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MARTIN,J.B. Region 3 (Post 820201)

SUBJECT: Requests enforcement discretion from plant TS 3.3.b.2.b permitting RHR train inoperability for period of 72 h during power operations.

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November 3, 1993

10 CFR 2, Appendix C (VII.C)

Mr. J. B. Martin, Regional Administrator, Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Request for Enforcement Discretion
for Kewaunee Nuclear Power Plant

Reference: 1) NRC Inspection Manual, Part 9900, Guidance on 10CFR 2, Appendix C, Enforcement Discretion dated August 6, 1993

The purpose of this letter is to request Enforcement Discretion from the Kewaunee Nuclear Power Plant (KNPP) Technical Specification 3.3.b.2.B. This Technical Specification (TS) permits one Residual Heat Removal (RHR) train to be inoperable for a period of 72 hours during power operations.

Currently the plant is operating at 100% reactor power; however, it is within a 72 hour Limiting Condition for Operation (LCO) on the RHR system due to a throughwall leak in the A RHR pump casing. Enforcement Discretion is being requested for an additional 120 hours beyond the current 72 hour LCO action statement in lieu of a plant shutdown. This additional 120 hours will provide sufficient time to facilitate the repair of the pump.

In accordance with the current guidance for requesting Enforcement Discretion (reference 1), the following information is provided in attachment 1:

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ADD: Richard Lauter 013E21

1 1

- -- The TS or other license conditions that will be violated,
- -- The circumstances surrounding the situation, including the need for prompt action,
- -- The safety basis for the request that Enforcement Discretion be exercised, including an evaluation of the safety significance and potential consequences of the proposed course of action,
- -- Proposed compensatory measures,
- -- The justification for the duration of the noncompliance,
- -- The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety and that a significant safety hazard is not involved,
- -- The basis for the licensee's conclusion that the noncompliance will not involve adverse consequences to the environment,
- -- A statement that the request has been approved by the facility organization that normally reviews safety issues,
- -- Any other information the NRC staff deems necessary before making a decision to exercise Enforcement Discretion.

Attachment 2 provides the schedule for the repair activities on the A RHR pump. Additionally in accordance with 10CFR50.73, a Licensee Event Report will be submitted describing this event, our assessment, and corrective actions.

A complete copy of this submittal has been transmitted to the State of Wisconsin.

If you have any questions or require additional information please contact me or a member of my staff.

Sincerely,

C. A. Schrock

C.A. Schrock
Manager - Nuclear Engineering

DJK/cjt

Attach.

cc - US NRC - Region III
US NRC - Document Control Desk
US NRC Senior Resident Inspector
Mr. R. S. Cullen, PSCW

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ATTACHMENT 1

To

Letter from C. A. SCHROCK (WPSC)

to

J. B. MARTIN (US NRC)

Dated

November 3, 1993

Request for Enforcement Discretion

This attachment provides the information requirements identified in Section "E" of "10 CFR PART 2 APPENDIX C ENFORCEMENT DISCRETION" of Part 9900 of the NRC Inspection Manual. The information is provided in the same order as requested in the inspection manual.

1. The Technical Specification or other license conditions that will he violated.

WPSC RESPONSE

WPSC is requesting Enforcement Discretion to extend the 72 hour Limiting Condition for Operation (LCO) action statement on the A residual heat removal (RHR) pump. The KNPP Technical Specification (TS) 3.3.b.1.B identifies a SI/RHR train as:

B. Two SI/RHR trains are operable with each train comprised of:

1. ONE operable safety injection pump.

2. ONE operable residual heat removal pump.

3. ONE operable residual heat removal heat exchanger.

4. An operable flow path consisting of all valves, piping and interlocks associated with the above train of components and required to function during accident conditions. This flow path shall be capable of taking suction from the selected boric acid tank and the refueling water storage tank upon a safety injection signal and after manual transfer taking suction from the containment sump.

WPSC is requesting Enforcement Discretion for TS 3.3.b.2.B which states:

2. During power operation or recovery from an inadvertent trip, ONE SI/RHR train may be inoperable for a period of 72 hours.

B. If the inoperability is due to a component in the residual heat removal system and operability is not restored within 72 hours, then within 1 hour action shall be initiated to:

-Achieve Hot Standby within the next 6 hours.
-Achieve Hot Shutdown within the following 6 hours.
-Achieve and maintain the Reactor Coolant System T_{avg} less than 350°F by use of alternate heat removal methods within an additional 36 hours.

The basis of the specification is to provide, based on plant risk, a limited time relaxation from the single failure criterion for the RHR pumps while assuring, with high reliability, that the safety system will function properly if required to do so and allow sufficient time to effect repairs using safe and proper procedures.

Currently the plant is operating at 100% reactor power; however, it is within a 72 hour LCO on the RHR system due to a throughwall leak in the A RHR pump casing. Enforcement Discretion is being requested for an additional 120 hours beyond the current 72 hour LCO action statement in lieu of a plant shutdown. This additional 120 hours will provide sufficient time to facilitate the repair of the pump.

A plant shutdown would be required when the time necessary to perform the repair and return to service exceeded the 72 hour LCO period. To avoid placing the plant in the transitory conditions required to achieve shutdown, WPSC is requesting an additional 120 hours to repair the pump while the plant remains at 100% power. As is discussed in questions 3 and 6, this action is consistent with safe operating practices and continues to provide reasonable assurance of the protection of the public health and safety.

2. The circumstances surrounding the situation, including the need for prompt action.

WPSC RESPONSE

On October 26, 1993, with the plant operating at 100% power, plant staff conducted a visual inspection of the A RHR pump. The inspection was part of Kewaunee's self-initiated safety system functional inspection of the RHR system. The inspection identified a small deposit of boric acid residue beneath the pump on the floor of the pump pit. A mirror was used to inspect the underside of the pump which is approximately four inches off the floor. This inspection identified an area approximately 1 inch in diameter of crystallized boric acid on the suction nozzle of the pump casing. The static head from the Refueling Water Storage Tank (RWST) provides a constant RHR system pressure of approximately 30 psig during normal plant operation.

The boric acid was removed from the floor of the pump pit and the pump casing was cleaned. Twenty minutes following removal of the boric acid, the pump casing was visually inspected by a Quality Control (QC) Inspector (certified to Level III VT). The inspection did not identify any moisture or boric acid crystallization. At this time it was believed that the boric acid residue was the result of a previous pump seal leak. However, in order to confirm this belief it was decided to re-examine the pump several days later.

On November 1, 1993, at approximately 1030, the QC Inspector (certified to Level III VT) identified an area approximately 1/32 of an inch in diameter of dried boric acid on the underside of the pump. Due to the minute size of the crystals, the inspector was not

confident that he was observing crystals due to leakage of the RHR pump casing. The inspection was made more difficult by the location of the potential leak. Due to the limited clearance between the pump casing and the floor, inspections had to be done using a mirror.

To resolve the concern, WPSC planned to hydrostatically test the RHR pump at 125% of its design pressure and observe for leakage. In addition, the area was prepared for a dye penetrant examination. After the area was buffed and cleaned, a QC Inspector visually examined the area of concern. The visual examination identified that a drop of liquid (half of a sphere with an approximate diameter of 1/32 of an inch) formed approximately five seconds after the area was wiped clean. However, the drop did not fall after 25 minutes of observation. At approximately 1841, the QC Inspector notified the control room of the confirmed pressure boundary leakage and the pump was immediately declared out-of-service.

Since a throughwall leak was verified, the planned hydrostatic test was cancelled and provisions were made to drain the system to allow for inspection of the pump casing in order to characterize the apparent indication. However, prior to pump disassembly, the following additional inspections were performed:

1. A Welch/Allen video probe was inserted through an opened flange on the suction side of the pump.

2. Radiography of the affected area.

In parallel with the inspection activities, the plant maintenance and engineering personnel reviewed potential repair techniques and developed a schedule for repair activities. Based on the estimated time required for repair, WPSC decided to begin repair rather than attempting to justify the integrity of the pump on an interim basis; this decision was based on minimizing the total out of service time for the RHR pump. Pump disassembly in preparation for the repair began at approximately 1400 hours on Tuesday, November 2. As part of the pump repair, additional non-destructive examinations will be performed.

The schedule for completing the repair of the pump is contained in Attachment 2 to this letter. As can be seen from Attachment 2, the repairs will not be completed by 1841 hours on Thursday November 4, when the 72 hour LCO expires. Therefore, unless the requested Enforcement Discretion is granted, the plant will be shutdown in accordance with TS 3.3.b.2.B.

3. The safety basis for tbe request that Enforcement Discretion be exercised, including an evaluation of tbe safety significance and potential consequences of the proposed course of action.

WPSC RESPONSE

A. PLANT DIVERSITY

The A RHR pump performs the following functions:

1. Emergency Core Cooling System (ECCS) injection on a large break Loss of Coolant Accident (LOCA).

2. Long term post accident cooling following a LOCA.

3. Decay heat removal during plant startup, shutdowns, and for non-LOCA events requiring a plant cooldown (e.g. steam generator tube rupture (SGTR), main steam line breaks (SLB), and a fire).

The first function of the A RHR pump is to provide ECCS injection to supplement the safety injection (SI) accumulators in refilling the reactor vessel on a large break LOCA. If the A RHR pump is inoperable, the B RHR pump and its associated train can perform this function. If the B RHR pump fails, then the high pressure SI pumps would continue injecting into the reactor coolant system (RCS) cold legs. Additional injection flow would be provided by operating two charging pumps at maximum speed taking suction from the RWST. If the LOCA was in an RCS cold leg, then the operator could realign the associated high pressure SI train to the reactor vessel injection path. Emergency Operating Procedures provide direction on performing these actions.

When the RWST is depleted following a LOCA, the RHR system is switched to the recirculation mode. In this mode the RHR pump takes suction from the containment sump and can provide:

1. Injection directly into the Reactor Coolant System (RCS), or

2. Flow to the suction of the Safety Injection (SI) or Internal Containment Spray (ICS) pumps.

During the recirculation phase, decay heat is removed from the core and transferred to containment by evaporation of the water injected into the RCS by the RHR or SI pumps. The heat added to containment, if not removed, will increase containment

pressure and temperature. The following combinations of equipment in conjunction with passive heat sinks and ambient losses are designed to remove all decay heat post accident:

1. 4 Fan Coil Units (FCUs)

2. 2 trains of ICS

3. 1 train of ICS and 2 FCUs

Best estimate Probabilistic Risk Assessment (PRA) has shown that only 1 of 4 containment fan coil units is necessary to adequately remove the heat in containment. Therefore, the ICS pumps are not required to provide containment cooling and RHR support for this function is not critical.

The second function of the A RHR pump is to provide long term post accident cooling following a LOCA. This function is accomplished by a combination of the containment sump recirculation mode described in function 1 above and the decay heat removal mode described in function 3 below.

The third function of the A RHR pump is to provide decay heat removal during plant startup, shutdowns, and for non-LOCA events requiring a plant cooldown such as a SGTR or SLB. There are other options available to perform this function, all of which are proceduralized; these include:

1. the B train of RHR.

2. one of two steam generators (note that only one may be intact if the event is a SGTR or SLB) cooled by:

   a. one of three auxiliary feedwater pumps (two motor driven, one turbine driven)

   b. one of two main feedwater pumps

   c. one of two condensate pumps.

3. bleed and feed using one of two pressurizer power operated relief valves (PORVs) and one of two high head SI pumps.

In the case of a fire, the equipment and procedures described above may not be available. Therefore, additional precautions as described in question 4 will be taken during the period of the Enforcement Discretion. These precautions will decrease the probability of a fire and increase the potential for early detection.

B. PROBABILISTIC RISK ASSESSMENT

A probabilistic risk assessment was performed in order to help determine the significance of having one RHR pump out of service for a period longer than the TS LCO. The risk assessment assumed that the A RHR pump was inoperable during the 192 hour period it is declared out-of-service. Three different PRA tools were used in order to fully understand the consequences of an extended one pump LCO. The three tools were Revision A to the Level 1 PRA, Revision A to the Level 2 PRA, and the draft plant Level 1 shutdown PRA. In all three cases instantaneous frequencies were calculated which characterize the configuration of interest, namely the A RHR pump is out of service for an eight consecutive day period, as opposed to averaging the LCO time over the course of a year. In the case of the at-power Level 1 and Level 2 PRAs, these instantaneous frequencies were then used in conjunction with existing annual frequencies to project the overall change in the annual core damage and containment failure frequencies.

The results of the Level 1 PRA indicate that the instantaneous core damage frequency for an eight day period increases from 4.7E-6 to 9.9E-6 if the duration that one RHR pump is inoperable increases from 72 hours to 192 hours. Operation of the plant with one RHR pump out of service for 192 hours instead of the 72 hours allowed by the KNPP TS increases the overall annual plant core damage frequency by 6.8%. However, even considering this increase, the total core damage frequency remains below 1E-4/year which was an industry upper bound estimate of an acceptable plant core damage frequency for Individual Plant Examinations (IPEs). The results of the Level 2 PRA indicate that the containment failure frequency agrees closely with the Level 1 PRA results; however, the total containment failure frequencies are almost two orders of magnitude lower than the total core damage failure frequencies due to the robustness of the Kewaunee containment as described in the KNPP IPE submittal (Letter from C. R. Steinhardt (WPSC) to NRC Document Control Desk dated December 1, 1992).

The shutdown PRA (currently in draft form) was used to compare a plant shutdown to cold shutdown for a normal case and the case when one RHR pump is inoperable. Cold shutdown conditions and below were not considered as it was assumed the plant would not enter cold shutdown with one RHR pump inoperable. If the shutdown endpoint is some intermediate shutdown condition, these numbers would not be as large and the importance of RHR would not be as great; however, the shutdown PRA model as it currently exists cannot be manipulated to stop at an intermediate shutdown condition. The reason for this is that the shutdown PRA was developed for refueling shutdowns, and in order to make the PRA manageable WPSC did not model each separate evolution, instead the outage was separated into thirteen defined periods, one of which was plant shutdown to cold shutdown (typically 1 1/2 days of a refueling outage).

The instantaneous core damage frequency associated with one RHR pump inoperable for a 192 hour period in the intermediate shutdown condition increases only by a small amount (less than 1E-6); however, the instantaneous chance of RCS boiling increases on the order of 5E-5. This points out the importance of RHR as a heat sink for decay heat removal in a shutdown, and that the loss of one RHR pump during an intermediate shutdown mode does not significantly effect core damage frequency. This indicates that there are benefits to avoiding a plant shutdown if one RHR pump is out of service.

C. CONCERNS ASSOCIATED WITH PERFORMING THE REPAIR IN A SHUTDOWN CONDITION

As stated in the PRA section above, there is a fairly significant increase in the probability of RCS boiling in a shutdown condition during the period the A RHR pump is inoperable. RCS boiling is a precursor to core damage if core cooling is not restored, and it is of great concern to WPSC and the NRC. In addition, there is concern with the plant shutdown evolution. Whenever a plant transient occurs, the potential for a reactor trip or some other transitory consequence increases with a greater likelihood of the need for RHR to help in the safe operation of the plant.

D. SUMMARY

In summary, the decision on appropriate plant conditions to effect repair of the leak on the A RHR pump must be based on providing reasonable assurance of protecting the health and safety of the public. WPSC has determined that the proposed course of action described in this Request for Enforcement Discretion does just that. This determination described above is based on several key factors which are:

1. The RHR system is designed with 100% redundancy, thus one of two trains is fully capable of performing the design requirements listed in part A above.

2. There are proceduralized alternatives to the RHR system that can perform in part or whole the functions of the RHR A train.

3. The concerns listed above in part C associated with shutting down the plant to make the repair in a shutdown mode.

4. Although the PRA showed that the risk of core damage increases, this increase is only a 6.8% increase on the overall plant core damage frequency which is on the order of 1 E-5/year.

4. Proposed compensatory measures.

WPSC RESPONSE

The following compensatory measures are being taken to ensure the operability of B train of the RHR system, containment integrity, and a reliable power supply is available.

a. The schedules for maintenance, testing, and surveillance associated with the B train safety-related components have been reviewed and rescheduled if necessary to prevent performance during the duration of the Enforcement Discretion. This includes both emergency diesel generators which supply power to the safeguards buses following a loss of offsite alternating current (AC) power to the buses.

b. WPSC will perform no switching in the Kewaunee substation which could result in the loss of any one of the four offsite transmission lines.

c. WPSC System Operating has been made aware of the status of the Kewaunce Plant and the importance of maintaining all offsite transmission lines in service. Furthermore, System Operating will be reminded of the requirement to notify the Kewaunee Plant of the loss of certain transmission lines. This notification is to ensure that actions are initiated to prevent a potential situation in which the Kewaunee generator would go unstable and result in a loss of all offsite power. (Refer to commitment in the letter from C. A. Schrock (WPSC) to Document Control Desk dated May 14, 1993.)

d. A system lineup check of major components, which includes a verification of the electrical system lineups will be performed to ensure the B train of the RHR system is operable prior to entering the period of Enforcement Discretion.

e. A system lineup check of major components in support systems (Service Water and Component Cooling) for the B train of RHR will be completed prior to entering the period of Enforcement Discretion.

f. All four containment fan coil units (2 units per train) will be maintained operable. This requirement is to ensure containment cooling is maintained should a LOCA occur and the B train of RHR be unable to supply containment sump recirculation water to the internal containment spray system.

g. All Kewaunee operations personnel will be made aware of the status of the RHR pump's operability during shift briefings. This will include discussion of TS requirements for shutdown cooling, concerns with one RHR train out of service should a plant trip occur or shutdown be required, and the compensatory measures described in this letter.

h. To further ensure that a single fire does not affect the redundant Appendix R Cold Shutdown Equipment (B RHR pump), prior to exceeding the 72 hour LCO, the following compensatory measures will be established for the "alternate" fire zones/areas that contain equipment and cabling for the B RHR pump.

1. Hourly fire watch inspections will be performed. The only exception to the fire tour will be the B RHR pump pit. This area has restricted personnel access, a low combustible loading, and automatic detection.

2. Work activities involving ignition sources (cutting and welding) not associated with the repair of the A RHR pump will be prohibited.

3. Daily inspections of areas containing transient combustibles will be performed by fire protection personnel.

5. The justification for the duration of the noncompliance.

WPSC RESPONSE

The requested time period, 120 hours beyond the 72 hour LCO for a total time of 192 hours, for the Enforcement Discretion is expected to be sufficient to allow for a complete repair and retest of the A RHR Pump and return it to operable status. A detailed time line for completion of the required work has been completed by personnel at the Kewaunee Plant (refer to attachment 2). The time line is based on input from the plant operations, maintenance, and engineering departments to:

-- prepare the required repair and retest procedures,
-- review and approve the procedures,
-- disassemble the pump,
-- cut the 6" pipe joint,
-- repair the casing,
-- radiograph the weld repair,
-- prepare and reweld the pipe joint,
-- re-assemble the pump and motor,
-- perform a post-maintenance hydrostatic test and,
-- perform the surveillance procedure associated with the pump flow retest.

Also, qualified welders, hired through a contractor, must complete the necessary requirements to work on site. This time line allows a small margin for contingencies. If activities are completed in under 192 hours, the system will be returned to service expeditiously.

6. The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety and that a significant safety hazard is not involved.

WPSC RESPONSE

The Request for Enforcement Discretion to TS 3.3.b.2 was reviewed in accordance with the provisions of 10 CFR 50.92 to show that no significant hazards exist. The Request for Enforcement Discretion will not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   An inoperable RHR Pump is not an initiating event for any accident evaluated in the Kewaunee Updated Safety Analysis Report (USAR). Therefore, one RHR pump out of service for an additional 120 hours beyond the present LCO time of 72 hours will not increase the probability of an accident previously evaluated.

   The Kewaunee Technical Specifications permit one RHR train to be inoperable during power operations for 72 hours; operation in this condition has been deemed acceptable because of the limited risk. Likewise, postulation of an accident under these conditions with the resultant consequences has also been accepted because of the low probability of an accident and a coincident RHR train failure. As describe in our response to question 3, one RHR pump inoperable for an additional 120 hours beyond the LCO action statement of 72 hours does not significantly increase the risk of a core melt event and the risk continues to be maintained at an acceptable level. Additionally, compensatory measures have been taken to ensure the operability of the remaining train of the RHR system, thereby ensuring one train of RHR is available following a design basis event to perform its function as analyzed in the USAR. Only one train of RHR is required following any design basis event. Therefore, operation of the Kewaunee Plant for an additional 120 hours with only one operable train of RHR will not significantly increase the probability or consequences of any accident previously analyzed in the USAR.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated.

   One train of the RHR system remains available to perform its function as analyzed in the USAR. Only one train of the RHR system is required to perform all analyzed functions. There is no change to system design or function of the RHR system, or the operation of Kewaunee due to the inoperable RHR train. Therefore, the possibility of a new or different kind of accident from any accident previously evaluated is not created.

3. Involve a significant reduction in a margin of safety.

As stated in the basis for TS 3.3.b.2, the LCO for the pump is a temporary relaxation of the single failure criterion. As described in our response to question 3, a PRA was performed assuming a 192 hour LCO. The results of the PRA demonstrate that the extension of the LCO does not significantly decrease the margin of safety.

7. The basis for the licensee's conclusion that the noncompliance will not involve adverse consequences to the environment.

WPSC RESPONSE

WPSC has determined that this Request for Enforcement Discretion involves no significant hazards considerations, no significant change in the types of any effluent that may be released off-site, and there is no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this Request for Enforcement Discretion meets the eligibility criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with this Request for Enforcement Discretion.

8. A statement that the request has been approved by the facility organization that normally reviews safety issues.

WPSC RESPONSE

Plant Operations Review Committee (PORC) has reviewed and endorsed this request for Enforcement Discretion.

9. Any other information the NRC staff deems necessary before making a decision to exercise Enforcement Discretion.

WPSC RESPONSE

Administrative Controls
Existing standard plant procedures and programs (work request, tagout procedures, etc.) will be used during the repair process.

WPSC has attempted to identify the circumstances requiring new procedures and added the time to develop and qualify these procedures to the schedule. New procedures, if required, will receive PORC review prior to implementation.

Contingencies

WPSC has taken action to pursue alternatives should the proposed repair not be successful. The Prairie Island Nuclear Generating Plant has available a spare pump of the same model as the KNPP RHR pump. On November 2, arrangements were completed for shipment of the spare pump and associated documentation to the Kewaunee site. The pump arrived on November 3. A preliminary schedule for use of this pump indicates a duration comparable to that required for pump repair. This would include review of documentation (radiographs, certificates of conformance, etc.) and preparation of the pump and piping for installation (end cap removal, weld preparation, etc.). However, the preferred action remains to make the repair, because WPSC has confidence in the repair technique and because of the uncertainties associated with performance of the spare pump. If WPSC decides to use the spare pump, we will notify the Senior Resident Inspector at the Kewaunee plant.

ATTACHMENT 2

To

Letter from C. A. SCHROCK (WPSC)

to

J. B. MARTIN (US NRC)

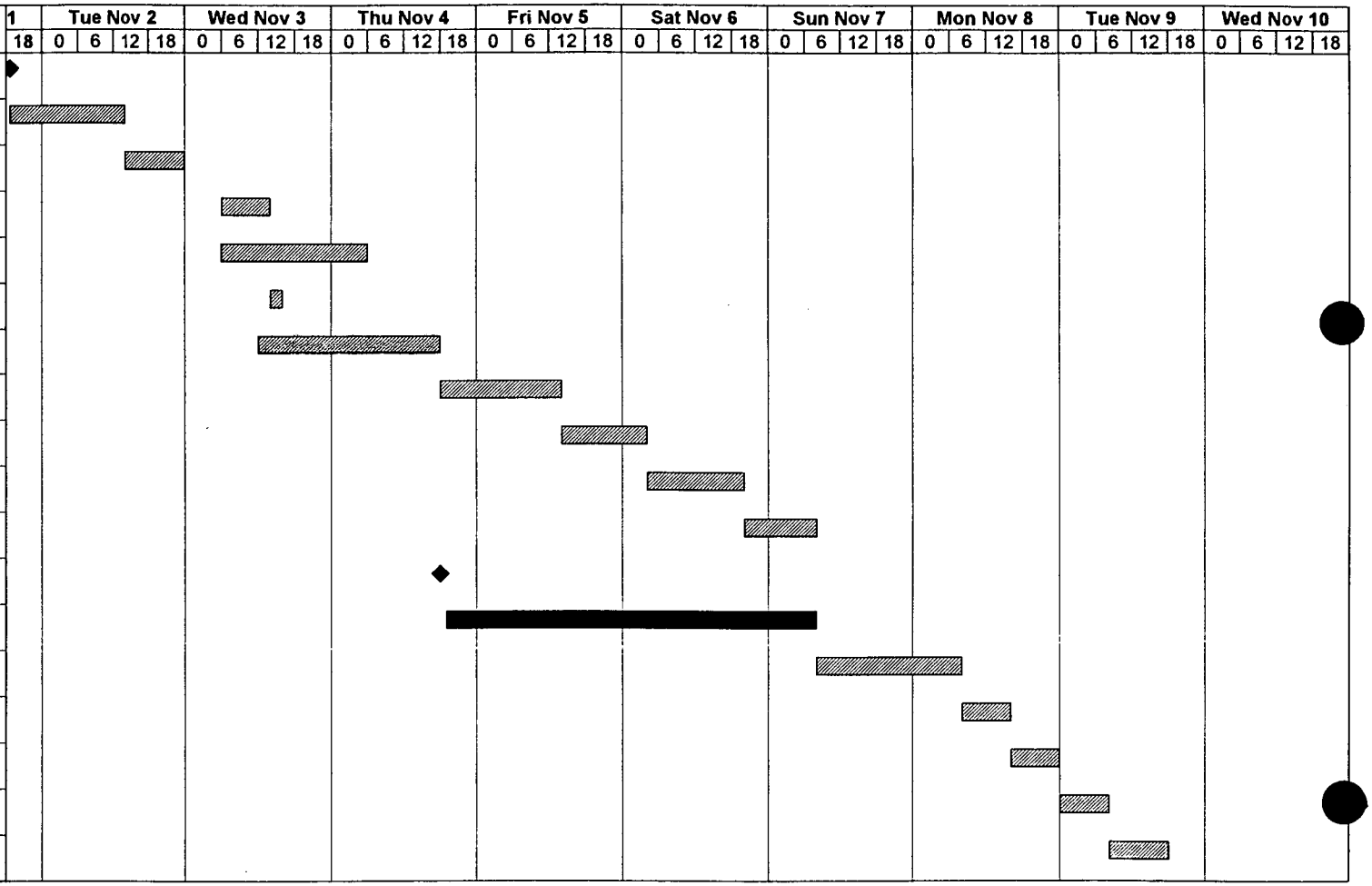
Dated

November 3, 1993

Schedule for Repair Activities

Attachment 2:
Schedule for Repair Activities

ID	Name	Duration
1	Pump Declared OOS (1841 hours)	0h
2	Pump Drain Down and Inspection	19.3h
3	Pump Disassembly	10h
4	Cut 6" Diameter Pipe and Invert Pump	8h
5	Welder and Weld Procedure Qual	24h
6	Pump UT	2h
7	Prepare Pump for Weld	30h
8	Weld Pump	20h
9	Radiograph Pump Weld and Reorientate Pump	14h
10	Prep and Weld 6" Diameter Pipe	16h
11	Post Weld Radiograph and LPT	12h
12	Decision to Repair or Replace	0d
13	Contingency Action (See Note Below) Install Spare RHR Pump	2.54d
14	Reassemble Pump	24h
15	Check Valve Repair	8h
16	Install Spool Piece	8h
17	Hydro	8h
18	Post Maintenance IST and Test Evaluation	10h



Note: The decision to replace the pump with the spare pump will be made by 1800 hours on Thursday. This will allow installation of the spare pump within the requested time.