Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

June 7, 1993
3F0693-04

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: 10 CFR 50, Appendix R Exemption Request
Reactor Coolant Pump Oil Collection System

Dear Sir:

Florida Power Corporation (FPC) has developed a maintenance program for the four Reactor Coolant Pump (RCP) motors at Crystal River Unit 3 (CR-3). A new RCP motor has been purchased from the original manufacturer, General Electric, with design improvements that will enhance motor reliability and simplify maintenance activities on both the motors and the associated lube oil collection systems. The new motor will be supplied with a seismic RCP lube oil system and re-designed, seismically-qualified upper and lower RCP lube oil collection systems. FPC plans to install the new RCP motor during Refuel 9 and to upgrade the removed motor to be consistent with the new design for installation during a future outage. This rotation will continue until all four motors are modified and re-installed in the plant.

FPC requests an exemption to the portion of 10 CFR 50, Appendix R, Section III.O, "Oil Collection System for Reactor Coolant Pump," that requires the RCP oil collection system to "be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the RCP lube oil systems." The modifications to the lube oil collection system will exclude four lube oil system sites from leakage protection, and as such, an exemption to Appendix R is required. Granting this exemption is justified by 10 CFR 50.12(a)(1) and (a)(2)(ii) in that the exclusion of the four sites listed herein from the oil collection system will not present an undue risk to the public health and safety, and does not prevent meeting the underlying purpose of the rule.

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It is requested that this exemption be granted prior to December 31, 1993. This schedule would allow for the first RCP motor replacement to be accomplished during the upcoming Refuel 9 outage in the Spring of 1994.

Sincerely,

Gary Boldt for

P. M. Beard, Jr.
Senior Vice President
Nuclear Operations

PMB/REF:ff

Attachment

xc: Regional Administrator, Region II
NRR Project Manager
Senior Resident Inspector

EXEMPTION REQUEST

Florida Power Corporation hereby submits a request for an exemption to certain portions of 10 CFR 50, Appendix R, Section III.O in accordance with the provisions of 10 CFR 50.12. This exemption will allow for the exclusion of four Reactor Coolant Pump (RCP) motor lube oil system sites from the requirement to provide leakage protection for all potential pressurized and unpressurized leakage sites.

NO UNDUE RISK

In accordance with 10 CFR 50.12(a)(1), Florida Power Corporation demonstrates herein that the requested exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. This request does not create conditions adverse to the safe operation of the unit in that the RCP motor lube oil and lube oil collection systems continue to meet the purpose of Appendix R, Section III.O, as discussed below.

SPECIAL JUSTIFYING CIRCUMSTANCES

The special circumstances which justify the Commission's approval of this exemption request are consistent with the following requirement of 10 CFR 50.12.

10 CFR 50.12(a)(2)(ii) Application of the regulation in this particular circumstance does not serve the underlying purpose of the rule nor is it necessary to achieve the underlying purpose of the rule.

The purpose of the rule is to provide assurance that oil leaking from the RCP motor lube oil system does not come in contact with surfaces that are hot enough to ignite the oil. These occurrences could be random or seismically-induced. The resulting fire could produce severe localized environments which could adversely affect the operability of safety-related equipment inside the containment building. The oil collection system was considered necessary to confine any oil discharge due to leakage or failure of the lube oil system and to prevent it from becoming a fire hazard by draining it to a safe location. In support of this, Appendix R required an oil collection system that was designed, engineered and installed such that failure will not lead to a fire during normal or design basis accident conditions and that has reasonable assurance of withstanding the Safe Shutdown Earthquake (SSE).

The requested exemption does not prevent achieving the underlying purpose of the rule. The new RCP motor lube oil system has been designed to withstand the SSE. The accompanying oil collection system is also seismically designed and is capable of channeling and containing the contents of all of the RCP motor lube oil systems with the exception of four sites. These four sites do not present a significant risk of oil leakage and are addressed in the evaluation below.

EVALUATION

The existing RCP motor lube oil system includes a high pressure and an induced flow system. The high pressure system consists of two independent pumps, one AC pump and one DC pump, and associated piping which supplies oil to the oil lift system at approximately 900 psig during motor startup and shutdown. Its function is to lift the rotor sufficiently to reduce the breakaway torque to a lower value. These pumps supply oil to the anti-reverse device via a low pressure port when the lift oil system is operating. Either pump is capable of supplying the needed oil flow. The induced flow system is driven by rotation of the RCP motor which provides lubrication at approximately 20 psig during normal operation to the thrust bearings, guide bearings and to the anti-reverse device. The reactor coolant pump motor lube oil system is presently a non-seismic system. The existing reactor coolant pump lube oil collection system is capable of channeling and containing the entire volume of all four reactor coolant pump motor lube oil systems. The oil collection system is seismically-qualified.

The installed RCP motors will be replaced one at a time with a new or refurbished/modified motors having improved design features. Design changes have been made to improve motor reliability and enhance maintenance activities on the motors and the associated lube oil collection systems. The improved design includes a seismic RCP lube oil system and re-designed, seismically-qualified upper and lower RCP lube oil collection systems.

The new RCP lube oil system eliminates the redundant high pressure RCP motor AC lube oil lift pump and its associated piping, valves and other components. This pump is not necessary for the operation of the RCP motor and its removal will enhance the integrity of the lube oil system by decreasing the number of potential high pressure lube oil leakage sites. Welded connections will be incorporated as much as possible into the re-design of the replacement systems. The seismic design and system modifications will eliminate the need for complete enclosure of the lube oil system since the system will be designed to withstand the postulated events contained within the Final Safety Analysis Report and 10 CFR 50, Appendix R, Section III.O, without failure. Maintenance on the RCP motors and, in particular, the oil collection systems will be simplified, thereby improving the reliability of these systems, reducing system maintenance time and cost, and lowering the personnel dose associated with RCP motor and oil collection system activities.

During the re-design effort, it was identified that four sites on the RCP motor lube oil system could not be readily equipped with leakage protection. The inclusion of these sites would not significantly enhance leakage protection and would create an oil collection system that was extremely difficult to design and maintain due to the location and arrangement of the collection devices and associated interferences. Therefore, an exemption to that portion of 10 CFR 50, Appendix R, Section III.O that requires the oil collection system to capture <u>all</u> potential pressurized and unpressurized leakage sites is requested.

EVALUATION (continued)

The following sites on the lube oil system are proposed to not be equipped with leakage protection. Attachment 1 provides a description of the oil collection system.

1. Anti-Reverse Device (ARD) Vents (2)
2. Upper Lines for ARD from Lift Oil Pump
3. Lower RCP Motor Leak Detection System Piping
4. Lower Guide Bearing and Oil Temperature Thermocouples (2)

The two anti-reverse device vents are positioned high on the motor and are seismically-designed. The vent pipes would contain only oil mist or foam and are equipped with a demister installed at the end of the vent line. These lines do not pose a significant oil leak potential and, therefore, will not be provided with leakage protection with the new oil collection system design.

The upper lines for the ARD which supply low pressure lift oil during pump startups and shutdowns will not be protected from potential oil spray leakage. Due to the configuration of the RCP motor and the required routing for these lines, spray protection would be difficult to provide without jeopardizing maintenance reliability. Extending the spray shield is not feasible. Since the duration of time for operation of this system is limited to a few minutes on startup and shutdown of the affected pump, and the cost and maintenance interference removal significant, no spray protection will be provided for these lines. Any minor leakage will be contained by the lip at the radial assembly line of the upper motor.

The lower RCP motor leak detection system piping will not be provided with leak capturing devices. This piping normally does not contain oil and providing leakage protection would interfere with maintenance activities, existing structures and other components, and would be difficult to design.

The two lower guide bearing and oil temperature thermocouples will not have leak protection associated with them. The installation of leakage protection was determined to not be feasible due to difficulties in designing leak coverage for the thermocouple end mechanical connections. Any leakage that could potentially occur would be at the mechanical joint to the lube oil system and would be minor due to the tolerances associated with the threaded connections on the thermocouple well.

The principle risk resulting from not providing leakage protection is the risk of the leaking oil coming in contact with a hot surface and causing a fire. The likelihood of oil leakage from the above listed sites is remote. The seismic design for the entire lube oil system precludes failures as a result of the Safe Shutdown Earthquake. The ARD vents and lower RCP motor leak detection piping do not contain oil under routine operating conditions; therefore, leaks would not be postulated from these sites. The upper lines for the ARD from the lift oil system are under pressure for only a very brief time during motor startups and shutdowns. Credit is taken for proper maintenance and leak check techniques to assure a leak-tight system. The thermocouple connections can be checked for leaks prior to completion of any maintenance activities on the system and, since these connections are passive in nature, leakage from these sites is considered

EVALUATION (continued)

remote. In addition, CR-3's Fire Hazards Analysis has analyzed a fire in the area of the reactor coolant pumps which resulted from the ignition of the total contents of the lube oil system. The resulting postulated fire did not adversely affect the plant's ability to safely shut down. Therefore, the consequences of a fire which might result from any spillage or leakage of RCP lube oil do not pose a significant risk to the health and safety of the public.

CONCLUSION

The granting of this exemption would enhance maintenance activities on the motors and the associated lube oil collection systems, thereby improving system performance and reliability. The new motors will be supplied with a seismic RCP lube oil system; a re-designed, seismically-qualified upper RCP lube oil collection system; and a modified, seismically-qualified lower lube oil collection system. The system modifications will be designed to withstand the postulated events contained within the Final Safety Analysis Report and 10 CFR 50, Appendix R, Section III.O, without failure. Leakage from the lube oil system is contained by the oil collection system with the exception of the sites identified herein. These sites represent little risk to the initiation of a fire in the containment and, therefore, pose no significant risk to the continued safe operation of the unit.

ATTACHMENT 1
DESCRIPTION OF RCP MOTOR
LUBE OIL COLLECTION SYSTEM

The following description of the lube oil collection system is to be used with the attached General Electric (GE) Drawings 4005E1072FT, "Outline Drawing," and 4004D1266CM, "High Pressure Oil Piping". The items identified within these drawings are identified by outline clouds with circled numbers. A description of the items contained within the clouds and the means of oil collection is provided for each numbered circle.

Item number one (1) is the Anti-Reverse Device (ARD) vents for the RCP motor. A vent is provided for each side of the ARD. These vents are seismically-designed and have a demister installed at the end of each of the vent lines. Per discussions with General Electric, the equipment manufacturer, these lines would contain oil mist or foam only; therefore, oil leakage from the lines and the demisters is not expected to occur. Reference: GE Drawing 4005E1072FT.

Item number two (2) contains the Upper Bearing Lube Oil Level Instrument, Oil Level Instrument Isolation Valve, Oil Level Instrument Drain Valve, Oil Fill, Remote Fill Connection, Drexelbrook Probe, Oil Level Gage, Thrust Bearing Thermocouples, Guide Bearing Thermocouple and Oil Temperature Thermocouple. These items are part of the Upper Bearing Lube Oil System which are supplied by the RCP motor induced flow lube oil system, and are seismically-designed. Therefore, spray protection for the mechanical joints for these items will not be provided. Oil leakage which may occur from the mechanical joints for these items will be collected by the lip installed at the upper radial assembly line of the RCP motor. Oil collected within this area will drain to the drip pan located below the Upper Lube Oil System Heat Exchanger. This drip pan will be attached to the existing RCP Lube Oil Collection System by an existing flex hose connected at the bottom of the drip pan. Reference: GE Drawing 4005E1072FT.

Item number three (3) contains the Upper Lube Oil flanged supply and return lines for the Upper Lube Oil System Heat Exchanger. These items are seismically-designed and supplied by the RCP motor induced flow lube oil system. Therefore, spray protection for these lines will not be provided. Oil leakage which may occur from the flanges will be collected either by the lip at the upper radial assembly line for the flanges located near the RCP motor housing or the drip pan located below the heat exchanger for the flanges located near the heat exchanger.

Item three 'A' (3A) identifies the Upper Lube Oil System reservoir drain valve/line and the heater exchanger drain valve/line (located below the heat exchanger - not shown on drawing). These drain lines are seismically-designed and part of the RCP induced flow lube oil system. Therefore, spray protection is not provided. Leakage from these drain lines will be collected by the drip pan located below the heat exchanger for the Upper Lube Oil System. Reference: GE Drawing 4005E1072FT.

Item number four (4) is the fiberglass spray guard for the High Pressure Lube Oil System. The spray guard is seismically designed and is a one piece cover protecting the High Pressure Lube Oil Lift Pump, associated high pressure oil piping, tubing and other piping/tubing components, high pressure relief valve which relieves to the reservoir, high pressure switches and high pressure oil hoses and tubing. The RCP High Pressure Lube Oil System is also seismically-designed. Oil leakage and oil spray from the mechanical joints in this area will be contained within the spray guard and lip at the radial assembly line area. Leakage or spray collected will drain to the drip pan located below the Upper Lube Oil System Heat Exchanger and into the existing RCP Lube Oil Collection System via the flex hose connection at the bottom of the heat exchanger drip pan. Reference: GE Drawing 4005E1072FT and 4004D1266CM.

Item four 'A' (4A) identifies the lines from the low pressure side of the Upper Lube Oil System Lift Pump which provides lubrication to the ARD during initial startup and shutdown of the RCP Motor. These lines are seismically designed. Spray protection for the mechanical joints is not being provided for these lines as a result of the design interferences and maintenance problems created. Oil leakage from the mechanical joints for these lines will be collected by the lip located at the radial assembly line area and directed to the drip pan located below the heat exchanger for the Upper Lube Oil System or the drip pan located at the lower end of the motor. Reference: GE Drawing 4004D1266CM.

Item number five (5) identifies the Upper Bearing Bracket Vents for the RCP motor. These vents are seismically-designed, and will be provided with oil collection pans which will drain to the drip pan located below the heat exchanger for the Upper Lube Oil System. Reference: GE Drawing 4005E1072FT.

Item number six (6) identifies the lower RCP Motor (Air Box) Leak Detection System. This system is seismically designed. Oil leakage collection from the mechanical joints for this system will not be provided since these lines do not contain oil during normal operations. Reference: GE Drawing 4005E1072FT.

Item numbers seven (7) and eleven (11) identify four covers which are used to gage gap the lower RCP Motor Bearing. Oil leakage from these sealed covers will be captured by the existing lower end motor drain pan. Reference: GE Drawing 4005E1072FT. See item number eleven for the description of the vents identified in item eleven.

Item number eight (8) contains the lower Lube Oil System Level Instrument, Oil Level Instrument Isolation Valve, Oil Level Instrument Drain Valve, Oil Fill, Remote Fill Connection, Drexelbrook Probe and Oil Level Gage. These items are seismically-designed and are part of the RCP induced flow lube oil system. Therefore, oil spray protection will not be provided for these items. Leakage from the mechanical joints for these items will be collected by a drip pan which will be connected to the existing Plant Lube Oil Collection System using an existing flex hose connected to the bottom of the drip pan for these items. Reference: GE Drawing 4005E1072FT.

Item number nine (9) identifies the lower Lube Oil System reservoir drain valve/line and shaft seal for the RCP motor. This drain line is seismically-designed. Leakage from the drain line or shaft seal will be collected by a drain pan located at the bottom of the motor. This drain pan is currently installed on the existing RCP motor and will be removed and re-installed on the new replacement RCP motor in its existing configuration. Drainage from the drain pan is transported to the RCP Lube Oil Collection System using a flex hose connection at the bottom of the drain pan. Reference: GE Drawing 4005E1072FT.

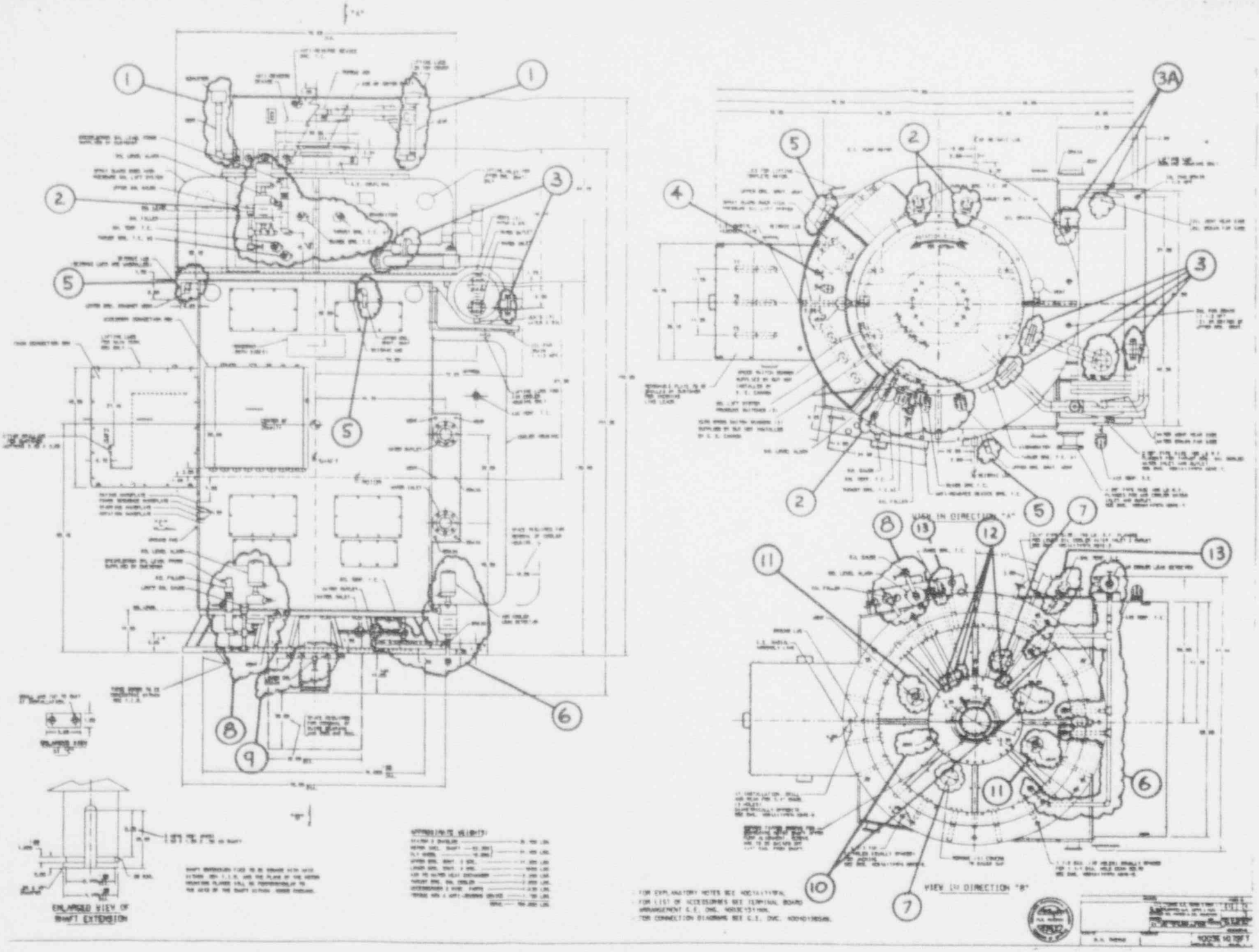
Item number ten (10) identifies the lower bearing vents for the RCP motor. These vents are piped from within the lower end of the RCP motor and protrude through the lower end cover. Leakage from these vents will be collected by the drain pan for the lower end of the motor as described within item nine. Reference: GE Drawing 4005E1072FT.

Item number eleven (11) identifies the lower motor vents. Oil leakage from these vents will be captured by the lower end motor drain pan. Reference: GE Drawing 4005E1072FT.

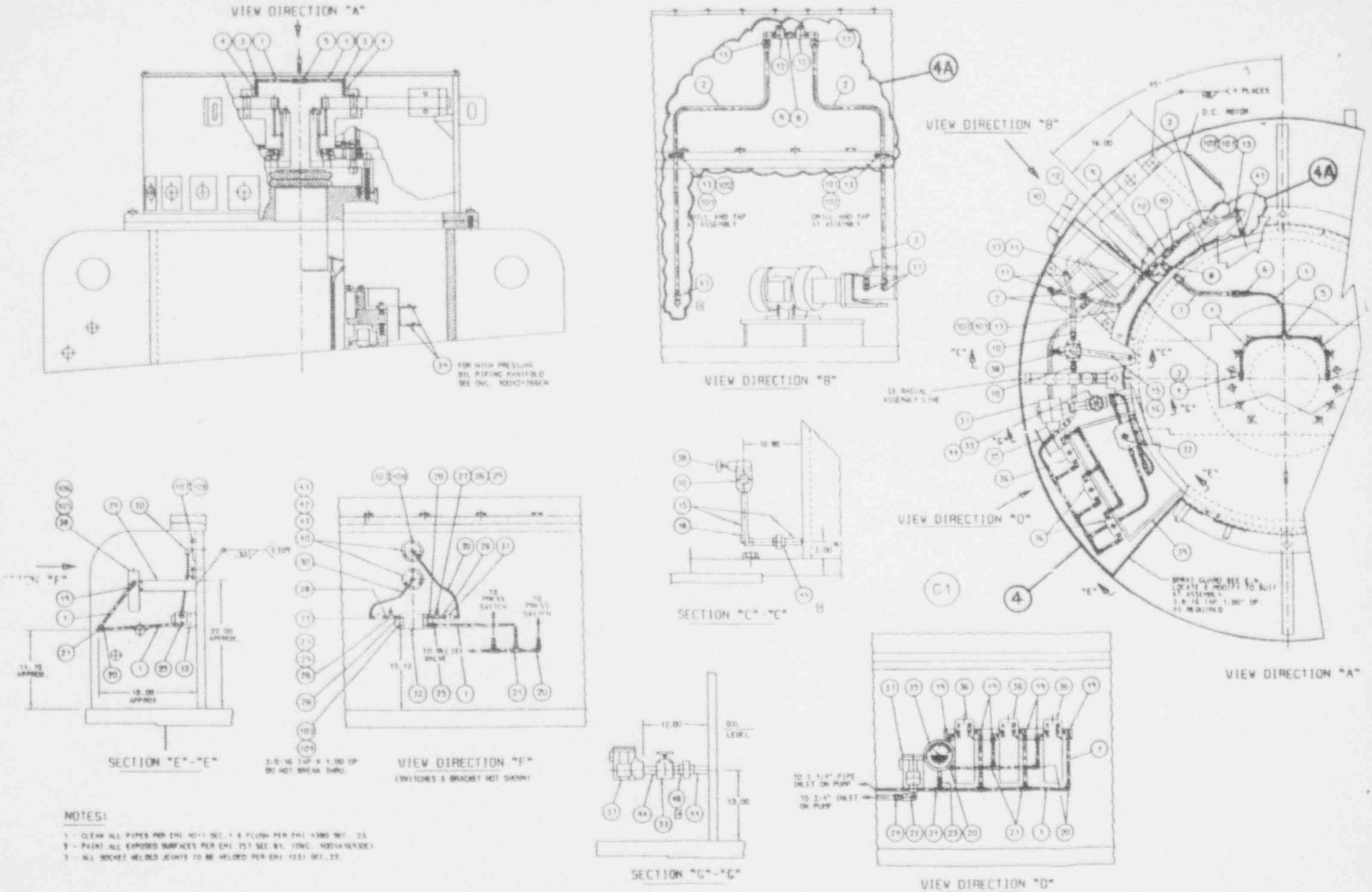
Item number twelve (12) identifies the threaded connections at the lower bearing oil reservoir for the lower Lube Oil System Level Instrument, Oil Fill, Oil Level Gage, Lower Guide Bearing Thermocouple and Lower Oil Temperature Thermocouple. These lines are seismically-designed. Leakage from the mechanical joints for these items will be collected by the drain pan for the lower RCP motor. Reference: GE Drawing 4005E1072FT.

Item number thirteen (13) identifies the Lower Guide Bearing Thermocouple and the Lower Oil Temperature Thermocouple. These items are seismically-designed. Oil leakage at the outer end mechanical connections for these thermocouples will not be provided since design of capture devices would be extremely difficult and maintenance and inspection assures a leak-free connection for these passive components. Reference: GE Drawing 4005E1072FT.

The drain lines for the Upper and Lower Lube Oil System reservoirs, Upper Lube Oil System Heat Exchanger; and the drain valves for the upper and lower level instruments will be in the closed position during normal operation and the outlets plugged.



General Electric Drawing 4005E1072FT



General Electric Drawing 4004D1266CM