SR
Safety Classification

FERMI 2 PROCEDURE - MAINTENANCE

TITLE: RWCU HOLDING PUMP MAINTENANCE

PROCEDURE NUMBER: 35.000.69

REVISION: 4

INFORMATION ONLY

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OSRO Chairman/Alternate

Approved by: R. S. Lenart /s/ Date: 09/27/85
Superintendent - Nuclear Production

The following approved Procedure Change Requests are incorporated in this revision: M3764

This revision | X | does | | does not constitute periodic review.

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1.0 Purpose

The purpose of this procedure is to provide detailed instructions necessary for the disassembly, inspection, and assembly of the Reactor Water Clean-up (RWCU) Holding Pumps.

If complete disassembly is not required, use only those sections which are applicable. Steps within those sections performed must be completed in the sequence given unless otherwise noted.

2.0 Equipment Location

The RWCU Holding Pumps are located on the Fourth Floor of the Reactor Building (Elevation 659'6") at the following grid locations:

2.1 G3305C003A: B/17 (7'10" south of column 17 and 9'1" east of row B)

2.2 G3305C003B: B/15 (9'2" north of column 15 and 9'1" east of row B)

3.0 References

3.1 Use References

3.1.1 Plant Operations Manual (POM) Procedure 12.000.15, "PN-21 (Work Order) Processing"

3.1.2 POM Procedure 35.000.107, "Horizontal Rotating Equipment Alignment"

3.1.3 Maintenance Instruction (MI) M055, "Bolting and Torquing Guidelines"

3.1.4 MI-M304, "Guidelines for Lubrication of Anti-Friction Bearings, Drive Shafts Universals, Flexible Couplings, Gear Reducers and Pump Packing Glands"

3.1.5 MI-M338, "Guidelines and Practices for the Use of Hoisting and Rigging Equipment"

3.2 Source References

3.2.1 Fermi 2 Technical Specifications - None

3.2.2 A30-00-0-000-JA, "EF-2 Lubrication Manual"

3.2.3 G33-05-Z-002-SG-001, Holding Pump Section, "Diautomatic Filter System"

4.0 Planning Information

4.1 General

4.1.1 Manpower and equipment not listed should be specified in the Work Order Package.

4.2 Measuring and Test Equipment

4.2.1 Measuring and test equipment (M&TE) used in the performance of this maintenance task shall be documented on Attachment 1.

4.2.2 The following is a recommended list of measuring and test equipment which may be used to perform this procedure:

1. Dial Indicator
2. Micrometers (ID & OD)
3. Torque Wrenches for the following values:
   a. 9 ft.-lbs.
   b. 15 ft.-lbs.
   c. 25 ft.-lbs.
   d. 500 ft.-lbs.

4.3 Special Tools and Equipment

4.3.1 The following is a recommended list of special tools and equipment which may be used to perform this procedure:

1. Suitable lube oil containers
2. Appropriate lifting equipment
3. Gear/bearing puller
4. Wooden blocking wrapped with herculite (obtain Health Physics approval prior to use)
5. Bent piece of wire
6. Feeler gauge

4.4 Required Replacement Parts

4.4.1 The following parts are normally replaced during the performance of this procedure:

		Item No.	(Enclosure No.)
1.	Pump end bearing end cover gasket	216B	(1)
2.	Coupling end bearing end cover gasket	216A	(1)
3.	Cooling cartridge-to-bearing housing gasket	262B	(1)
4.	Stuffing box extension-to-casing gasket	363	(1)
5.	Gland ring gasket	G	(3)
6.	Gland ring O-ring	6	(3)
7.	Stationary sealing element	2	(3)
8.	Shaft sleeve gasket	262A	(1)
9.	Packing ring	P	(3)
10.	Sealing ring	3	(3)
11.	Springs	C	(3)

4.5 Consumable Materials

4.5.1 The following consumable materials, or approved equivalents, may be required during the performance of this procedure:

1. Clean, lint-free rags
2. Isopropyl alcohol
3. Shell Turbo 220, lubricating oil
4. Dow Corning No. 44 Silicone Lubricant
5. Texaco Marfak #2HD
6. Wire brush (miscellaneous)
7. Fel Pro N-5000

5.0 Precautions and Limitations

5.1 Ensure the external surface of the component and its surrounding area are free of dust, soil, foreign materials, rags, loose objects, and debris prior to commencement of work. | 4

5.2 All lifting, supporting, and positioning of heavy components is to be performed in accordance with Reference 3.1.5 (MI-M338, "Guidelines and Practices for the Use of Hoisting and Rigging Equipment").

5.3 Unless otherwise directed, during disassembly discard all used O-rings and gaskets.

5.4 Use suitable temporary covers on open piping, pump cases, flanged mating surfaces, valves, etc., to preclude the entry of foreign material into the system and to protect sealing surfaces from damage. | 4

5.5 Provide adequate thread protectors to prevent damage to shaft threads and body bound stud threads.

5.6 Establish a designated storage area for parts removed during disassembly. Tag parts removed to ensure proper reinstallation. Document location of storage area in the Remarks section of Attachment 1.

5.7 Match mark parts as required during diassembly to aid in proper orientation during reassembly.

5.8 Observe applicable radiological precautions. Contact Health Physics for guidance, as required.

5.9 All bolting and torquing shall be in accordance with Reference 3.1.3 (MI-M055, "Bolting and Torquing Guidelines").

5.10 During the disassembly/assembly of the pump, do not allow the pump shaft (10) to strike any hard objects.

5.11 The mechanical seal (429) is very delicate and extreme care must be exercised during the removal, handling, and installation of the sealing components. Direct bare hand contact with the sealing faces will cause etching and poor seal performance. 4

5.12 Do not bend or kink the oil rings (31) when removing/installing the shaft assembly.

5.13 The inner and outer thrust bearings (204) must be seated against the shaft shoulder, with the wide flange of the outer race facing toward the pump coupling.

5.14 The radial bearing (205) must be seated against the shaft shoulder, with the wide flange of the outer race facing toward the impeller end of the pump shaft (10). 4

5.15 Due to the expected high levels of radioactive contamination, a prejob briefing with Health Physics should be conducted to determine specific radiological requirements.

6.0 Prerequisites

6.1 A PN-21 (Work Order) shall be processed and released by the Nuclear Shift Supervisor in accordance with Reference 3.1.1 (POM Procedure 12.000.15, "PN-21 [Work Order] Processing") prior to the performance of this procedure.

6.2 The Work Leader assigned the responsibility for performing this procedure has reviewed the work plan and understands the total job. He shall sign the Maintenance Data Sheet's "Prerequisites Met" slot (Attachment 1) to document this understanding and that all other prerequisites have been met.

7.0 Procedure

NOTE (1): If any discrepancies are noted during the performance of the following sections, contact the cognizant engineer for further instructions. 4

NOTE (2): Document all parts replaced in the Remarks section of Attachment 1.

7.1 Disassembly

NOTE: Refer to Enclosure 1 for the applicable illustration.

7.1.1 Remove the motor-to-pump coupling by performing the following:

1. Remove the coupling guard.

2. Match mark the coupling hubs, spacer, bolts, washers, and nuts, as required, to ensure proper assembly. (Make a sketch noting the arrangement, as they must be installed in the same positions.) 4

3. Loosen and remove the coupling-to-spacer bolts from both coupling hubs.

4. Remove the coupling spacer.

7.1.2 Drain the bearing housing by performing the following:

1. Loosen the thumb screw and remove the oiler glass reservior.
2. Remove the lube oil drain plug and drain the lube oil into suitable containers.
3. Reinstall the oil drain plug when draining is complete.

4

7.1.3 Remove the auxiliary piping, as required, to permit pump disassembly.

7.1.4 Loosen and remove the support plate bolts (E).

7.1.5 Loosen and remove the support plate (332)-to-bedplate bolts.

7.1.6 Attach appropriate lifting equipment to the bearing housing (159) and the stuffing box extension (264).

7.1.7 Take up all slack in the lifting equipment, to support the pumping assembly when the casing bolts (A) are removed.

7.1.8 Loosen and remove the casing bolts (A).

7.1.9 Install jacking bolts into the tapped holes provided in the casing (1), and jack the stuffing box extension (264) and the pump assembly from the casing (1).

7.1.10 Carefully lift out the pump assembly and transport it to the designated work area.

7.1.11 Install a suitable protective cover over the pump casing to prevent debris from entering the casing.

7.1.12 Using a gear puller, remove the pump coupling hub from the pump shaft (10).

7.1.13 Remove the coupling key (12) from the pump shaft (10).

NOTE: The shaft nut (126) has left-hand threads.

7.1.14 Loosen the shaft nut setscrew, then loosen and remove the shaft nut (126).

7.1.15 Remove the washer (300) and the impeller washer (246) from the pump shaft (10).

7.1.16 Remove the impeller (3).

7.1.17 Remove the impeller key (11).

> **CAUTION**
>
> During the disassembly of the pump do not allow the pump shaft (10) to strike any hard objects.

7.1.18 Carefully position the pump assembly in the vertical position (coupling end up) on wooden blocking.

7.1.19 Loosen and remove the four (4) gland nuts (B) from the mechanical seal assembly (429).

7.1.20 Loosen and remove the four (4) oil cooler bolts.

7.1.21 Remove the cooling cartridge (373) and the cooling cartridge-to-bearing housing gasket (262B).

7.1.22 Loosen and remove the stuffing box extension capscrews (C).

7.1.23 Carefully pull the bearing housing (159) and the shaft assembly, with the shaft sleeve (8), from the stuffing box extension (264).

> **CAUTION**
>
> The mechanical seal is very delicate and extreme care must be exercised during the removal, handling, and installation of the sealing components. Direct bare hand contact with the sealing faces will cause etching and poor seal performance.

7.1.24 Remove the shaft sleeve (8) and the rotating mechanical seal assembly, as a unit, from the pump shaft (10).

7.1.25 Remove the shaft sleeve gasket (262A).

7.1.26 Remove the stationary mechanical seal assembly, as a unit, from the pump.

7.1.27 Loosen the coupling end flinger setscrew and remove the coupling end flinger (157A).

7.1.28 Loosen and remove the coupling end bearing housing cover capscrews (F).

7.1.29 Remove the coupling end bearing housing cover (160A) and the coupling end bearing end cover gasket (216A).

7.1.30 Loosen the pump end flinger setscrew and remove the pump end flinger (157B).

7.1.31 Loosen and remove the pump end bearing housing cover capscrews (D).

7.1.32 Remove the pump end bearing housing cover (160B) and the pump end bearing end cover gasket (216B).

7.1.33 Using a bent piece of wire, position the oil rings (31) as shown on Enclosure 4, to prevent inadvertent damage.

CAUTION
Do not bend or kink the oil rings (31) when removing the shaft assembly.

7.1.34 Carefully, pulling from the coupling end, remove the pump shaft assembly from the bearing housing (159).

7.1.35 Remove the thrust bearing springs (341B) and shims (257). Match mark/tag these components to ensure proper installation during assembly.

7.1.36 Remove the radial bearing springs (341A). Match mark/tag the springs to ensure proper installation during assembly.

7.1.37 Loosen and remove the locknut (240) from the pump shaft (10).

7.1.38 Remove the lock washer (241).

NOTE: Each bearing must be marked indicating its location and direction of rotation, to ensure proper installation.

7.1.39 Using a bearing puller, remove the thrust bearings (204) and radial bearing (205). Match mark the bearings to ensure proper installation during assembly.

7.2 Mechanical Seal Maintenance

NOTE: Refer to Enclosure 3 for the applicable illustration.

7.2.1 Remove the mechanical seal assembly in accordance with Steps 7.1.1 through 7.1.12, 7.1.15 through 7.1.20, and 7.1.23 through 7.1.27.

NOTE: Do not remove the drive collar (Y) unless required for component replacement.

7.2.2 Completely disassemble the mechanical seal rotating and stationary assemblies.

7.2.2.1 If the drive collar (Y) must be removed (i.e., the mechanical seal rotating assembly or shaft sleeve (8) requires replacement), scribe a line or otherwise record the relative position of the drive collar (Y) to the shaft sleeve (8), then loosen setscrew (S).

7.2.3 Visually check the component parts in accordance with Steps 7.3.5 and 7.3.6.

7.2.4 Prior to installing the mechanical seal, assemble the pump in accordance Steps 7.4.1 through 7.4.17, as applicable.

7.2.5 Assemble and install the mechanical seal by performing the following:

NOTE: Discard all used O-rings and gaskets.

CAUTION
The mechanical seal is very delicate and extreme care must be exercised during the removal, handling, and installation of the sealing components. Direct bare hand contact with the sealing faces will cause etching and poor seal performance.

1. Visually check the carbon sealing ring (B), located in the bore of the gland ring (1) for cracking and excessive pitting. Replace if necessary.

2. Apply a light coat of Dow Corning No. 44 Silicone Lubricant to the new gland ring gasket (G) and the gland ring O-ring (6).

3. Install the gasket (G) and the O-ring (6) in their grooves in the gland ring (1).

4. Install the retaining pin (Z) into the gland ring (1).

5. Carefully install the new stationary sealing element (2) into the gland ring (1), ensuring extreme care is exercised to prevent inadvertent damage.

6. Install the stationary sealing assembly onto the pump shaft (10).

7. Apply a light coat of Dow Corning No. 44 Silicone Lubricant to the new shaft sleeve gasket (262A).

8. Install the new shaft sleeve gasket (262A) into the shaft sleeve (8).

9. Install the drive collar (Y) into position on the shaft sleeve (F). Securely tighten setscrew (S).

10. Install the spring pins (E) and the new springs (C) into the drive collar (Y).

11. Install the drive ring (X) onto the shaft sleeve (8), ensuring that the spring pins (E) and the springs (C) are properly seated in their alignment holes.

12. Install the drive pins (D) into the drive ring (X).

13. Apply a light coat of Dow Corning No. 44 Silicone Lubricant to the new packing ring (P).

14. Install the new packing ring (P) onto the shaft sleeve (8).

15. Carefully install the new sealing ring (3) onto the shaft sleeve (8), ensuring that the drive pins (D) are properly seated in their alignment holes.

16. Carefully install the shaft sleeve (8), with the rotating sealing assembly onto the pump shaft (10).

17. Complete pump assembly by performing Steps 7.4.19 through 7.4.41, as applicable.

7.3 Component Checks

NOTE: Replace all damaged parts, as required.

7.3.1 Thoroughly clean all component parts with isopropyl alcohol, or approved equivalent, and clean, lint-free rags, as necessary.

7.3.2 Visually check component parts for excessive wear, corrosion, erosion, and/or other damage. Document results on Attachment 1.

7.3.3 Place the pump shaft (10) in a lathe (or other suitable means of support) and measure the Total Indicated Runout (TIR). The maximum TIR is 0.0025". Document results on Attachment 1.

7.3.4 Visually check the bearings (204 and 205) for rust, flat spots, and/or other damage. Replace the bearings as required. Document results on Attachment 1.

7.3.5 Visually check the shaft sleeve (8) for nicks, burrs, erosion, excessive wear, and/or other damage. Replace the shaft sleeve as required. Document results on Attachment 1.

CAUTION
The mechanical seal is very delicate and extreme care must be exercised during the removal, handling, and installation of the sealing components. Direct bare hand contact with the sealing faces will cause etching poor seal performance.

7.3.6 Visually check the mechanical seal components for pits, nicks, and/or other damage. Document results on Attachment 1.

7.3.7 Visually check the oil cooler for fouling/blockage. Clean the oil cooler, using wire brushes and clean, lint-free rags, if necessary.

7.3.8 Visually check the impeller openings for blockage. Clean the openings using a wire brush and clean, lint-free rags, if necessary.

7.3.9 Measure the clearance between the impeller (3) and the stuffing box bushing (88). Maximum acceptable clearance is less than or equal to 0.040." Document results on Attachment 1. If clearances are excessive replace the stuffing box bushing (88).

7.4 Assembly

NOTE: Refer to Enclosure 1 and 2 for the applicable illustrations.

7.4.1 Apply a light coat of Shell Turbo 220 lubricant, or approved equivalent, to the bearing components. 4

NOTE: The bearings must be installed in their proper positions. Ensure all match markings are adhered to.

CAUTION

The inner thrust bearing (204) must be seated against the shaft shoulder with the wide flange of the outer race towards the pump coupling. The outer thrust bearing (204) must be installed in the same manner.

7.4.2 Install the thrust bearings (204) onto the pump shaft (10), ensuring that the inner most bearing is firmly seated against the shaft shoulder, with the wide flange of the outer race towards the pump coupling.

7.4.3 Install the lock washer (241).

7.4.4 Install and securely tighten the locknut (240).

7.4.5 Properly position the oil rings (31) and the oil throwers (50) onto the pump shaft (10).

CAUTION

The radial bearing (205) must be seated against the the shaft shoulder, with the wide flange of the outer race towards the impeller end of the pump shaft (10).

7.4.6 Install the radial bearing (205) onto the pump shaft (10), ensuring that the bearing is firmly seated against the shaft shoulder with the wide flange of the outer race towards the impeller end of the pump shaft (10).

7.4.7 Carefully position the bearing housing (159) in the vertical position (coupling end up) on wooden blocking.

7.4.8 Apply a light coat of Dow Corning No. 44 Silicone Lubricant to the new pump end bearing end cover gasket (216B).

7.4.9 Install the new pump end bearing end cover gasket (216B) and the pump end bearing housing end cover (160B) onto the bearing housing (159).

7.4.10 Install and torque the pump end bearing housing end cover capscrews (D) to 8-10 (9) ft.-lbs. Document on Attachment 1.

7.4.11 Install the eight (8) radial bearing springs (341A) against the pump end bearing housing end cover. The springs must form a "V" as shown on Enclosure 2.

7.4.12 Install the pump shaft assembly into the bearing housing (159) from the coupling end.

7.4.13 Install the same number of shims that were previously removed onto the pump shaft (10) against the thrust bearing (204).

7.4.14 Check for proper shim thickness by performing the following:

1. Install the eight (8) thrust bearing springs (341B) onto the pump shaft (10) against the shims. The springs must form a "V" as shown on Enclosure 2. 4

2. Install the coupling and bearing housing cover (160A) without an end cover gasket (216A).

3. Install and torque the coupling end bearing housing end cover capscrews (F) to 14-16 (15) ft.-lbs. Document on Attachment 1.

4. Measure the gap between the coupling end bearing housing end cover (160A) and the bearing housing (159) at four (4) locations to ensure the end cover is torqued equally.

5. Refer to the chart on Enclosure 2 for the quantity of shims to be removed.

6. Loosen and remove the coupling end bearing housing end cover capscrews (F).

7. Remove the coupling end bearing housing cover (160A).

8. Remove and/or add shims as determined in Step 7.3.14.5.

9. Apply a light coat of Dow Corning No. 44 Silicone Lubricant to the new coupling end bearing end cover gasket (216A).

10. Install the new coupling end bearing end cover gasket (216A) and install the coupling end bearing housing cover (160A).

11. Install and torque the coupling end bearing housing end cover capscrews (F) to 24-26 (25) ft.-lbs. Document on Attachment 1.

7.4.15 Properly position the oil rings (31) over the shaft shoulders and firmly against the bearings.

7.4.16 Position the pump end flinger (157B) on the pump shaft (10) as close as possible to the bearing housing without actually touching the bearing housing. Securely tighten the setscrew.

7.4.17 Position the coupling end flinger (157A) on the pump shaft (10) as close as possible to the bearing housing without actually touching the bearing housing. Securely tighten the setscrew.

7.4.18 Install the mechanical seal assembly in accordance with Step 7.2.3.

7.4.19 Carefully install the stuffing box extension (264) onto the bearing housing (159). Install and securely tighten the stuffing box extension capscrews (C).

7.4.20 Install a new cooling cartridge-to-bearing housing gasket (262B).

7.4.21 Install the cooling cartridge (373). Install and securely tighten the oil cooler bolts.

7.4.22 Carefully position the pump assembly in the horizontal position.

7.4.23 Install the impeller key (11) into the shaft keyway.

7.4.24 Apply a light coat of Fel Pro N-5000 to the pump shaft (10), then carefully install the impeller (3) onto the pump shaft (10), ensuring that the impeller key (11) is squarely and firmly seated.

7.4.25 Install the impeller washer (246).

NOTE: The shaft nut (126) has left-hand threads

7.4.26 Install the washer (300), and install and torque the shaft nut (126) to 14-16 (15) ft.-lbs. Document on Attachment 1.

7.4.27 Install and securely tighten gland nuts (B).

7.4.28 Install the coupling key (12) into the shaft keyway.

7.4.29 Install the pump coupling hub onto the pump shaft (10), ensuring that the coupling key (12) is squarely and firmly seated.

7.4.30 Install a new stuffing box extension-to-casing gasket (363).

NOTE: Use care when installing the pump assembly into the pump casing (1) to avoid damaging the gasket (363).

7.4.31 Using appropriate rigging equipment, install the pump assembly into the pump casing (1).

7.4.32 Fill the bearing housing (159) with Shell Turbo 220 Lubricating Oil to the specified level. Install the oiler glass reservior and tighten thumb screw.

7.4.33 Install and torque the casing bolts (A) to 475-525 (500) ft.-lbs. Document on Attachment 1.

7.4.34 Install the pump support plate (332), and install and securely tighten the support plate bolts (E).

7.4.35 Install and securely tighten the support plate (332)-to-bedplate bolts.

7.4.36 Install the auxiliary piping that was previously removed, using new gaskets as required.

7.4.37 Align the pump coupling in accordance with Reference 3.1.2 (35.000.107, "Horizontal Rotating Equipment Alignment") with the parallel and angular Total Indicated Runout (TIR) less than or equal to 0.003". Document on Attachment 1. Attach all pertinent Data Sheets to the Work Order Package. 4

NOTE: Ensure all match markings are adhered to.

7.4.38 Install the coupling spacer.

7.4.39 Install the coupling bolts, washers, and nuts.

7.4.40 Securely tighten the coupling nuts and bolts.

7.4.41 Lubricate the coupling with Texaco Marfak #2HD in accordance with Reference 3.1.4 (MI-M304, "Guidelines for Lubrication of Anti-Friction Bearings, Drive Shafts Universals, Flexible Couplings, Gear Reducers and Pump Packing Glands").

7.4.42 Install the coupling guard and securely tighten mounting bolts.

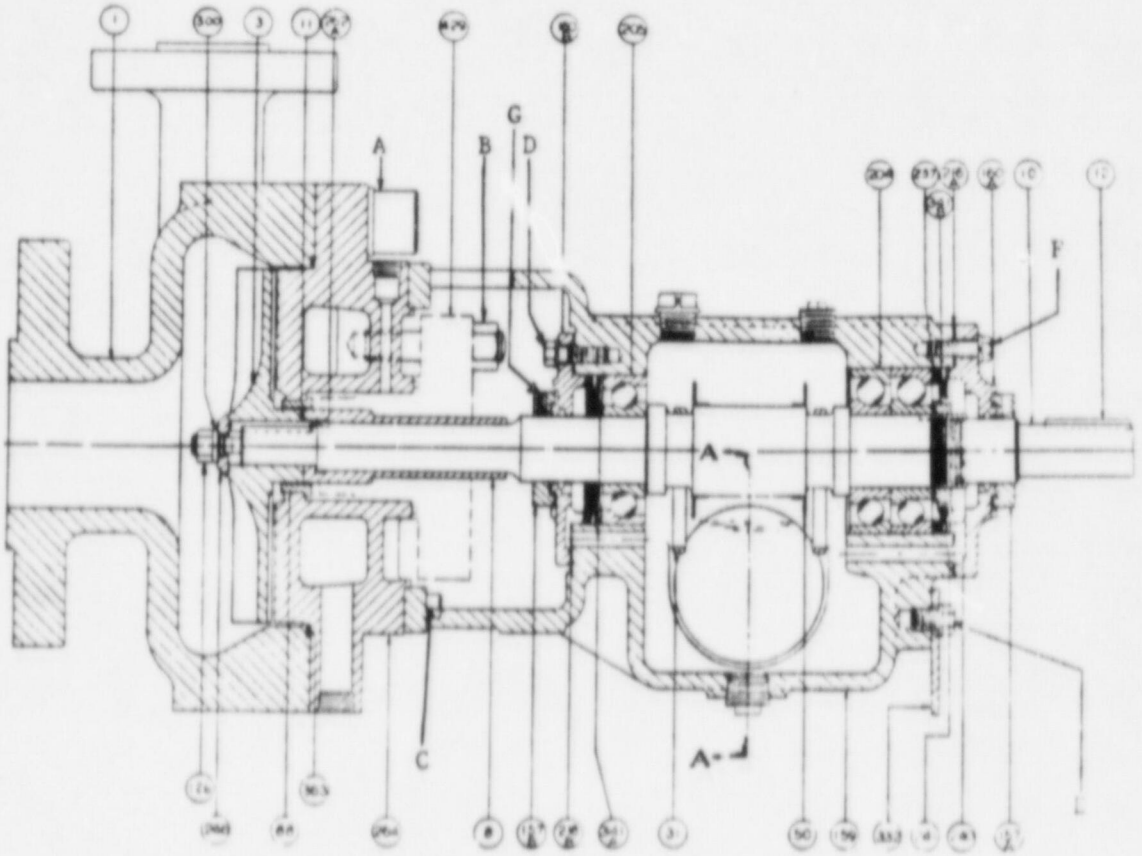
7.5 Post Maintenance Inspection, Testing, and Restoration

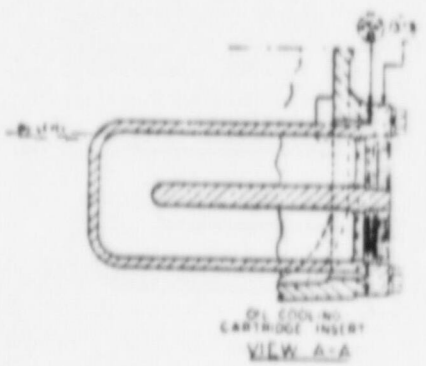
7.5.1 Ensure all equipment labels and/or nameplates are reinstalled.

7.5.2 See the Work Order Package for any further inspections, tests, or checks.

7.5.3 After successful completion of all inspections and tests as listed above, the Protection/Work Leader shall sign the Maintenance Order and process the PN-21 in accordance with Reference 3.1.1 (POM Procedure 12.000.15, "PN-21 [Work Order] Processing").

PUMP ASSEMBLY AND PARTS LIST





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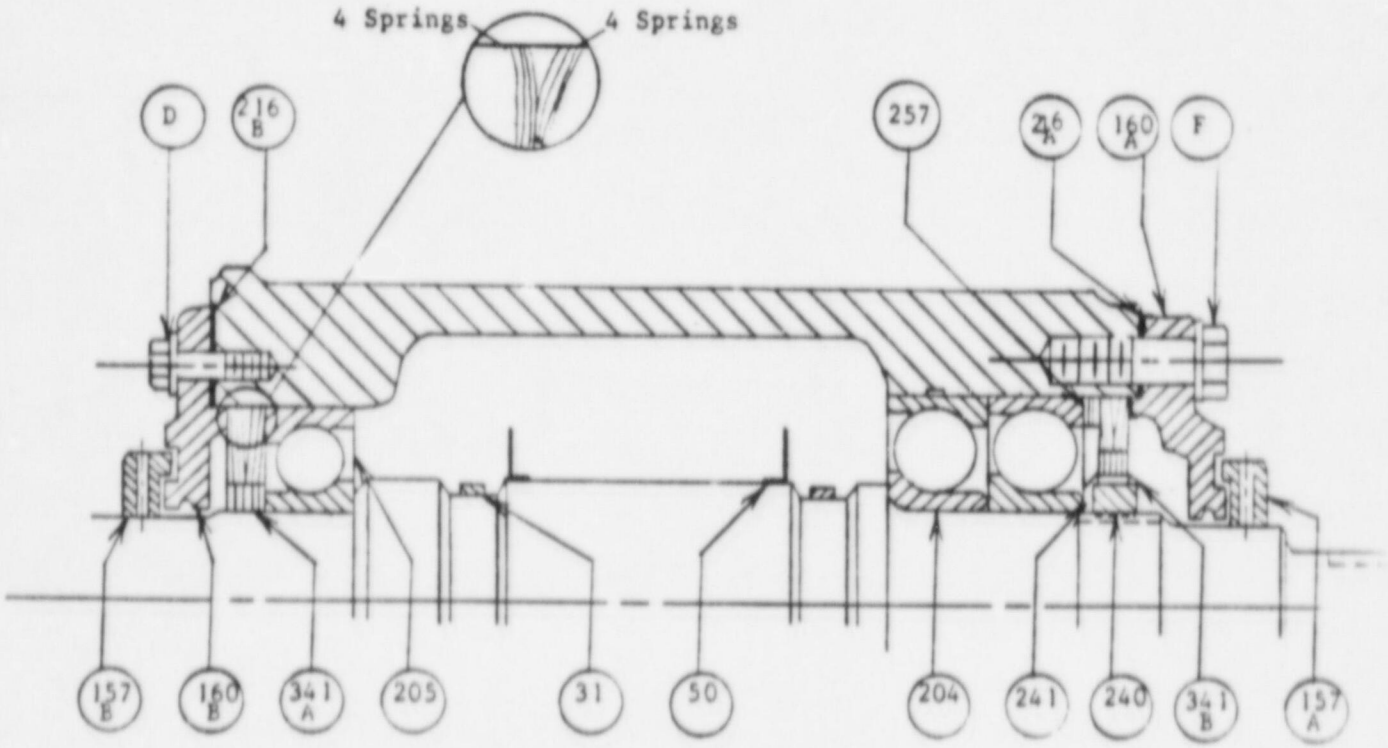
PUMP ASSEMBLY AND PARTS LIST

Parts List

1. Casing
3. Impeller
8. Shaft Sleeve
10. Shaft
11. Impeller Key
12. Coupling Key
31. Oil Ring
50. Oil Thrower
88. Stuffing Box Bushing
126. Shaft Nut
157A. Coupling End Flinger
157B. Pump End Flinger
159. Bearing Housing
160A. Coupling End Bearing Housing End Cover
160B. Pump End Bearing Housing End Cover
204. Thrust Bearing
205. Radial Bearing
216A. Gasket, Coupling End Bearing End Cover
216B. Gasket, Pump End Bearing End Cover
240. Locknut
241. Lock Washer
246. Impeller Washer
257. Shims
262A. Gasket, Shaft Sleeve
262B. Gasket Cooling Cartridge to Brg Housing
264. Stuffing Box Extension
332. Support Plate
341A. Radial Brg Springs
341B. Thrust Brg Springs
363. Gasket, Stuffing Box Extension to Casing
373. Cooling Cartridge
429. Mechanical Seal (Complete)
A. Casing Bolts
B. Gland Nuts
C. Stuffing Box Extension Capscrews
D. Pump End Bearing Housing Cover Capscrews
E. Support Plate Bolts
F. Coupling End Bearing Housing Cover Capscrews
G. Coupling End Funger Setscrew

THRUST BEARING ASSEMBLY



Measured Gap	Shim Removal
.008 to .017	(2) .010 shims
.018 to .027	(3) .010 "
.028 to .037	(4) .010 "
.038 to .047	(5) .010 "
.048 to .057	(6) .010 "
.058 to .067	(7) .010 "
.068 to .077	(8) .010 "
.078 to .087	(9) .010 "
.088 to .097	(10) .010 "
.098 to .107	(11) .010 "
.108 to .117	(12) .010 "
.118 to .127	(13) .010 "
.128 to .137	(14) .010 "
.138 to .147	(15) .010 "

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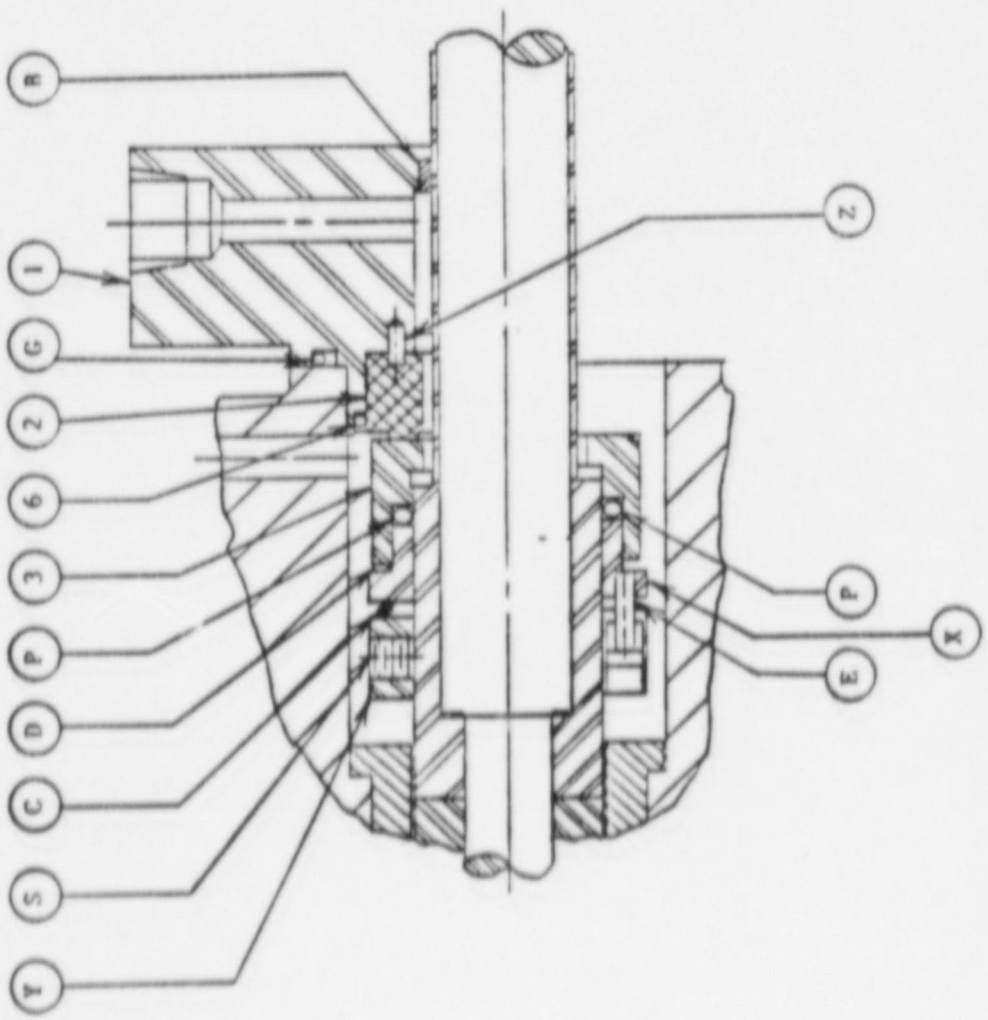
Note: See Parts List on Enclosure 1, page 2 of 2.

MECHANICAL SEAL ASSEMBLY

Parts List

1. Gland Ring
2. Stationary Sealing Assembly
3. Sealing Ring
6. Gland Ring O-ring
B. Carbon Sealing Ring
C. Springs
D. Drive Pins
E. Spring Pins
G. Gland Ring Gasket
P. Packing Ring
S. Setscrew
X. Drive Ring
Y. Drive Collar
Z. Retaining Pins



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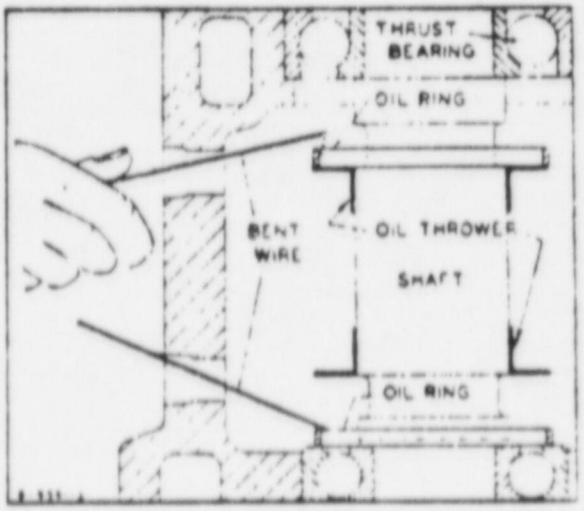
OIL RING POSITION DIAGRAM



Suggested Method of Protecting Ring when dismantling

RWCU HOLDING PUMP MAINTENANCE
MAINTENANCE DATA SHEET

PIS No. _____ PN-21 No. _____

Equipment Serial No. _____ Prerequisites Met _____/_____
Signature/Date

Step No.	Description	Data	Acceptance Criteria	M&TE Serial No.	Verified/by Date
7.3.2	Pump component parts visual checks	Sat____ Unsat____	Satisfactory; No signs of excessive wear, corrosion, erosion, and/or other damage	N/A	_____/_____
7.3.3	Pump shaft TIR	____	≤ 0.0025" TIR	_____	_____/_____
7.3.4	Bearings visual checks	Sat____ Unsat____	Satisfactory; No signs of rust, flat spots, and/or other damage	N/A	_____/_____
7.3.5	Shaft sleeve visual checks	Sat____ Unsat____	Satisfactory; No signs of excessive wear, nicks, burrs, erosion, and/or other damage	N/A	_____/_____
7.3.6	Mechanical seal visual checks	Sat____ Unsat____	Satisfactory; No pits, nicks, and/or other damage	N/A	_____/_____
7.3.9	Impeller to stuffing box bushing	____	≤ 0.040"	_____	_____/_____
7.4.10	Pump end bearing housing end cover capscrews torque	____	8-10 (9) ft.-lbs.	_____	_____/_____
7.4.14.3	Coupling end bearing housing end cover capscrews torque	____	14-16 (15) ft.-lbs.	_____	_____/_____
7.4.14.11	Coupling end bearing housing end cover torque	____	24-26 (25) ft.-lbs.	_____	_____/_____

RWCU HOLDING PUMP MAINTENANCE
MAINTENANCE DATA SHEET

PN-21 No. _____

Step No.	Description	Data	Acceptance Criteria	M&TE Serial No.	Verified/by Date
7.4.26	Shaft nut torque	____	14-16 (15) ft.-lbs.	_____	_____/_____
7.4.23	Casing bolts torque	____	475-525 (500) ft.-lbs.	_____	_____/_____
7.4.37	Coupling alignment	Angular ___	≤ 0.003"	_____	_____/_____
		Parallel ___		_____	_____/_____

Test Equipment	Serial No.	Equip. Range	Calibration Due Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Remarks _____

_____

_____

_____

Completed by:

_____

_____

Name (Print) Signature Initials Employed by Date

Reviewed by: _____/_____
Foreman /Date

Approved by: _____/_____
Maintenance Engineer or designee /Date

081385

END