

OAK GROVE PLANT
MAINTENANCE SECTION-MECHANICAL

ABSORBER RECYCLE PUMP
REBUILD

PROCEDURE NO. OG-MSM-1426

REVISION NO. 0

EFFECTIVE DATE: _____

PREPARED BY (Print): _____ TOM PERSON 6/30/2010 _____ EXT: _____ 6395 _____

TECHNICAL REVIEW BY (Print): _____ EXT: _____

APPROVED BY: _____ DATE: _____

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 2 OF 24

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to remove, rebuild, and replace the Absorber Recycle Pump.

2.0 ACCEPTANCE CRITERIA

- The existing bearing assembly will be removed from the pump for repair.
- A new bearing assembly will be installed in the pump.

3.0 DEFINITIONS/ACRONYMS

- AR Action Request
- I&C Instrumentation and Controls
- LOTO Lock Out Tag Out
- PPE Personnel Protective Equipment
- MSDS Material Safety Data Sheet
- RCM Reliability Centered Maintenance
- RTD Resistance Temperature Detector

4.0 REFERENCES

- MSDS for chemicals, cleaners, oil, grease, etc.
- Safety Handbook
- Babcock Power Environmental Operation and Maintenance Manual, Volume 11, Recycle Pumps

5.0 PRECAUTIONS, LIMITATIONS AND NOTES

- Hold tailgate meeting prior to performing procedure.
- Follow LOTO and permit procedures.
- Wear proper PPE.
- Keep area clean and organized.
- Be aware of other workers in the area.
- Use two-way radios.
- Provide adequate lighting.

6.0 PREREQUISITES

6.1 Planning Group

6.1.1 ENTER the following information:

Work Order No. _____

Component Tag No. _____

Unit No. _____

Serial No. _____

6.1.2 SCHEDULE I&C to remove and install thermocouples and RTD housing.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 4 OF 24

8.2 Disassembly

NOTE: Absorber recycle pumps may be equipped with a drain cock or drain plug for draining oil, or both. The pump also may be equipped with an oiler and/or a dessicant oil filter on the breather.

- ☐ 8.2.1 If not already attached, ATTACH hose to oil drain.

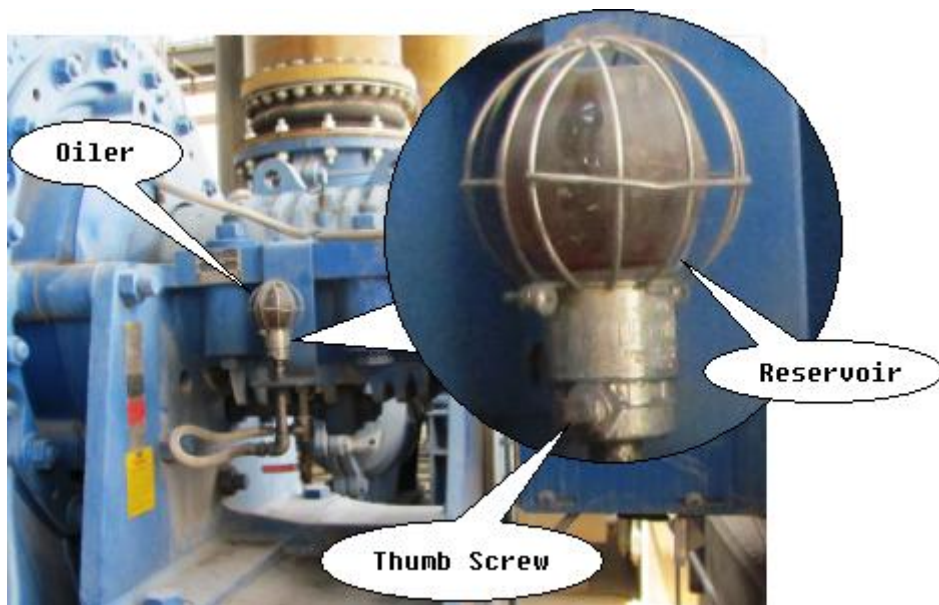


- ☐ 8.2.2 REMOVE drain plug from pump OR OPEN drain cock THEN DRAIN oil into suitable container.

- ☐ 8.2.3 If a drain plug was removed, using clean rag, CLEAN threads of drain plug THEN WRAP drain plug threads with Teflon tape. INSTALL drain plug in pump.

If a drain cock was used, CLOSE drain cock.

- ☐ 8.2.4 If pump is equipped with an oiler, LOOSEN thumb screw AND REMOVE oil reservoir from main body of oiler.

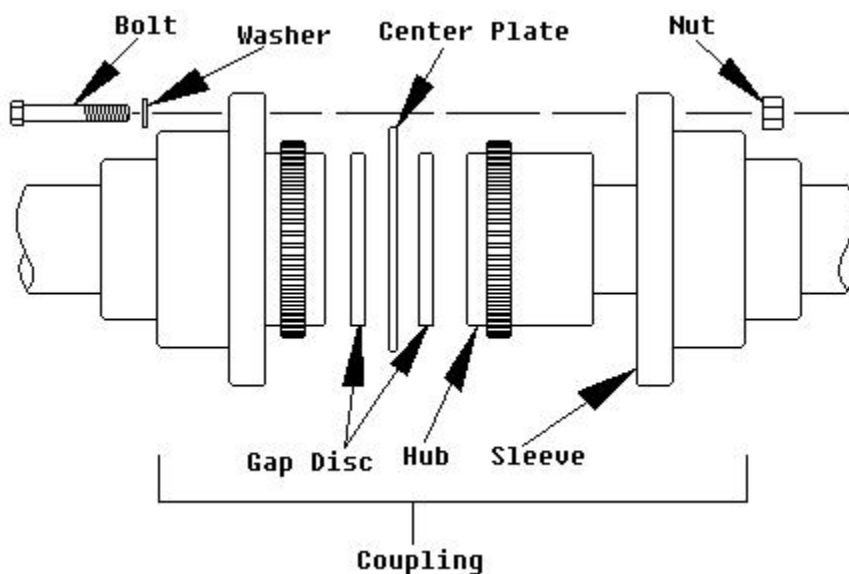


OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 5 OF 24

- ☐ 8.2.5 REMOVE six nuts, six washers, six bolts, and two coupling guards between gearbox and pump. PLACE nuts, washers, and bolts in zip-lock bag AND LABEL bag.



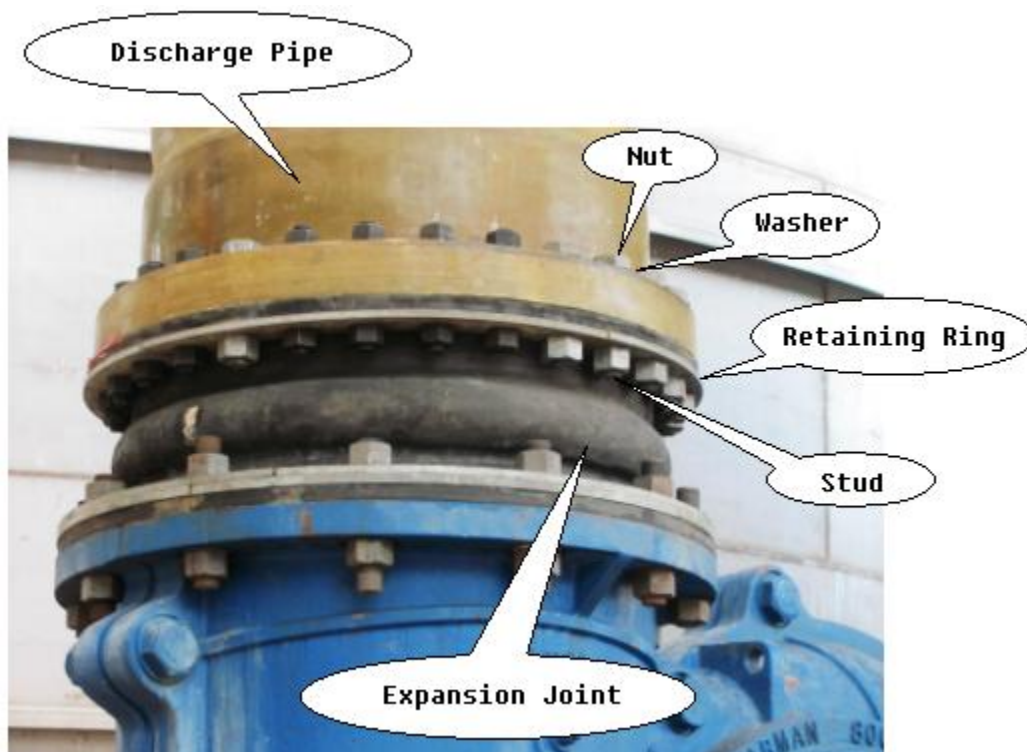
- ☐ 8.2.6 REMOVE eight nuts, eight bolts, and eight washers from coupling. PLACE nuts, bolts, and washers in zip-lock bag AND LABEL bag.



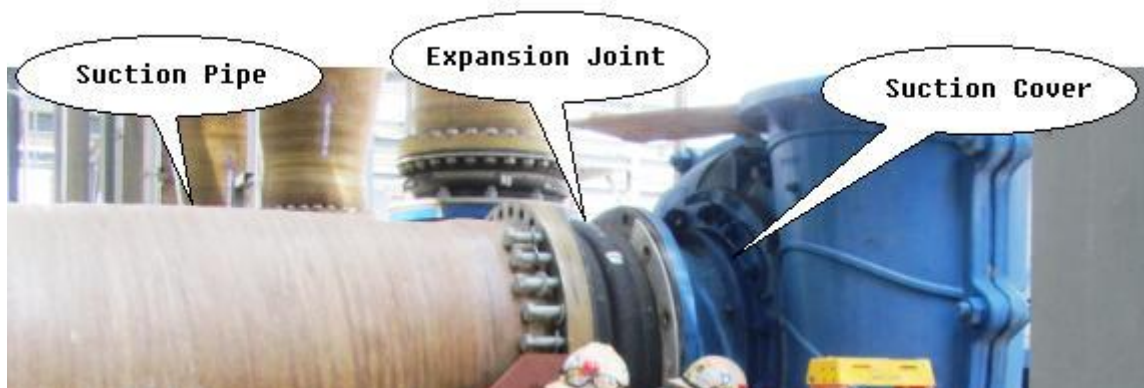
- ☐ 8.2.7 SLIDE sleeves apart AND REMOVE center plate and two gap discs from coupling.
- ☐ 8.2.8 WRAP coupling halves with plastic and duct tape.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 6 OF 24

- ☐ 8.2.9 REMOVE 28 nuts, 28 washers, 28 studs, and retaining ring sections from expansion joint and flange of discharge pipe. PLACE nuts, washers, studs, and retaining ring sections in parts bin AND LABEL bin.

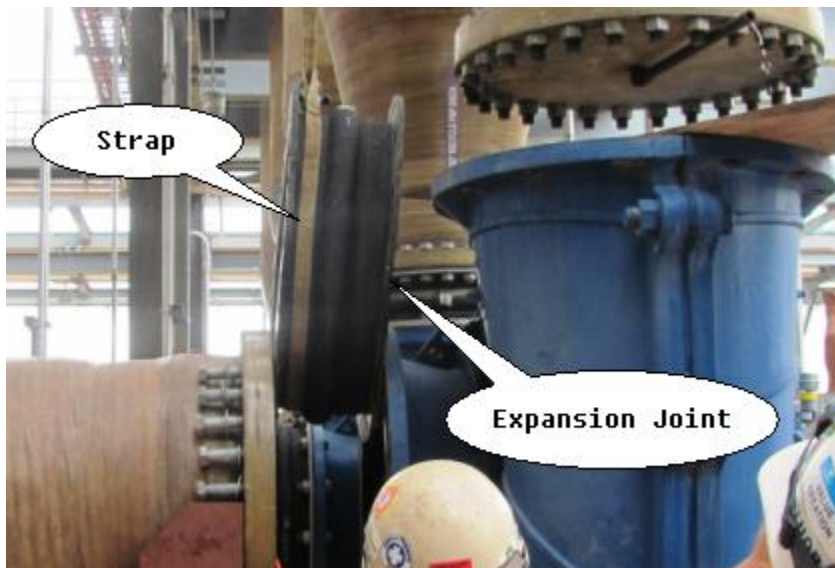


- ☐ 8.2.10 REMOVE 12 nuts, 12 washers, 12 studs, and retaining ring sections from expansion joint and discharge flange of pump. PLACE nuts, washers, studs, and retaining ring sections in parts bin AND LABEL bin.
- ☐ 8.2.11 WRAP strap around expansion joint AND ATTACH rigging on crane to strap.
- ☐ 8.2.12 Using crane and come along winch, REMOVE expansion joint from between discharge pipe and pump AND SET expansion joint aside.
- ☐ 8.2.13 REMOVE 32 nuts, 32 washers, 32 bolts, and retaining ring sections from expansion joint and flange of suction pipe. PLACE nuts, washers, bolts, and retaining ring sections in parts bin AND LABEL bin.



OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 7 OF 24

- ☐ 8.2.14 REMOVE 12 nuts, 12 bolts, and retaining ring sections from expansion joint and flange of suction cover. PLACE nuts, bolts, and retaining ring sections in parts bin AND LABEL bin.
- ☐ 8.2.15 Using pry bars, LOOSEN seal between expansion joint and suction pipe, and expansion joint and suction cover, to allow pump and piping to drain.
- ☐ 8.2.16 WRAP strap around expansion joint THEN ATTACH rigging to strap and crane.



- ☐ 8.2.17 Using crane, REMOVE expansion joint from between suction pipe and suction cover AND SET expansion joint aside. REMOVE strap from expansion joint and rigging.
- ☐ 8.2.18 If excess sediment is present, RINSE out suction cover and suction pipe with service water.
- ☐ 8.2.19 REMOVE 16 nuts from studs securing suction cover to pump. PLACE nuts in zip-lock bag AND LABEL bag.



OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 8 OF 24

- ☐ 8.2.20 ATTACH rigging to lifting lug on suction cover.

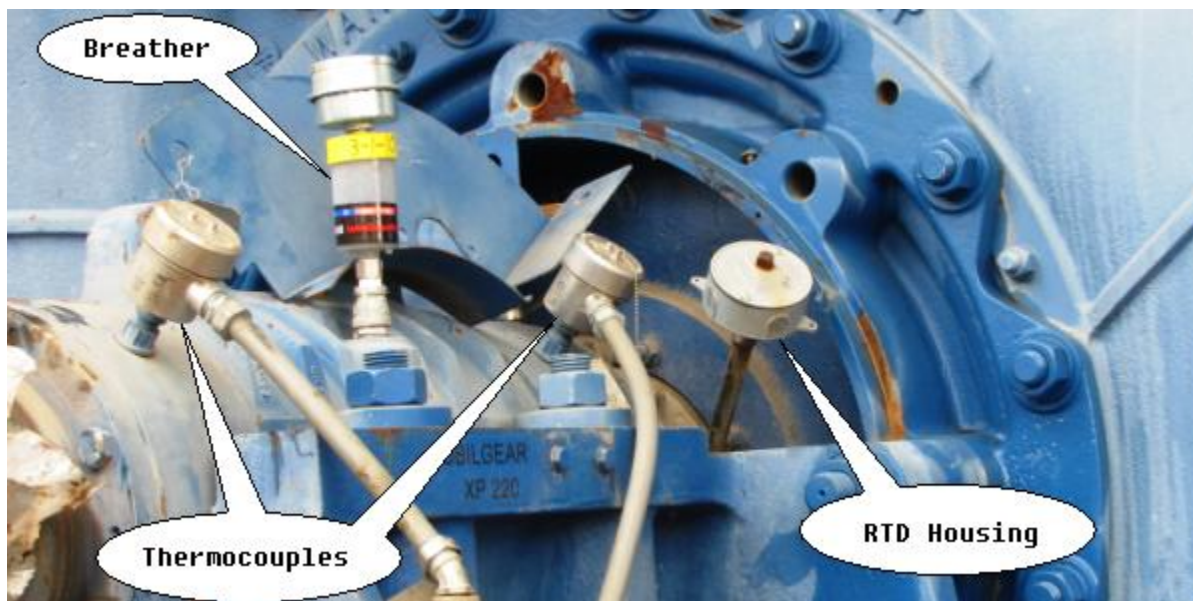


- ☐ 8.2.21 Using crane, REMOVE suction cover from pump AND SET suction cover aside. REMOVE rigging from suction cover.
- ☐ 8.2.22 If excess sediment is present, RINSE impeller with service water.
- ☐ 8.2.23 REMOVE four bolts, four washers, and both halves of seal guard from pump. PLACE bolts and washers in zip-lock bag AND LABEL bag.

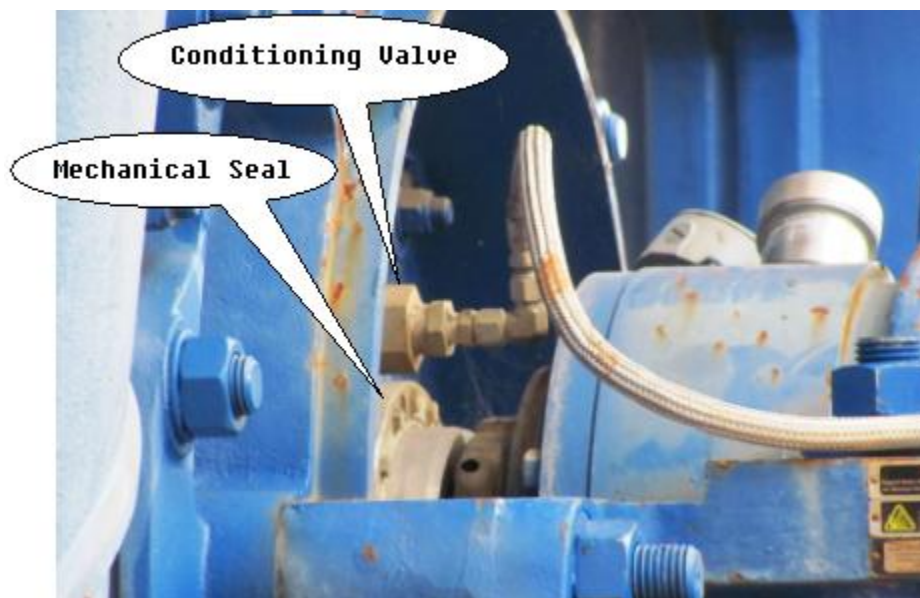


OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 9 OF 24

- ☐ 8.2.24 NOTIFY I&C to remove thermocouples from bearing housing.

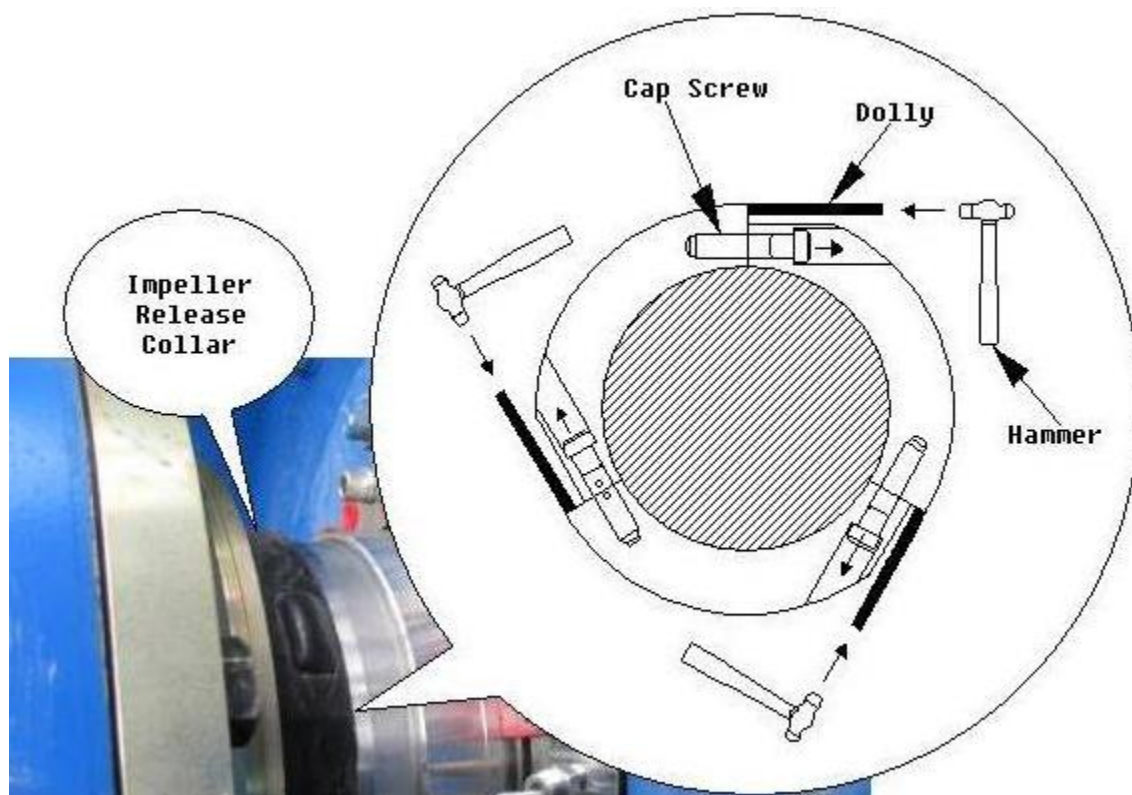


- ☐ 8.2.25 REMOVE RTD housing from mechanical seal.
- ☐ 8.2.26 REMOVE breather from bearing housing.
- ☐ 8.2.27 SHUT OFF water supply to mechanical seal (valve is located below gearbox to pump coupling).
- ☐ 8.2.28 DISCONNECT supply hose from conditioning valve THEN REMOVE conditioning valve from mechanical seal.



OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 10 OF 24

- ☐ 8.2.29 REMOVE three cap screws from impeller release collar.



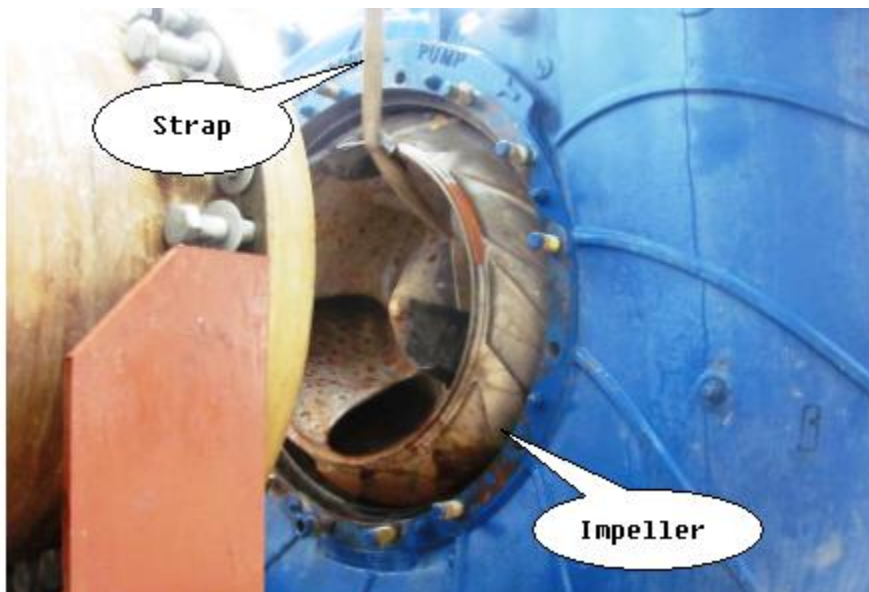
NOTE: It is best to remove all three segments of the impeller release collar as evenly as possible. Removing segments one at a time will only make removing the last segment more difficult.

- ☐ 8.2.30 Using hammer and dolly, SEPARATE three segments that make up the impeller release collar AND REMOVE collar segments from shaft. PLACE collar segments and cap screws in zip-lock bag AND LABEL bag.
- ☐ 8.2.31 INSTALL shaft clamp over key in drive end of shaft.



OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 11 OF 24

- ☐ 8.2.32 ATTACH come along winch to shaft clamp to prevent shaft from turning.
- ☐ 8.2.33 WRAP strap around one blade of impeller AND ATTACH strap to rigging on crane.



- ☐ 8.2.34 Using crane, carefully RAISE strap to turn impeller as far as possible.
- ☐ 8.2.35 REPOSITON strap AND RAISE strap again. REPEAT repositioning strap and turning impeller until impeller is released from shaft.
- ☐ 8.2.36 ATTACH impeller lifting tool to rigging on crane.
- ☐ 8.2.37 INSTALL impeller lifting tool on impeller.

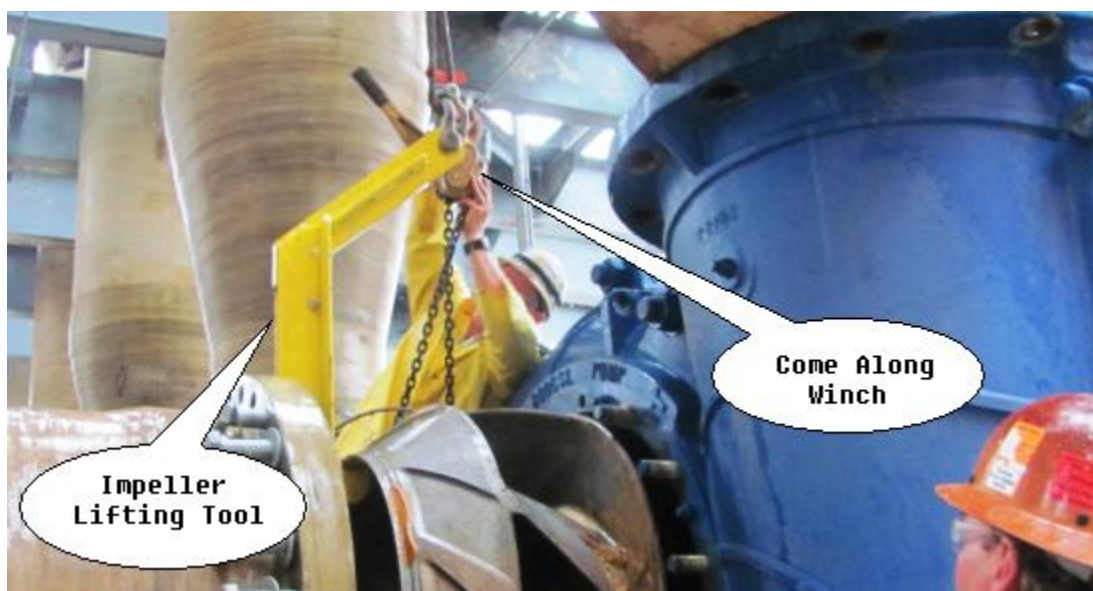


- ☐ 8.2.38 Using crane, RETRACT impeller from pump casing.

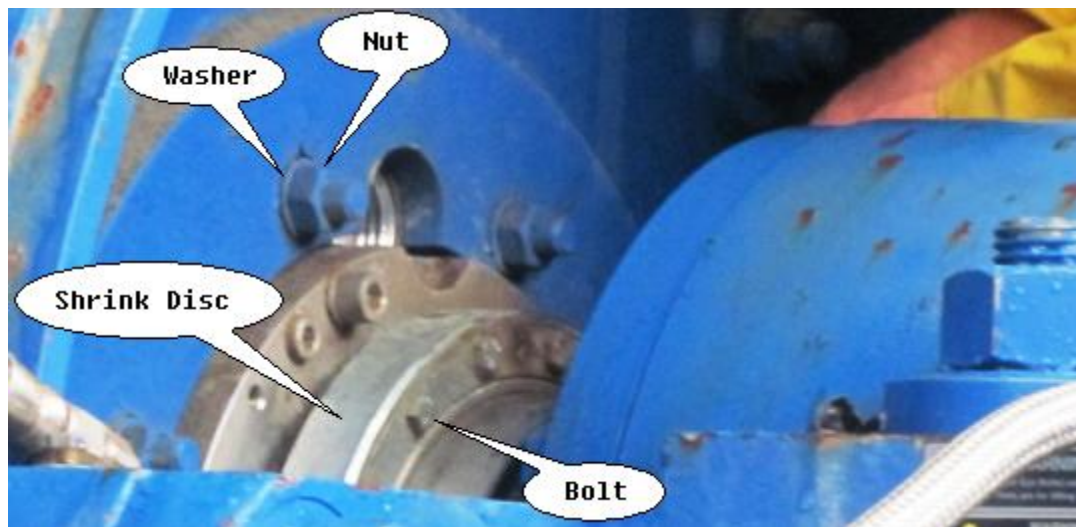
OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 12 OF 24

NOTE: Because of the tight clearance between the pump and the discharge pipe, it is necessary to use a come along to maneuver the impeller between them.

- ☐ 8.2.39 INSTALL come along winch on rigging next to impeller lifting tool and wire rope looped through an impeller vane.



- ☐ 8.2.40 TIGHTEN come along winch to support impeller AND REMOVE impeller lifting tool from impeller.
- ☐ 8.2.41 Using crane, LOWER impeller to ground.
- ☐ 8.2.42 REMOVE come along winch from wire rope and rigging on crane THEN ATTACH wire rope to rigging.
- ☐ 8.2.43 Using crane, RAISE impeller AND SET impeller on pallet. REMOVE wire rope from impeller.
- ☐ 8.2.44 LOOSEN 16 bolts in shrink disc on mechanical seal.

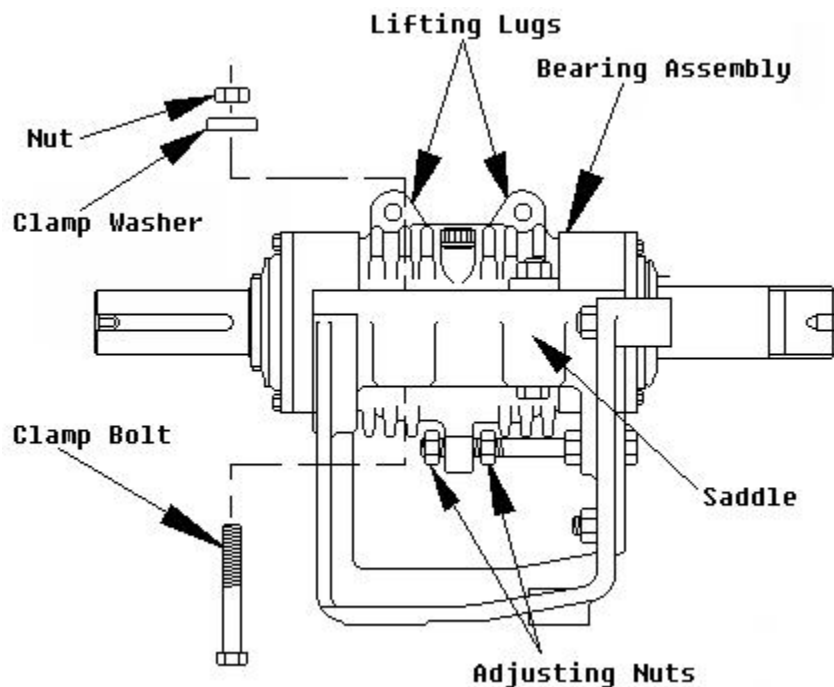


OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 13 OF 24

- ☐ 8.2.45 REMOVE eight nuts and eight washers securing mechanical seal to pump. PLACE nuts and washers in zip-lock bag AND LABEL bag.
- ☐ 8.2.46 Using come along winch, REMOVE mechanical seal assembly and three o-rings from pump.



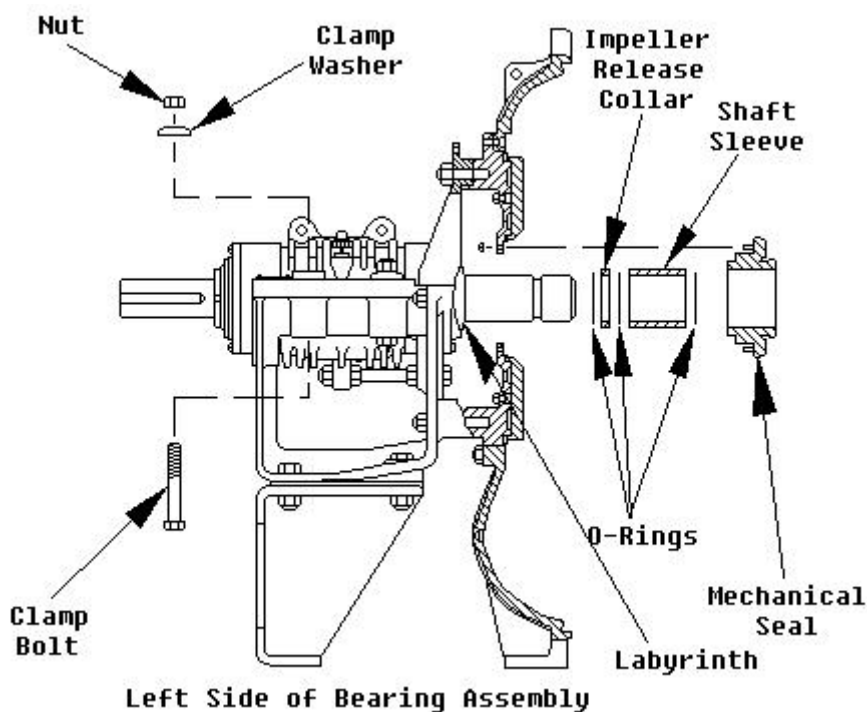
- ☐ 8.2.47 REMOVE four nuts, four clamp washers, and four clamp bolts securing bearing assembly to saddle.



- ☐ 8.2.48 THREAD two adjusting nuts away from lug on underside of bearing assembly.
- ☐ 8.2.49 ATTACH rigging on crane to two lifting lugs on bearing assembly.
- ☐ 8.2.50 Using crane, REMOVE bearing assembly from saddle AND SET bearing assembly on forklift.
- ☐ 8.2.51 Using forklift, TRANSPORT bearing assembly to shop for repair.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 15 OF 24

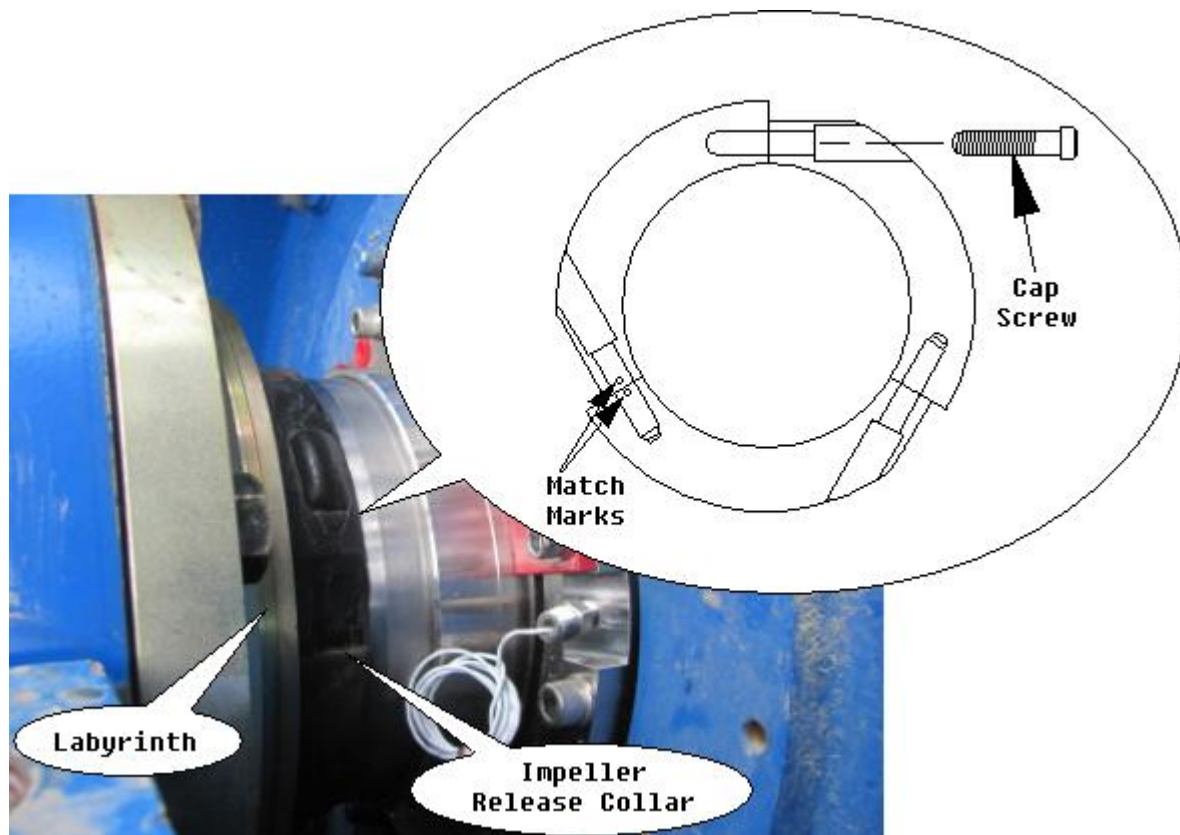
- ☐ 8.3.6 INSTALL four clamp bolts, four clamp washers (domed side up), and four nuts on saddle to secure bearing assembly. TORQUE bolts on left side of bearing assembly (looking from impeller end) to 387-388 ft-lb. Bolts on opposite side should be left snug.



- ☐ 8.3.7 APPLY grease to impeller end of shaft to aid in assembly shaft components and prevent damage to shaft from moisture.
- ☐ 8.3.8 POSITION o-ring against labyrinth. Grease can be used to hold o-ring in place.
- ☐ 8.3.9 If necessary, DEBURR impeller release collar segments.
- ☐ 8.3.10 Using clean rags, CLEAN three cap screws for impeller release collar THEN APPLY Loctite to threads of cap screws.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 16 OF 24

- ☐ 8.3.11 ASSEMBLE impeller release collar segment with three socket head cap screws. Note that two segments have a match mark on an end. Match those marks for the first joint.



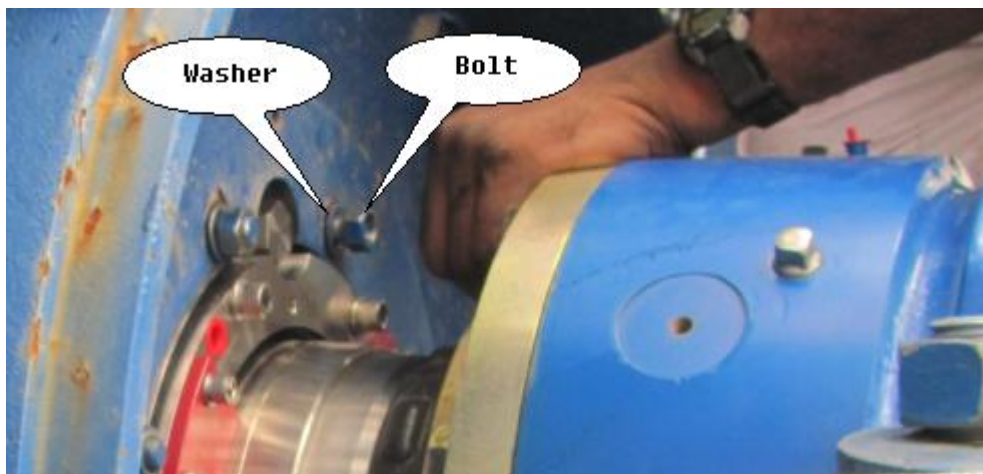
- ☐ 8.3.12 APPLY coating of anti-seize to side faces and internal diameter of impeller release collar.
- ☐ 8.3.13 SLIDE impeller release collar onto shaft with so tapered face on impeller release collar matches tapered face on labyrinth.
- ☐ 8.3.14 ASSEMBLE shaft sleeve and mechanical sleeve with o-ring at each end of sleeve.

CAUTION: The mechanical seal cartridge contains ceramic components that can break easily. Avoid bumping the cartridge against the shaft. Failure to comply can cause damage to equipment.

- ☐ 8.3.15 FEED mechanical seal assembly onto shaft AND POSITION against pump casing with water supply connection at top of mechanical seal.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 17 OF 24

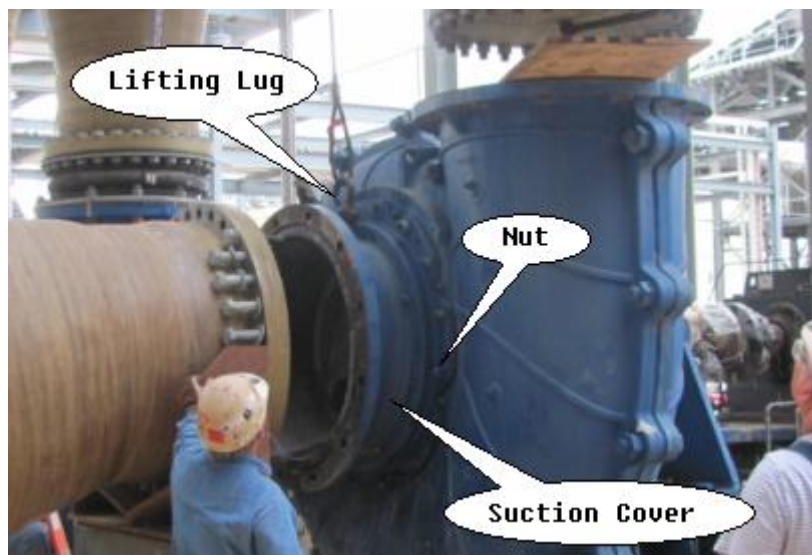
- ☐ 8.3.16 Apply anti-seize to threads of studs on mechanical seal THEN INSTALL eight washers and eight nuts to secure mechanical seal to pump.



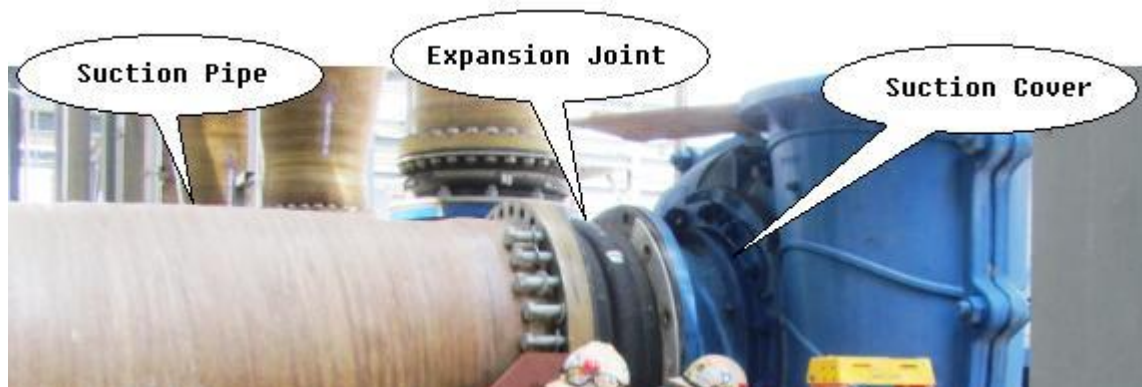
- ☐ 8.3.17 DEGREASE shaft in area of clamping device as much as possible to obtain best transmission ration. DO NOT tighten bolts in shrink disc at this time.
- ☐ 8.3.18 INSTALL key and shaft clamp on drive end of shaft.
- ☐ 8.3.19 APPLY grease to shaft thread.
- ☐ 8.3.20 WRAP wire rope through one vane of impeller AND ATTACH wrie rope to rigging on crane.
- ☐ 8.3.21 Using crane, POSITION impeller in pump casing. REMOVE wire rope from impeller and rigging while manually holding impeller in pump casing.
- ☐ 8.3.22 ATTACH impeller lifting tool to rigging on crane.
- ☐ 8.3.23 Using crane, POSITION impeller lifting tool on pump casing AND INSTALL impeller lifting tool on pump casing.
- ☐ 8.3.24 With impeller lifiting tool holding impeller in place, ROTATE shaft in direction shown by arrow on pump casing until impeller is snug on shaft.
- ☐ 8.3.25 Using sledge hammer on shaft clamp, TIGHTEN impeller on shaft.
- ☐ 8.2.26 Using clean rags, CLEAN studs on pump casing that will hold suction cover THEN APPLY antiseize to threads of studs..

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 18 OF 24

- ☐ 8.3.27 ATTACH crane rigging to lifting lug on suction cover.



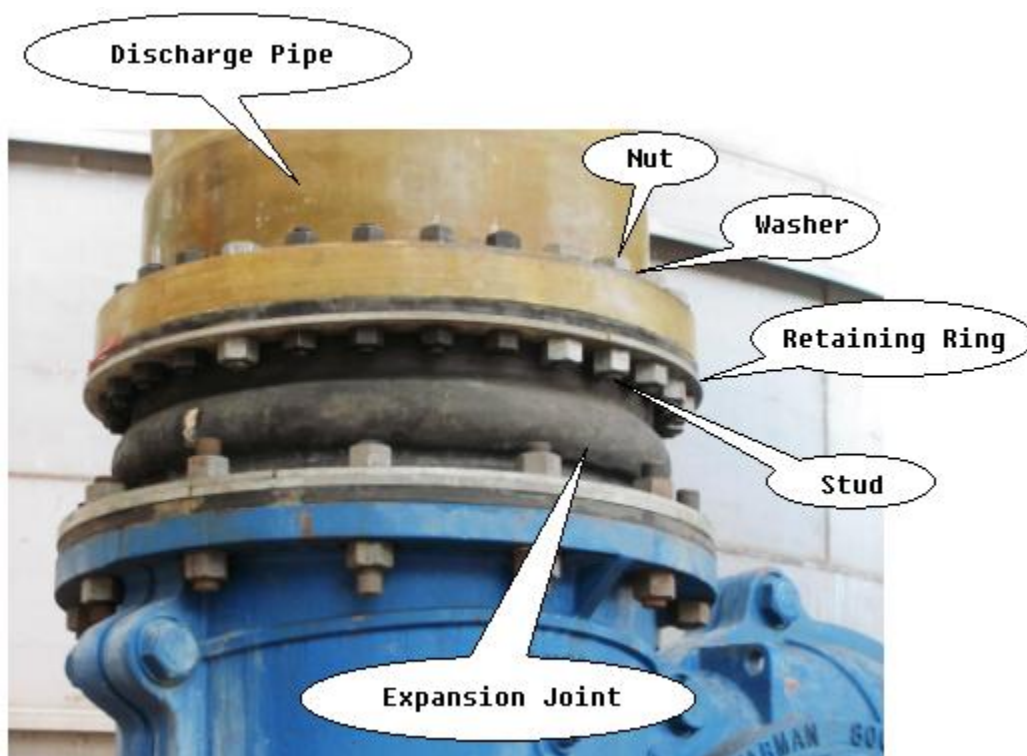
- ☐ 8.3.28 Using crane, POSITION suction cover on studs on pump casing.
- ☐ 8.3.29 INSTALL 16 nuts on studs to secure suction cover to pump casing.
- ☐ 8.3.30 REMOVE rigging from suction cover.
- ☐ 8.3.31 WRAP strap around suction expansion joint AND ATTACH rigging on crane to strap.
- ☐ 8.3.32 Using crane, POSITION expansion joint between suction cover and suction pipe.



- ☐ 8.3.33 Using clean rags, CLEAN 12 bolts and 12 nuts for expansion joint to suction cover connection THEN APPLY anti-seize to bolt threads.
- ☐ 8.3.34 INSTALL 12 bolts, retaining ring sections, and 12 nuts to secure expansion joint to flange of suction cover.
- ☐ 8.3.35 Using clean rags, CLEAN 32 bolts, 32 washers, and 32 nuts for expansion joint to suction cover connection THEN APPLY anti-seize to bolt threads.
- ☐ 8.3.36 INSTALL 32 washers, 32 bolts, retaining ring sections, and 32 nuts to secure expansion joint to flange of suction pipe.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 19 OF 24

- ☐ 8.3.37 REMOVE strap from expansion joint.
- ☐ 8.3.38 WRAP strap around discharge expansion joint AND ATTACH rigging on crane to expansion joint.
- ☐ 8.3.39 Using crane and come along winch, POSITION expansion joint between discharge flange and discharge pipe.

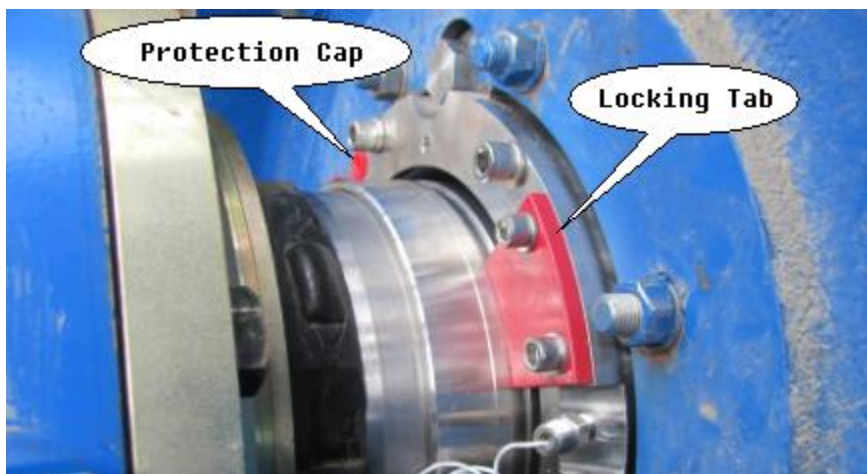


- ☐ 8.3.40 Using clean rags, CLEAN 12 bolts and 12 nuts for expansion joint to suction cover connection THEN APPLY anti-seize to bolt threads.
- ☐ 8.3.41 INSTALL 12 bolts, retaining ring sections, and 12 nuts to secure expansion joint to discharge flange of pump.
- ☐ 8.3.42 Using clean rags, CLEAN 28 bolts, 28 washers, and 28 nuts for expansion joint to suction cover connection THEN APPLY anti-seize to bolt threads.
- ☐ 8.3.43 INSTALL 28 washers, 28 bolts, retaining ring sections, and 28 nuts to secure expansion joint to flange of discharge pipe.
- ☐ 8.3.44 REMOVE shaft clamp from shaft.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 20 OF 24

8.3.45 Adjust impeller clearance.

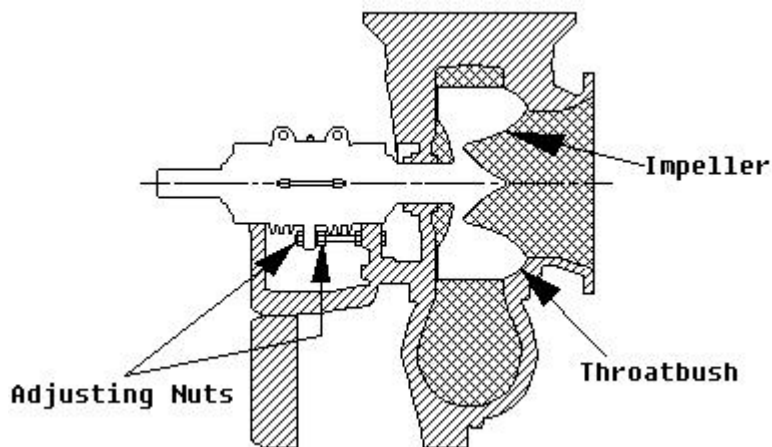
- ☐ 8.3.45.1 ENSURE locking tabs on mechanical seal are in places and that seal is not locked to shaft sleeve.



- ☐ 8.3.45.2 LOOSEN clamp bolts on right side of bearing assembly (the ones not torqued when the bearing assembly was installed).

NOTE: When adjusting the impeller, it is best to loosen the adjusting nut at the front one flat and then immediately adjust the rear adjusting nut one flat so adjustment is always “positive” and the nuts are hard up against the bearing housing lug at all times. Note that the turn of the adjusting nut is made simply by the operator’s eye.

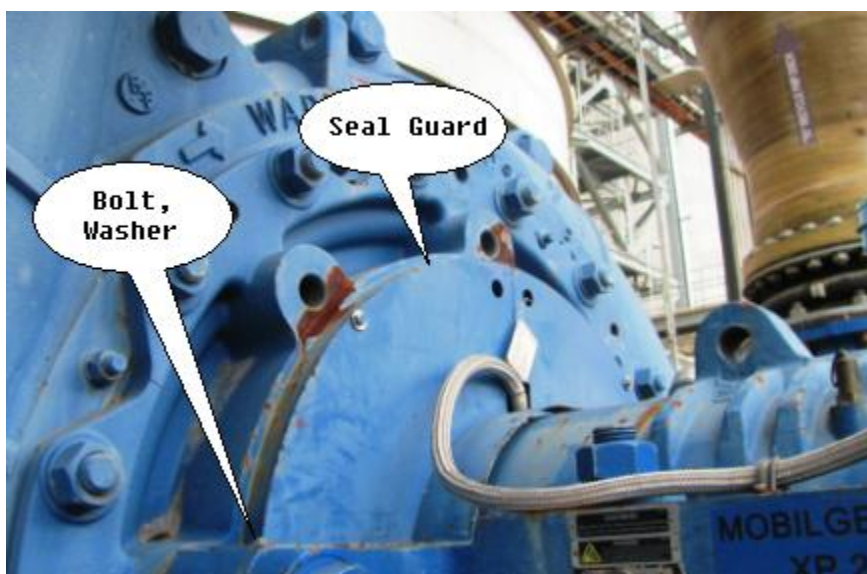
- ☐ 8.3.45.3 ADJUST impeller fully forward until it just contacts throatbush (front liner). Adjust in small steps and turn shaft at drive end by hand to help establish when impeller contacts throatbush.



- ☐ 8.3.45.4 ADJUST impeller back one half or one full flat of the adjusting nuts. LOOSEN rear nut first followed immediately with front nut.
- ☐ 8.3.45.5 ENSURE impeller turns freely by hand.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 22 OF 24

- ☐ 8.3.51 NOTIFY I&C to install thermocouples from bearing housing and RTD housing on mechanical seal.
- ☐ 8.3.52 Using clean rag, CLEAN four bolts for seal guard THEN APPLY anti-seize to bolt threads.
- ☐ 8.3.53 INSTALL both halves of seal guard, four washers and four bolts on pump.

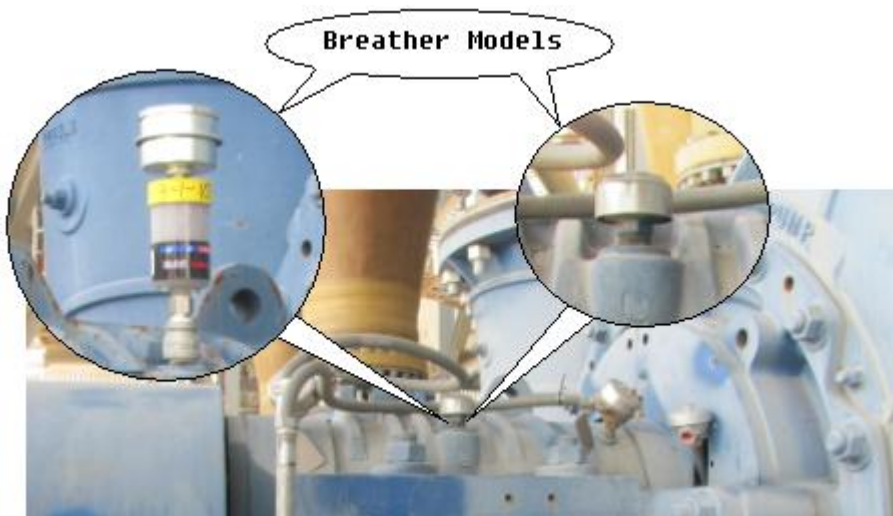


- ☐ 8.3.54 Using clean rags, CLEAN six bolts for coupling guards THEN APPLY anti-seize to bolt threads.
- ☐ 8.3.55 INSTALL two coupling guards, six bolts, six washers, an six nuts between gearbox and pump.

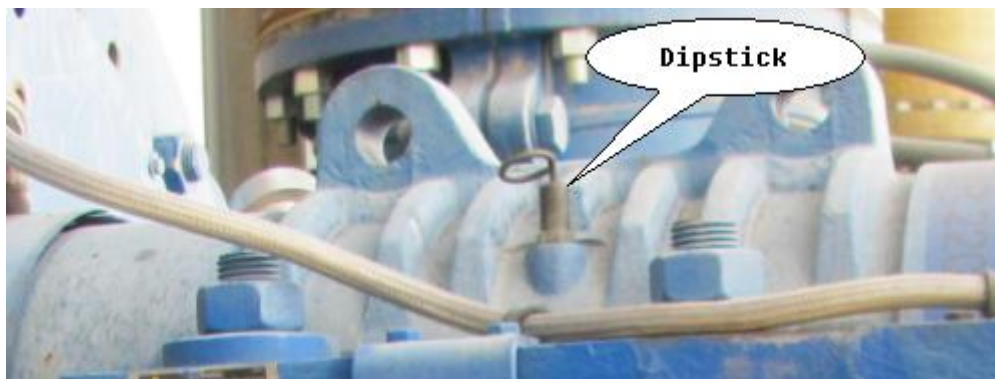


OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 23 OF 24

- ☐ 8.3.56 If breather is not removed already, REMOVE breather from pump fill hole.



- ☐ 8.3.57 ADD oil (MOBILGEAR 600 XP 220) at pump fill hole until oil level is between ADD and FULL on dipstick (approximately 1.9 gallons).



- ☐ 8.3.58 If pump is equipped with an oiler, FILL reservoir with oil (MOBILGEAR 600 XP 220) THEN INVERT reservoir into place on main body of oiler. TIGHTEN thumb screw on reservoir.
- ☐ 8.3.59 Using clean rag, CLEAN threads of breather THEN WRAP breather threads with Teflon tape.
- ☐ 8.3.60 CLEAN breather element (shake or blow out as necessary).
- ☐ 8.3.61 INSTALL breather in pump fill hole.
- _____/_____/ 8.3.62 Assembly is complete.

VERIFY

_____/_____/ VERIFY the satisfactory completion of steps 8.2 through 8.3.62.

OAK GROVE PLANT MAINTENANCE SECTION-MECHANICAL		PROCEDURE NO. OG-MSM-1426
ABSORBER RECYCLE PUMP REBUILD	REVISION NO. 0	PAGE 24 OF 24

9.0 TESTING

Not applicable.

10.0 CLOSEOUT

- ☐ 10.1 NOTIFY supervisor of unsatisfactory conditions documented during inspection.
- ☐ 10.2 CLEAN UP all spills and trash in the area.
- ☐ 10.3 CHECK for leaks.
- ☐ 10.4 RETURN all tools and ladders to proper locations.
- ☐ 10.5 RETURN unused oil to proper location.
- ☐ 10.6 RECORD job information and man hours on Work Order for historical and accounting purposes.
- ☐ 10.7 ENTER an AR for any problems not corrected.
- ☐ 10.8 DISPOSE of all trash properly.

Data Reviewed & Approved: _____ Date _____
 Mechanical Maintenance Supervisor

11.0 ATTACHMENTS/FORMS

None