Plant Tag No. (EXAMPLE S1-CCW-G-13C, S21203MP023, ETC)	2 Pump Name (System) (EXAMPLE: COMPONENT COOLING WATER PUMP, ETC.)
3 Tested By	4 Reason for Test (QUARTERLY, POST MAINTENANCE, ETC.)
5 Plant Power	6 Reference IST Record No./Date RECORD NO. DATE
7 Test Frequency	8 Date Last Tested 9 Run Time Before Test (MUST BE AT LEAST 5 MIN.)

	HYDRAULIC DATA	INSTRUMENT ID (ENTER "C" FOR CALC'D VALUE)	CALIBRATION DUE DATE	UNITS	SET REF.	REFERENCE VALUE	TEST VALVE	ACCEPTABLE RANGE
10	Prestart Suction Pressure (Ps)							
11	Speed (N)							
12	Discharge Pressure (Po)							
13	Running Suction Pressure (Pi)							
14	Differential Pressure (Po-Pi)							
15	Motor Current (A)							
16	Flow Rate (Q)							

Calculations

MECHANICAL DATA

Vibration Instrument ID _____ Calibration Due Date _____

		Vibration Axis	Displacement (Mils) REFERENCE VALUE	Displacement (Mils) TEST VALUE	Displacement (Mils) ACCEPTABLE RANGE	Velocity (IPS) REFERENCE VALUE	Velocity (IPS) TEST VALUE	Velocity (IPS) ACCEPTABLE RANGE
17	Point No. 1	Horiz. (0 Deg.)						
18		Vert. (90 Deg.)						
19		Axial						
20	Point No. 2	Horiz. (0 Deg.)						
21		Vert. (90 Deg.)						
22		Axial						

23 Lubrication Level/Pressure — Bulls Eye ____ Chicken Feeder ____ Other _____ Sat ____ UnSat ____

24 BEARING TEMPERATURES

Instrument ID _____
Cal. Due Date _____
Date Last Taken _____
Reference Data Record No. _____
Reference Temperature _____
Max. Allowable Temperature _____

	Point No. 1 TIME	Point No. 1 TEMP	Point No. 1 % CHANGE	Point No. 2 TIME	Point No. 2 TEMP	Point No. 2 % CHANGE
1						
2						
3						
4						

CORRECTIVE ACTION/REVIEW RESULTS

REQUIRED ACTION 25	NCR NO. AND/OR M.O. NO. 26
ENGINEER PERFORMING OPERABILITY ANALYSIS 27	SUPERVISING ENGINEER OR DESIGNEE 28 DATE

SQE EG(123) 53 REV. 2 08/23/88

FACSIMILE

EG(123) 53, INSERVICE PUMP TEST RECORD AND KEY POINTS (Continued)

Key Points

NOTE: All blocks must be completed or marked "NOT USED" per Reference 2.3.14. For clarity, it is recommended that a diagonal line be drawn through the Block(s) not used and "NOT USED" be written on the diagonal.

Blank	Instructions
"CDM Encode Number"	Leave blank.
"Test Procedure Used"	Record the procedure used to conduct the Inservice Test on the Pump being tested.
"Test Date"	Record the date the test was conducted.
"Unit"	Self-Explanatory.
"Record Number"	Determine the record number as follows: 1) Pump Number 2) Month Tested 3) Year Tested Example: 2P096-5 93 NOTE: If more than one test is run on a given pump in the same month, add a letter following the test number to separate it from the preceding test(s). Example: 2P096-5-93 (First Test) 2P096-5-93A (Second Test) 2P096-5-93B (Third Test) etc.
1 Plant Tag No.	Use the plant tag number as it appears in the PEDMS (Example provided on the form).
2 Pump Name (System)	Use the pump name and system name as they appear in the PEDMS (Example provided on the form).
3 Tested By	Put the name of the Engineer who conducted the Inservice Test.

EG(123) 53, INSERVICE PUMP TEST RECORD AND KEY POINTS (Continued)

Blank		Instructions (Continued)
4	Reason for Test	Indicate the cause for initiating the test (Examples provided on the form).
5	Plant Power	Enter the Plant power in Percent (preferred), by plant Mode (M-4, M-1, etc.), or any other way to differentiate this test from other tests that might have different results depending on plant mode.
6	Reference IST Record No./Date	Record the record number and date of the reference test from which the values recorded under "Reference Value" in the body of this form are taken.
7	Test Frequency	Record the frequency that the pump is currently undergoing Inservice Tests. This is normally monthly or quarterly, but if the pump is in ALERT, it may be on a 15 day interval or 46 day interval.
8	Date Last Tested	Self-Explanatory.
9	Run Time Before Test	Record the time the pump is running before data is taken. This is usually required to be at least 2 minutes. If the pump has been running before the test started (the pump is in service, for example), write "> 2 Min.", or equivalent, in this block.

HYDRAULIC DATA Columns:

Instrument ID - Put the control number used for control and calibration of the instrument in this block. If the data recorded in this row are calculated put "C" in this block.

Calibration Due Date - Put the date the instrument calibration will expire, or the recall date in this block.

Units - Record the units of measurement for the values recorded in this row (Examples: Feet, PSI, PSID, GPM, lbs/hr, etc.).

Set Ref. - If this row is the reference to which the system is adjusted to achieve the reference conditions, put a check mark in this column. For example, if the test is run such that the flow rate is set on a constant value and the differential pressure is measured to verify the condition of the pump, put a check mark in this column next to "Flow Rate".

EG(123) 53, INSERVICE PUMP TEST RECORD AND KEY POINTS (Continued)

HYDRAULIC DATA Columns: (Continued)

Reference Value - Record the value for this parameter from the reference test identified in Block 6. If this is a reference test leave this column blank and put the test results in the "Test Value" column.

Test Value - Record the value for this parameter from the measurement made during the test currently being run.

Acceptable Range - Calculate the acceptance range from Attachment 3 to this procedure and record the result here.

NOTE: Measured test quantities must also meet or exceed the values discussed in Attachment 10, *MINIMUM PUMP PERFORMANCE TO ACHIEVE SAFETY ANALYSIS COMPLIANCE*.

If the acceptance range is more restrictive than that indicated on Attachment 3 (for example, due to Technical Specification limits), indicate the correct acceptance range here and do not use Attachment 3 (this should be explained on the reference test record to facilitate future review).

10 Prestart Suction Pressure (Pa) — Record the pressure at the pump suction before the pump is started and verify that sufficient NPSH is available to safely run the pump. If the pump is already running, or this value is normally unavailable, mark "NOT USED" in this row.

11 Speed (N) — Record the component speed if this is required. If pump speed is not required, mark "NOT USED" in this row.

12 Discharge Pressure (Po) — Record the pressure at the pump discharge in accordance with the test procedure. If this value is normally unavailable or not recorded, mark "NOT USED" in this row.

13 Running Suction Pressure (Pi) — Record the pressure at the pump suction in accordance with the test procedure. If this value is normally unavailable or not recorded, mark "NOT USED" in this row.

14 Differential Pressure (Po-Pi) — This is normally a calculated value. Record the results of this calculation or measurement in the "Test Value" column. If this value is normally unavailable or not recorded, mark "NOT USED" in this row.

EG(123) 53, INSERVICE PUMP TEST RECORD AND KEY POINTS (Continued)

HYDRAULIC DATA Columns: (Continued)

15 Motor Current (A) — Record the motor current as read per the test procedure. If this value is normally unavailable or not recorded, mark "NOT USED" in this row.

16 Flow Rate (Q) — Record the test loop flow rate per the test procedure. If this value is normally unavailable or not recorded, mark "NOT USED" in this row.

CALCULATIONS — If a calculation (such as for differential pressure) is required, it may be made here, if not otherwise required to be elsewhere by the test procedure. In addition, significant Maintenance Orders should be recorded here.

MECHANICAL DATA — Adjacent to the "Mechanical Data" title, is a place to record the vibration instrument ID, its attachment(s) (such as probe) ID and their calibration due dates. This information shall be recorded here.

CAUTION When vibration readings are taken on 4KV motors, use an accelerometer vibration detector to avoid erroneous readings due to electrical fields.

Columns:

Vibration Axis - These are defined in the test procedure. Exercise care to place the vibration transducer at the same position for each test. Also, make every effort to keep the vibration probe perpendicular (Rule of Thumb: Within 15 degrees of normal to the surface) to the surface from which the readings are being taken.

Reference Value, Test Value and Acceptable Range - For both Displacement and Velocity, these columns mean the same as that described under "Hydraulic Data", above.

17, 18, 19, 20, 21
22 Point Numbers 1 and 2 — Horizontal, Vertical and Axial - This data is measured as described in the Test Procedure for the specific pump.

EG(123) 53, INSERVICE PUMP TEST RECORD AND KEY POINTS (Continued)

MECHANICAL DATA (Continued)

23	Lubrication Level/Pressure	Identify the type of lubrication device on the bearing(s) of concern and whether the lubrication level and pressure, as applicable, are satisfactory.
24	Bearing Temperatures	Draw a diagonal line through this section and write, "Not Used" above the line.

CORRECTIVE ACTION/REVIEW RESULTS

25	Required Action	If the pump is evaluated as satisfactory, indicate the result by recording "N/A - Pump is Sat.", or equivalent. If the pump fails the IST or is in ALERT, indicate this and explain the required action (Example: "Pump in ALERT - Test interval 46 days").
26	NCR No. and/or	If there is an NCR and/or M.O. resulting from this IST, record its number, otherwise write "N/A" in this block.
27	Engineer Performing Operability Analysis	The Engineer evaluating the test results shall sign in this block.
28	Supervising Engineer or Designee	The Supervising Engineer approving the test and results shall sign this block.

SUMMARY OF CURRENT TEST STATUS

YEAR: _____ UNIT: _____

Instructions: 1. Record the year - one sheet per year.
2. As tests are completed, record the date under the appropriate month.
3. Review against past dates to assure test intervals are not exceeded.

PUMP NO.	PUMP NAME	DATE											
		JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
P-012	CONTAINMENT SPRAY PUMP												
P-013	CONTAINMENT SPRAY PUMP												
P-015	L.P.S.I. PUMP												
P-016	L.P.S.I. PUMP												
P-017	H.P.S.I. PUMP												
P-018	H.P.S.I. PUMP												
P-019	H.P.S.I. PUMP												
P-024	COMPONENT COOLING WATER PUMP												
P-025	COMPONENT COOLING WATER PUMP												
P-026	COMPONENT COOLING WATER PUMP												
P-093	DIESEL FUEL TRANSFER PUMP												
P-094	DIESEL FUEL TRANSFER PUMP												
P-095	DIESEL FUEL TRANSFER PUMP												
P-096	DIESEL FUEL TRANSFER PUMP												
P-112	SALTWATER COOLING PUMP												
P-113	SALTWATER COOLING PUMP												
P-114	SALTWATER COOLING PUMP												
P-307	SALTWATER COOLING PUMP												
P-140	AUXILIARY FEEDWATER PUMP (STEAM)												
P-141	AUXILIARY FEEDWATER PUMP (STEAM)												
P-504	AUXILIARY FEEDWATER PUMP MOTOR												
P-160	AUXILIARY BUILDING EMERGENCY CHILLED WATER PUMP												
P-162	AUXILIARY BUILDING EMERGENCY CHILLED WATER PUMP												
P-174	BORIC ACID MAKEUP PUMP												
P-175	BORIC ACID MAKEUP PUMP												
P-190	CHARGING PUMP												
P-191	CHARGING PUMP												
P-191	CHARGING PUMP												
P-1018	CCW MAKE-UP PUMP												
P-1019	CCW MAKE-UP PUMP												

PUMP RELIEF REQUEST NO. 12 AS SUBMITTED TO THE NRC

PUMP RELIEF REQUEST No. 12

SYSTEM Units 2 & 3 Saltwater Cooling (SWC), Reactor Charging

COMPONENTS Saltwater Cooling: P112, P113, P114, P307;
Reactor Charging: P190, P191, and P192.

CLASS 2 AND 3

FUNCTION To provide flow to safety systems.

TEST REQUIREMENT Per OM-6 4.6.1.2, the full-scale range of each analog instrument shall not be greater than three times the reference value.

BASIS FOR RELIEF Relief is requested from the full scale range requirements of OM-6 for SWC pump discharge pressure, and Charging pump suction pressure and flow.

Though the existing installed station instruments do not meet the code range requirement, their accuracy is significantly better than the code requirements. Thus the combination of range and accuracy of the installed equipment provides for the acquisition of repeatable data that meets the intent of the code.

The instruments listed in the attached table do not meet the OM-6 requirement (e.g., the full-scale range of each instrument shall not be greater than three times the reference value). However, the manufacturer's stated accuracy for each pressure instrument listed in the attached table exceeds the OM-6 4.6.1.1 required accuracy (plus or minus two percent) for pressure instruments by a factor of four. Similarly, although the range for charging pump flow instrument FI-0212 is approximately 3.5 times the reference value, the combined loop accuracy of 1.28% exceeds the OM-6 required accuracy (plus or minus two percent) for flow instruments.

Even Accuracy determination based on the square root of the sum of the squares of the inaccuracies of each component in the loop per OMa 1988 Part 6, Section 1.3, instrument accuracy.

PUMP RELIEF REQUEST NO. 12 AS SUBMITTED TO THE NRC (Continued)

PUMP RELIEF REQUEST No. 12 (Continued)

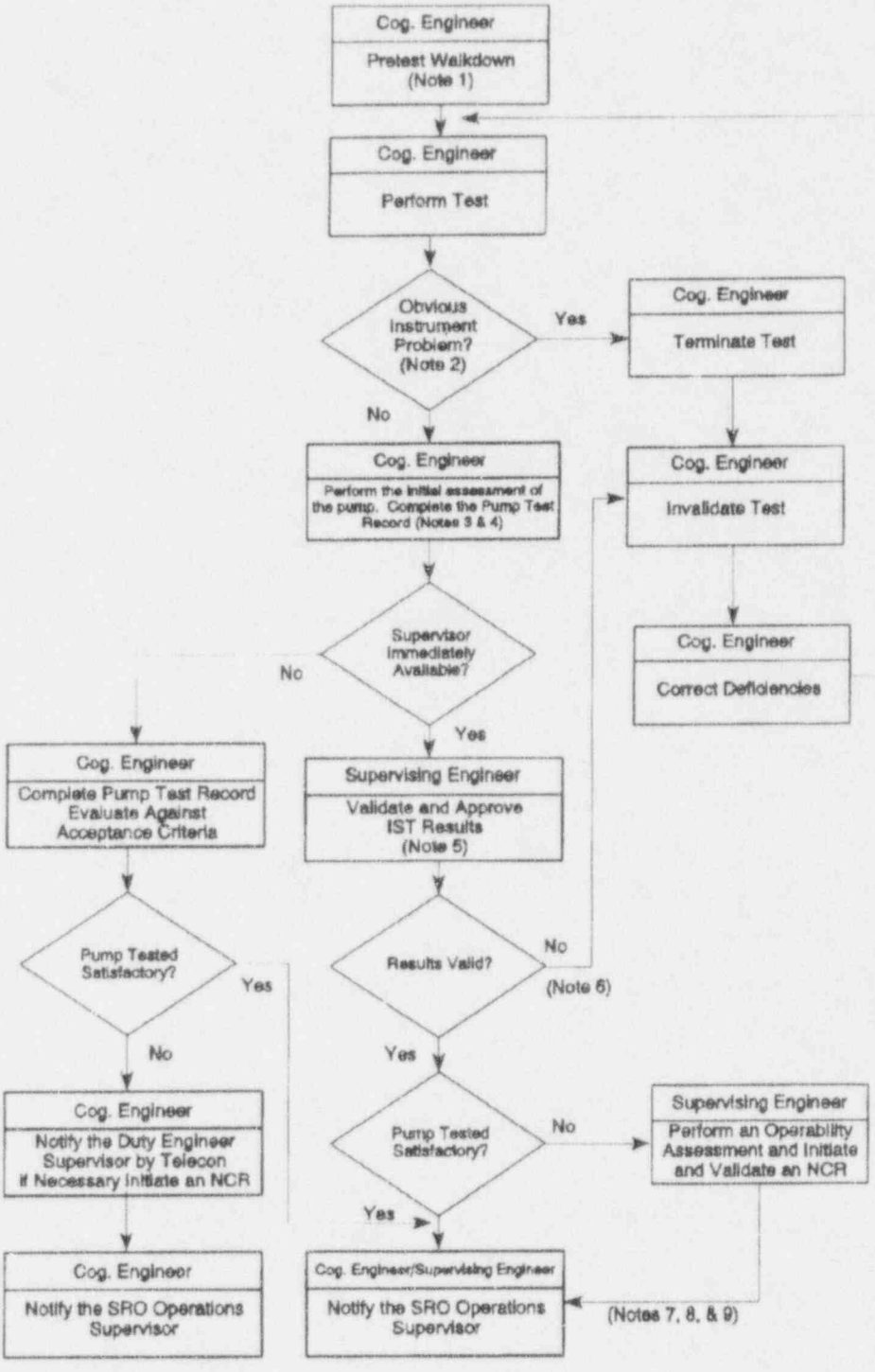
Pump	Parameter	Instrument	Instrument Range (Range÷Ref)	Reference Value	Maximum Inaccuracy Permitted by Code*	As Installed Accuracy at Full Scale (error at full scale)
Saltwater Cooling System Pumps						
P112	Disch. Press.	PI-6230	0-160 (5.1)	32.4 psig	1.94 psig	0.5% (0.8 psig)
P113	Disch. Press.	PI-6231	0-160 (5.2)	31 psig	1.86 psig	0.5% (0.8 psig)
P114	Disch. Press.	PI-6233	0-160 (5.9)	27 psig	1.62 psig	0.5% (0.8 psig)
P307	Disch. Press.	PI-6232	0-160 (5.5)	29 psig	1.74 psig	0.5% (0.8 psig)
Reactor Charging Pumps						
P190	Suction Press.	PI-9284	0-160 (3.5)	46.0 psig	2.76 psig	0.5% (0.8 psig)
P191	Suction Press.	PI-9285	0-160 (3.6)	44.0 psig	2.64 psig	0.5% (0.8 psig)
P192	Suction Press.	PI-9286	0-160 (3.2)	50.0 psig	3 psig	0.5% (0.8 psig)
P190	Flow	FI-0212	0-150 (3.3)	44.9 gpm	2.69 psig	1.28% (1.92 psig)
P191, &			0-150 (3.4)	44 gpm	2.64 psig	1.28% (1.92 psig)
P192			0-150 (3.3)	45 gpm	2.7 psig	1.28% (1.92 psig)

Submittal: This Pump Relief Request was submitted by Reference 2.5.5, letter, W. C. March to USNRC, ASME Code Update for the Second Ten-Year Interval, Inservice Testing Program, August 17, 1993.

Approval: Not yet received.

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

PUMP IST EVALUATION FLOW DIAGRAM



PUMP IST EVALUATION FLOW DIAGRAM (Continued)

NOTES:

1. During the pretest walkdown, the Engineer conducting the test (usually the Cog. Engineer) (a) walks down the system and component alignment to the extent necessary to assure himself that the test flow path is as required to begin the test described herein and instrumentation is ready, (b) reviews the last test, (c) If applicable, performs a cross comparison of instrumentation as a rough validation of calibration, (d) a "pre-test" is not allowed.

2. During a test, anomalous data with no clear indication of the cause must be attributed to the pump under test. For this occurrence, a prompt determination of operability is appropriate with follow-on corrective action as necessary. *Recalibrating test instruments and then repeating pump or valve tests is an acceptable alternative to the corrective action of repair or replacement, but is not an action that can be taken before declaring the pump or valve inoperable.* However, if during a test it is obvious that a test instrument is malfunctioning, the test may be halted and the instruments promptly recalibrated or replaced. [See NRC Generic Letter 91-18, "Information to Licensees Regarding ... Operability"]

3. SAFETY ANALYSIS LIMITS: When evaluating pump performance, verify that the pump meets the minimum requirements of the Safety Analyses as discussed in Attachments 3 and 10 of the Pump IST Procedure and related references discussed therein. For Units 2 and 3, this is Engineering Procedure SO23-V-3.4.

4. NOTIFICATION OF SUPERVISOR: The Engineer conducting the test shall immediately notify his supervisor when the data acquired are in the "Alert", or, "Required Action Range".[1,2]

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[1] **Required Action Range** is defined in Reference 2.1.7, para. 6.1: "If deviations fall within the *Required Action Range* ... the pump shall be declared inoperable until the cause of the deviation has been determined and the condition corrected." **Alert Range** is also defined in the Reference 2.1.7, para. 6.1: "If deviations fall within the *Alert Range* ... the frequency of testing ... shall be doubled until the cause of the deviation has been determined and the condition corrected."

[2] Although the Reference 2.1.7, para. 6.2 says completion of the test report (analysis) shall be within 96 hours, including supervisor signature, this is overridden by the NRC Generic Letter 89-04. The 96 hours remains the mandatory code requirement, however, the SONGS IST Program requires the evaluation be completed within 8 hours, as a maximum, if the pump is in the ALERT or Required Action Range.

PUMP IST EVALUATION FLOW DIAGRAM (Continued)

NOTES: (Continued)

5. It is appropriate to validate the data prior to the inoperability declaration.[3] **Validation** (verifying the test was conducted using the required system lineup, instruments were not obviously out-of-calibration, a second check of calculations, etc.) **must be completed as soon as possible and in no case later than eight hours following completion of data gathering phase of the test if it is suspected that the pump is in the "Alert" or "Required Action" ranges.**. The validation period is provided to obtain management concurrence that the IST test results are valid and entry into an applicable action statement is required. A retest using recalibrated instrumentation is not allowed as a validation step.

6. If the Cognizant Supervising Engineer and the Engineer conducting the test conclude that the test is invalid, the test may be ignored and the test records not used. **IN THIS CASE, A VALID TEST SHOULD BE COMPLETED ON THE PUMP IN QUESTION AS SOON AS POSSIBLE TO CONFIRM PUMP OPERABILITY.** Performing an invalid test in no way absolves those responsible from compliance with the surveillance requirements and schedules of the Technical Specifications (e.g., IST requirements) as they apply to the components under test.

7. NRC POSITION: The NRC guidance on T-S Clock Policy states that when performance data fall in the Required Action Range, regardless of whether the limit is equal to or more conservative than the TS limit, the pump or valve must be declared inoperable immediately and the TS action statement for the associated system must be entered. In cases where the required action range limit is more conservative than its corresponding TS limit, the corrective action may not be limited to replacement or repair; it may be an analysis to demonstrate that the specific performance degradation does not impair operability and that the pump or valve will still fulfill its function, such as delivering the required flow. A new required action range may be established after such analysis which would then allow a new determination of operability.

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[3] An incident in January, 1992, involving the Unit 1 Main Feed pumps is a circumstance where this policy of validation could have been applied. Declaring a main Feedwater pump inoperable put Unit 1 in Technical Specification 3.0.3. The pump data were only slightly into the Required Action Range, and, as it turned out, resulted from an inaccurate discharge pressure gauge. It would have been appropriate and consistent with the intent of the NRC Generic Letter 89-04, Att. 1, Position 8 to consider this test to be non-valid. A valid IST could then be promptly completed to verify pump operability.

PUMP IST EVALUATION FLOW DIAGRAM (Continued)

NOTES: (Continued)

"The durations specified by the Code for analyzing test results have not been accepted by the NRC for postponing entering a TS action statement. As soon as the data are recognized as being within the required action range for pumps or as exceeding the limiting value of full-stroke time for valves, the associated component must be declared inoperable and, if subject to the TS, the Allowed Outage Time (AOT) specified in the action statement must be started at the time the component was declared inoperable."[4]

8. If the Engineering Supervisor determines that the test was valid and the data are in the Alert or Required Action Range (Refer to Footnote No. 1, above), the Supervising Engineer shall immediately initiate and validate an NCR (including an operability assessment) and notify the SRO Operations Supervisor.

9. The NCR shall contain the date and time of the pump test. In all cases, the Technical Specification clock shall be started and controlled by the SRO Operations Supervisor.

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[4] This is a quote from the NRC Generic Letter 91-18, Information ... on Resolution of Degraded and Nonconforming Conditions and Operability, November 7, 1991.

MINIMUM PUMP PERFORMANCE TO ACHIEVE SAFETY ANALYSIS COMPLIANCE

1.0 REQUIREMENTS

1.1 Pump performance parameters identified in the following reference drawings from NEDO shall be met as a minimum during IST. If these values are not met, the pump is considered to not meet the Safety Analysis assumptions for the performance of the safety systems.

1.2 The Code requirements in Attachment 3 to this procedure shall be met in cases where the Safety analysis requirements of this Attachment are less restrictive.

1.3 Accordingly, when evaluating a Pump IST, the Cog. Engineer identifies the Code limits as shown on Attachment 3 and then reviews the safety analysis limits form the below references. The most restrictive limits shall be recorded on the pump test record and used for evaluation of the pump performance.

2.0 PUMP PERFORMANCE REFERENCES

PUMP	REFERENCE
CONTAINMENT SPRAY PUMPS	
S2(3)1206MP012	Drawing 41063
S2(3)1206MP013	
LOW PRESSURE SAFETY INJECTION PUMPS	
S2(3)1204MP015	Drawing 41065, and T-S 4.5.2.g
S2(3)1204MP016	
HIGH PRESSURE SAFETY INJECTION PUMPS	
S2(3)1204MP017	Drawing 41064, and T-S 4.5.2.g
S2(3)1204MP018	
S2(3)1204MP019	
COMPONENT COOLING WATER PUMPS	
S2(3)1203MP024	Drawing 41066
S2(3)1203MP025	
S2(3)1203MP026	
COMPONENT COOLING WATER MAKEUP PUMPS	
S2(3)1203MP1018	Under Development
S2(3)1203MP1019	

MINIMUM PUMP PERFORMANCE TO ACHIEVE SAFETY ANALYSIS COMPLIANCE (Continued)

2.0 PUMP PERFORMANCE REFERENCES (Continued)

PUMP	REFERENCE
DIESEL FUEL OIL TRANSFER PUMPS	
S2(3)2421MP093	Drawing 41068
S2(3)2421MP094	
S2(3)2421MP095	
S2(3)2421MP096	
SALT WATER COOLING PUMPS	
S2(3)12CMP112	Drawing 41067
S2(3)12OMP113	
S2(3)12OMP114	
S2(3)12OMP307	
AUXILIARY FEEDWATER PUMPS	
S2(3)1305MP140	Drawing 41061
S2(3)1305MP141	
S2(3)1305MP504	
AUX. BUILDING EMERGENCY CHILL WATER PUMPS	
SA1513MP160	Drawing 41075
SA1513MP162	
BORIC ACID MAKEUP (BAMU) PUMPS	
S2(3)1218MP174	Drawing 41069
S2(3)1218MP175	
REACTOR CHARGING PUMPS	
S2(3)1208MP190	Drawing 41062, and T-S 4.5.2.g
S2(3)1208MP191	
S2(3)1208MP192	

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