FERMI 2

RECOVERY PLAN

Approved: R. D. McKean Date: 4/14/94
Plant Manager

Fermi 2 Recovery Plan
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FERMI 2 RECOVERY PLAN OVERVIEW

Mission Statement: Provide an overall coordinated plan to maintain control of the plant and efficiently utilize resources during the investigation into the root cause of the December 25, 1993 incident and determination of the final recovery plan for power generation. The following goals are integral to the above mission statement:

- o Place and maintain plant in stable and safe condition
- o Determine cause of turbine generator failure
- o No injuries, contaminations or unplanned exposures
- o No impact to the environment

Organizational Structure

See attached Outage 93-06 Task Team Organization

Team Action Plans

Each team will prepare an action plan per the Guideline for Individual Recovery Plans. The guidelines will address format and approval by the Plant Manager. The Plant Manager will consult with the Technical Manager and Nuclear Assurance Manager, as needed. Status of action plans will be presented at the daily management meeting. See the attached listing of Individual Plan Titles, Managers and Mission Statements.

Management Expectations

All activities will be conducted in a controlled fashion per the Fermi Management Policy, Fermi Management Directives, and procedures. Procedures shall be adhered to. Procedure changes or new procedures will be prepared for activities to be conducted differently than as proceduralized.

All changes to the plant and procedures, whether temporary or permanent, shall be thoroughly reviewed. The plant license, Technical Specifications, Updated Final Safety Analysis Report and other NRC approved plans shall be met or revised.

All action plans and investigations shall be thoroughly reviewed for adequacy prior to implementation to ensure risks are identified and actions taken to minimize risks. The action plans and investigations shall be compatible with the overall recovery goals.

All personnel shall use STAR (Stop, Think, Action, Review) techniques in performing work activities. This includes planning, preparation and analysis activities as well as work in the plant. Personnel shall maintain a questioning attitude. Management does not expect personnel errors. Management expects the time be taken to do the job right the first time.

Documentation

All documentary evidence of investigative efforts shall be maintained. Documentary evidence includes checklists, reports, procedures, sample results, analytical results, tapes, photographs (if documenting information material to investigation, such as location of debris), work packages, approved action plans, and other information documented on process of or

results of investigation. Each team leader is currently responsible for maintaining documentation associated with the team's activities. If the documentary evidence is also a Quality Assurance record, the record shall be processed per procedure and the team leader shall retain a copy or a list, including retrieval location, of such records. The documentary evidence must be made available to the Nuclear Regulatory Commission and may be requested by the insurance company.

Commitments to Regulatory Agencies

See NRC Confirmatory Action Letter, Martin to Gipson, dated December 28, 1993
LER 93-014 is due for submittal January 24, 1994
LER 93-015 is due for submittal January 25, 1994

Oversight

Nuclear Quality Assurance will assess plans and conduct of activities through surveillances, inspections, audits, reviews and general oversight provided by attendance at the daily outage meetings and Plant Manager's meeting. Areas selected for oversight will be determined by management concern, the Risk Assessment Guideline, regulatory and code requirements, scheduled audits, and past performance. Temporary modification installations associated with recovery activities will be reviewed by Nuclear Quality Assurance.

Safety Engineering will assess defense in depth on a daily basis and for the overall outage schedule. This will be achieved by evaluating outage plans, schedules and activities to ensure planned decay heat removal, inventory make up, containment, and electrical power are maintained available as required. Additionally, Safety Engineering is evaluating and participating on the scram team, B3105F031B Valve and the turbine generator assessment teams.

Additional oversight is being utilized where outside technical expertise is considered advisable by management. Failure Prevention International will be reviewing the turbine generator assessment plan.

INDIVIDUAL PLAN TITLES, MANAGERS AND MISSION STATEMENTS

Water Management Team

TEAM MANAGER: B. Terrasi

Mission Statement: Return plant water inventories to acceptable quantity and quality levels, without jeopardizing plant safety or violation of plant operating license.

Turbine Generator Root Cause Analysis

TEAM MANAGER: L. Fron

Mission Statement: Determine root cause of Fermi 2 MTG trip on 25 December and develop a plan for damage assessment, repair options, reassemble and startup recovery.

Access to the Generator area is controlled by the NSS.
The area is QUARANTINED and security is stationed to control access.
The Quarantine will not be lifted until the action plan is reviewed and approved by Senior management.

Fire Protection Restoration

TEAM MANAGER: R. Kilroy

Mission Statement: Maximize the current level of protection afforded by the fire protection program by recovering and restoring both the fire detection and fire suppression systems to their intended design configuration. Evaluate and restore all fire barriers.

B3105F031B Reactor Recirc Pump B Discharge Valve Dual Indication Response Team

TEAM MANAGER: L. Collins

Mission Statement: Determine findings and conclusions and recommend corrective actions. Determine root cause and recommend actions to prevent reoccurrence. Evaluate and determine if similar failures could occur in other safety related valves.

Plant Area Cleanup

TEAM MANAGER: D. Pettinari

Mission Statement: Restore the plant areas to original condition. Minimize radwaste generation during cleanup.

Nuclear Fuels Concerns

TEAM MANAGER: G. Smith

Mission Statement:

1) Verify fuel reliability is satisfactory for Reactor Startup and for power operation.
2) Determine correct core design loading.
3) Determine Startup Testing Requirements.

Mission Statement: Provide recommendations to:

a) minimize corrosion product formation and transport to plant systems;
b) minimize interference with required outage activities; and
c) preserve plant component integrity.

System Walkdowns
TEAM MANAGER: D. Bergmooser

Mission Statement: Identify corrective and preventative maintenance needed to return systems to service in a reliable condition.

Structural and Support Systems
TEAM MANAGER: A. Alchalabi

Mission Statement: Walkdown and visually inspect plant structures, supports and components for structural damage. Evaluate potential impact of "seismic alarm."

Scram Team
TEAM MANAGER: J. Contoni

Mission Statement: Identify the initiating signal for the Scram. Review the plant systems and equipment responses to the scram. Evaluate any significant challenges encountered while responding to the event.

Financial Controls
TEAM MANAGER: R. Franklin

Mission Statement: To account for all costs associated with damage assessment, cleanup, repair and/or replacement, and Root Cause Analysis.

RF04 Outage Preparations
TEAM MANAGER: J. Davis

Mission Statement: Integration of the Refueling Outage and Plant Recovery Activities.

Radwaste Restoration
TEAM MANAGER: W. Tucker

Mission Statement: Restore Radwaste to full, reliable operation. First priority will be placed on establishing process streams, and secondly on full restoration of component operability and reliability.

Reactor Vessel Internals Assessment
TEAM MANAGER: B. Sheffel

Mission Statement: (Under development)

Sequence of Events Recorder Investigation
TEAM MANAGER: G. DePalma

Mission Statement: Investigate Sequence of Events Recorder (SOER) anomalies which occurred during the 12/25/93 scram.

TB Steam Tunnels, 1st & 2nd Floor
TEAM MANAGER: A. Kowalczuk

Mission Statement:

December 28, 1993

Docket No. 50-341
License No. NPF-43
CAL No. 3-93-018

The Detroit Edison Company
ATTN: D. R. Gipson
Senior Vice President
Nuclear Generation
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: CONFIRMATORY ACTION LETTER

Dear Mr. Gipson:

This confirms the conversations on December 25 and 27, 1993, between Mr. Edward G. Greenman of this office and you related to the recent turbine-generator failure which occurred at Fermi Unit 2 on December 25, 1993. With respect to the matters discussed, we understand that you are performing or will perform the following actions:

1) Complete an internal investigation to determine the sequence of events and root cause(s) of this event and subsequent equipment failures, such as the failure of the "B" loop recirculation pump discharge valve to fully close. The investigation will determine and assess consequential damage, and additional random failure of equipment.

2) Complete an evaluation of the effects of the abnormal water chemistry experienced in the reactor on the fuel and reactor internals.

3) Place components, equipment, and data sources associated with the turbine-generator failure event, including those components that subsequently failed to perform as expected, under in situ quarantine to preserve evidence and data until released by you and discussed with the NRC's Augmented Inspection Team (AIT) or the NRC's Senior Resident Inspector. Note, however, that nothing in this Confirmatory Action Letter should be construed to take precedence over those actions which you feel necessary to ensure plant and personnel safety.

4) When developed, provide a copy of your proposed course of action for investigation of the event, recovery of the facility, and proposed corrective actions to the NRC Region III office for review. We acknowledge that in order to assure a comprehensive plan is developed that will clearly identify the root cause of the turbine-generator failure(s), some considerable time may be required to complete both items 1) and 2).

5) Maintain documentary evidence of your investigation effort and make this available to the AIT.

6) Make those staff members on shift at the time of the event available for interview.

We further understand that reactor startup (power operation) will not occur until you have informed the Regional Administrator or the Director of the Division of Reactor Projects, Region III, of the results of your investigation and corrective actions.

Pursuant to Section 182 of the Atomic Energy Act, 42 U.S.C. 2232, you are required to notify me immediately if your understanding differs from that set forth above, notify me if for any reason you cannot complete the actions within the specified schedule and advise me in writing of your modified schedule in advance of the change, and notify me in writing when you have completed the actions addressed in this Confirmatory Action Letter.

Issuance of this Confirmatory Action Letter does not preclude issuance of an order formalizing the above commitments or requiring other actions on the part of the licensee; nor does it preclude the NRC from taking enforcement action for violations of NRC requirements that may have prompted the issuance of this letter. In addition, failure to take the actions addressed in this Confirmatory Action Letter may result in enforcement action.

The responses directed by this letter are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, Pub. L. No. 96-511.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and your response will be placed in the NRC Public Document Room.

We will gladly discuss any questions you may have concerning this matter.

Sincerely,

Original signed by J. B. Martin

John B. Martin,
Regional Administrator

See Attached Distribution

Distribution:

cc: John A. Tibai, Principal
Compliance Engineer
P. A. Marquardt, Corporate
Legal Department
DC/LFDCB
Resident Inspector, RIII
James R. Padgett, Michigan Public
Service Commission
Michigan Department of
Public Health
Monroe County Office of
Civil Preparedness
Fermi, LPM, NRR
J. M. Taylor, EDO
J. H. Sniezek, DEDR
H. L. Thompson, DEDS
T. E. Murley, NRR
L. J. Callan, NRR
J. W. Roe, NRR
J. A. Zwolinski, NRR
W. H. Bateman, EDO
A. R. Blough, Acting Director, PD III-1
E. L. Jordan, AEOD
J. Lieberman, OE
J. R. Goldberg, OGC
R. J. Strasma, RIII
R. N. Gardner, DRS

bcc: PUBLIC-IE36

GUIDELINE FOR INDIVIDUAL RECOVERY PLANS

I. Purpose

A) This guideline will provide instructions for plan development, format, approval and revision control

II. Plan Development

A) Individual plan will be developed for all major activities involved in achieving the overall recovery plan for outage 93-06.

B) Plans will be published by the Work Control Group.

III. Plan Format

A) Individual plans will follow the following format

- o Plan Title
- o Approval and Revision Date
- o Team Manager and Members
- o Mission Statement
- o Major Actions (sub-actions as applicable)
  NOTE: Actions which are commitments to regulatory agencies shall be flagged
- o Fragnet (as applicable)

IV. Plan Approval

A) All plans will be approved by the Plant Manager. The approval date will be the revision level.

V. Plan Revision

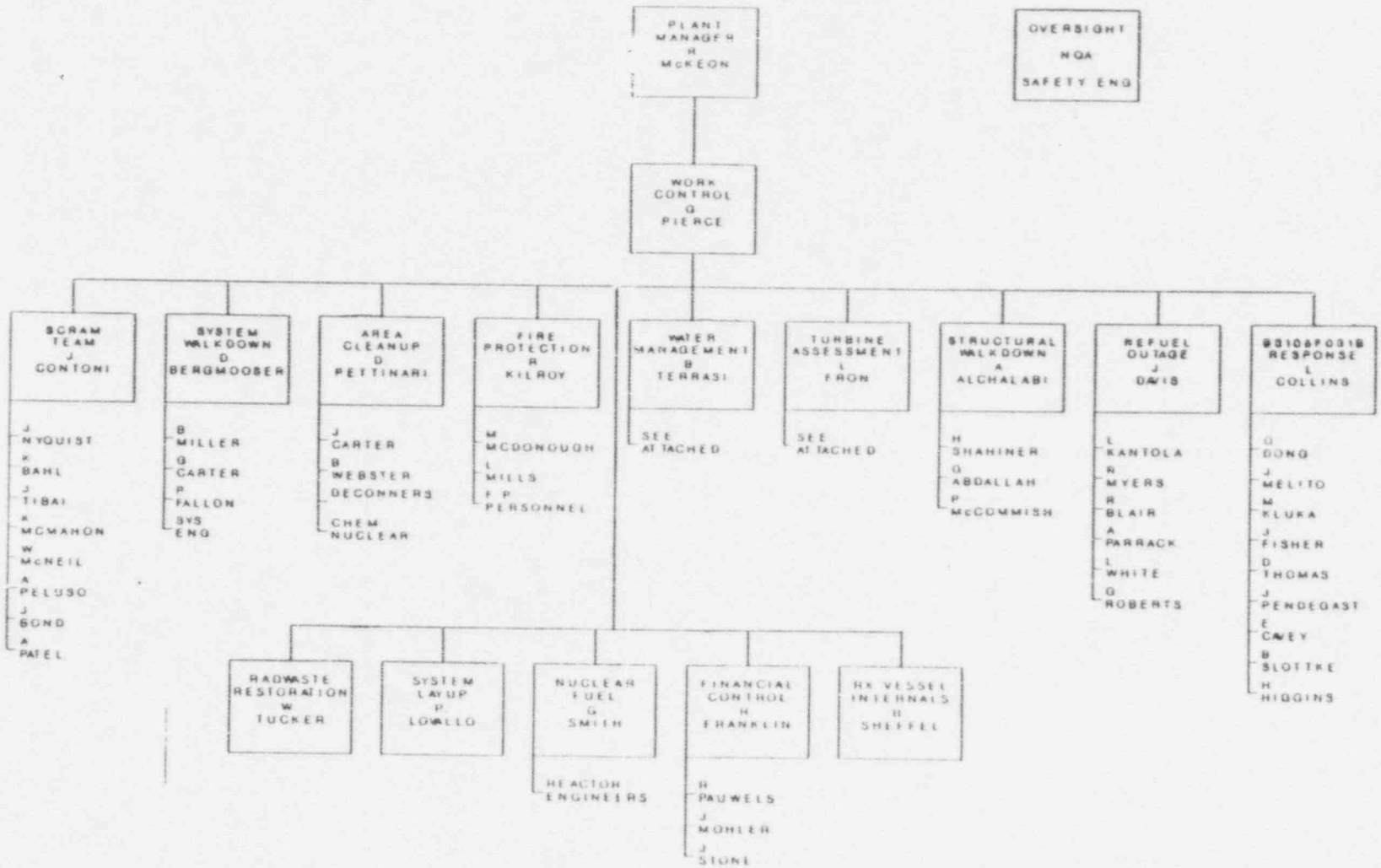
A) Minor changes can be made at the discretion of the Team Manager.

B) Major changes impacting the mission statement or actions need the approval of the Plant Manager.

C) Revisions can be approved on an as needed basis and will be reviewed at the morning management meeting (i.e. 8:45 am)

December 30, 1993

OUTAGE 93-06
TASK TEAM ORGANIZATION



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TB Steam Tunnels, 1st & 2nd Floor
TEAM MANAGER: A. Kowalczuk

Mission Statement:

FERMI 2

WATER TREATMENT ACTION PLAN

REVISION 1

W Terrasi

William Terrasi
Team Manager

Robert McKeon

Robert McKeon
Plant Manager

2/2/94

Date:

WATER MANAGEMENT ACTION PLAN

MISSION STATEMENT

Return plant water inventories to acceptable *quantity* and *quality* levels, without jeopardizing plant safety, or violation of plant operating license. Return water quality and quantity in a time frame so as to minimize impact to reactor internals and to other plant maintenance activities. Liquid discharges to lake Erie shall be minimized in keeping with the philosophy of *"near"* zero discharge policy, and shall be treated prior to release in keeping with **ALARA** .

TEAM MEMBERS *

W. Terrasi, Team Manager
G. Carter, Systems Engineering
E. Wilds, Plant Engineering
S. Peterman, Operations
C. Cassise, Maintenance
T. Young, Mods
M. Moren, Work Control
S. Bartman, Chemistry
P. Lovallo, Chemistry
D. Pettinari, Radwaste
D. Craine, Rad Protection
A. Hickman, Facilitator
J. Allen, Procurement

* Above list includes lead personnel only. Refer to attached organization chart for complete team listing.

1.0 INTRODUCTION

The plant shutdown on December 25, 1993 resulted in large volumes of water with chemical quality orders of magnitude above acceptable plant chemistry specifications. These volumes exist in plant systems and building with virtually no installed plant water processing equipment available to reduce the levels of impurities.

These waters are being evaluated as the five (5) distinct volumes of water they are: (1) Reactor water, (2) Condenser Hotwell, (3) Condensate Storage Tank, (4) Radwaste and Turbine Building volumes, (5) Turbine Building Closed Cooling Water (TBCCW). Even if all volumes are recovered to reactor or reactor system quality, some amount of water will exist that is in excess of the plants' storage capacity.

The following criteria used to develop this plan are:

1. Maintain public health and safety.

2. Support the plant needs to comply with regulations and Tech Specs.

3. Minimize further contamination of water or plant systems and spaces.

4. Recover water chemistry volumes in order of a pre-determined priority.

5. Minimize contamination of water volumes that presently meet associated chemistry specifications.

6. Minimize the amount of water discharged.

7. Minimize spent resin generation. (solid radwaste).

Phase 1 of this action plan involves the implementation of the initial temporary modifications and pumping and processing equipment to treat and move the main bulk water volumes to the locations and/or water quality levels specified. (i.e., reactor coolant, CST, CRT, torus, condensate & TBCCW in spec, Radwaste and Tubine Building basements, empty).

Phase 2 involves the coordinated flushing of large portions of piping currently filled with poor quality water. This may, in turn, affect and impede progress in the cleanup of reactor coolant.

Phase 3 involves the final polishing of all water volumes remaining on site to within normal excellent water quality specifications. Organics removal will be a prime target in this effort.

PHASE 1

MAJOR ISSUE

Return Reactor water quality as a segregated volume to within normal specifications.

Approach: 1:

Provide pure CRT to CRD seal flushing/cooling water supply, and treated reactor water letdown to CRT.

Temporary Modification 93-0012: An alternate path of clean demineralized water to the Reactor Vessel via the CRDs. Presently the conductivity of the vessel is beyond the upper limits. Because of the current plant conditions, normal supply to the CRDs from the polishing demineralizers or Condensate storage is not feasible (impure water source). A temporary hose will be connected between P11F030A, condensate storage supply to Reactor Building header drain valve, and C11F006, CRD Pump Discharge header vent valve. Clean water will then be supplied from the Condensate Return Tank using the condensate jockey pump to valve P11F030A. An alternate supply may be from the normal hotwell supply pump. In both cases, water is supplied at approximately 100 psig. The flow path will then be via the hose connection to C11F006 and through the drive water filters to the CRDs. The purpose of the alternate path is to be able to supply a clean volume of water to the CRD mechanisms, with exhaust into the reactor vessel.

Temporary Modification 93-0013: Provide a flowpath for letdown from the Reactor Vessel via Reactor water cleanup blowdown line, through a temporary filter demineralizer to the Condensate Return Tank via the HPCI test line. This modification is required to permit Reactor Vessel Level control while the control rod mechanisms are being flushed. Operations to control valve lineup using approved procedures and guidance contained in this temporary modification. With this temporary modification in place, Operations personnel will be able to control letdown flowrate by manipulating G33R606 (H11P602, Manual Loading Station: Blowdown Flow Controller) to control the Reactor Water Cleanup (RWCU) To Condenser/Radwaste Flow Control Valve (A.O.), G3300F033. This will permit control of reactor vessel level via blowdown flow control. Letdown flow is indicated on G33R602, Flow Indicator Electric: Blowdown Flow). Procedural Control will be provided via TCN to 23.707, Reactor Water Cleanup SOP.

Temporary Modification 94-0005: To provide a letdown flowpath to maintain reactor vessel level while providing clean water to the CRD pump suction to operate the CRD pump which will flush the control rod drive mechanisms. Incorporated into this temporary modification is the capability to treat (Demineralize) the letdown water prior to return to the Condensate Return Tank and filter the water going to the suction of the CRD pump. This temp mod will also have the capability to recirculated and demineralize the CRT water. Once installed, Temp Mod 93-012 and 93-0013 will no longer be used. This Temp Mod accomplishes the same objectives plus provides much greater flow capability to flush the drives using the CRD pumps.

Approach 2:

Install deep bed demins on a side stream cleanup system in lieu of RWCU F/Ds until Rx water quality is sufficient to enable RWCU F/D purification. (Temp Mod 93-0015).

Temporary Modifiction 93-0015: Install Chem Nuclear supplemental demins on the R.B. 5th floor in order to clean up the Reactor Water/RHR Water. This modification involves connecting to two existing RWCU flanged connections in the 4th floor RWCU Valve Gallery and running both a solid piped fill and return line to the fifth floor. This line will be equipped with appropriate isolation vent, drain and pressure control valves. Hose will be used to connect to the temporary processing equipment. This equipment is to include Sluiceable Demins, Process Skid, Process Shields, Shield Cask, Process Liner, Dewater Head, Dewater Panel, Water Retention Liner, Sluice Water Pump, plus interconnecting hose and valves.

Post Modification testing will be performed as defined in the temporary modification and would include:

- o Seismic Walkdown
- o System Walkdown
- o Leak testing of new piping/vendor equipment
- o Verification of vendor pressure relief valve

Approach 3.

Use RWCU F/Ds to maintain required purity, once reactor coolant is below at most 10 uS/cm. (1-2 uS/cm, optimum), within constraints of spent resin processing capabilities and piping flushing sequences. Flushing "dead legs" of piping and systems could result in significant crud bursts to the reactor and reactor coolant conductivity increases. It is preferred to have RWCU F/D's in service during crud bursts (to preclude dose build up on temporary demins and piping), and to use temporary deep bed demins for conductivity cleanup. Intermittent use of the two systems, therefore, is expected.

MAJOR ISSUE

CST volume is out of Chemistry Specification and is not available for plant makeup.

Approach 1.

Install temporary portable demins and filters to treat CST volume on a side stream recirculation prior to discharge. (SE's 94-0001, 94-0005). Initially cesium-specific resin will be used to target cesium removal from the waste water, the primary contribution to potential offsite doses resulting from the release.

Approach: 2.

Discharge CST volume as possible via evaluated pathways (Temp Mod 94-0001). Treat as required for discharge. (SE)

The radioactive material concentrations in the CST water are less than limits for allowable release as specified in the Fermi 2 ODCM. The calculated dose consequences of releasing this CST water would be 0.3 mrem, total body and 0.4 mrem, maximum organ (liver). These doses are within regulatory limits, representing approximately 10% of the 10 CFR 50, Appendix I annual limits. However, this release would not be considered ALARA. It is Detroit Edison's intent to process this water prior to release for the purpose of reducing the radioactive material content, ensuring potential doses are maintained to a small fraction of the limit in keeping with the principle of ALARA.

Temporary Modification 94-0001: Temp Mod Description - In order to discharge water from the Condensate Storage Tank (CST), the Neutralization Tank (Neut Tank) waste water discharge line is modified to allow hookup to a temporary, hydraulically powered, variable speed pump. Discharge of radioactive liquids will occur using the temporary pumping equipment used to recirculate and cleanup the liquid in the CST. Flow will be diverted from the recirc pump through a 4" hard wall hose routed through temporary filters to a section of pipe. This length of pipe contains a manually operated isolation valve which will be used to isolate the flow path if a high radiation condition occurs and 1.5" taps for routing flow through an off-line radiation monitor. A non-intrusive ultrasonic flow meter is installed on the pipe to monitor the discharge flow rate. Flow will be routed via 4" hard wall hose to the modified Neut Tank waste water discharge line. All discharges will occur in accordance with approved plant procedures, the Offsite Dose Calculation Manual (ODCM), and the Fermi 2 National Pollutant Discharge Elimination System (NPDES) permit. Procedural Control for discharge operation will be provided via TCN to 23.104, Condensate Storage and Transfer System Operations.

Approach 3.

Evaluate temporary outside storage options for the excess water, in lieu of discharge.

Options have been evaluated and advantages and disadvantages of this approach vs. discharge have been given to the Plant Manager. Pursue as directed.

MAJOR ISSUE

Large volumes (~1,000,000 gallons) of oily water must be pumped from the Radwaste Building basement (approx. 6 ft.), the Turbine Building basement, the RFP rooms and the oil tank farm, and treated prior to discharge.

Approach: 1.

Pump standing volumes of bulk water as possible to HW, then to CST, via evaluated alternate pathways. Treat as required in CST for discharge or recovery, as possible.

Radwaste basement flood water will be pumped to the hotwell initially to a level just below the tube bundle; a decision will be made at that point whether to continue pumping up into the condenser tube bundle or to temporary storage tanks. Standing oil is skimmed from atop the flood waters. Remaining lower volumes of oily water will be processed through oil/water separating equipment (as necessary) while pumping to hotwell or temporary storage tanks. Water volumes in the enclosed tank rooms and some water from the FDCT (to prevent continual overflowing) shall be moved into the Radwaste basement hallway for eventual pumping in a controlled and evaluated manner. Water from the WCT shall be pumped to suitable storage to prevent it form continually overflowing.

Approach 2.

Pump TB basement, oil tank room, RFP reservoirs to HW or temp storage in same manner. Temp storage options include portions of TB Basement, used oil tanks, unused tanks in Radwaste, FRAK trucks, smaller temporary tanks in Radwaste and OSSF.

Approach 3.

Plug TB basement drains to prevent back flooding from RW basement. Temp Mod 93-0014.

Temporary Modification 93-0014: The Radwaste Building basement is flooded as a result of the Main Turbine Generator failure which occurred on 12/25/93. Water contained in the Radwaste Basement can flow backwards into the Turbine Building via the identified drains due to static head. The purpose of the modification is to isolate the Turbine Building floor and equipment drains which flow to sumps located in the Radwaste Building basement in order to facilitate cleanup and recovery of both buildings and the equipment contained therin. Transfer of water from the Turbine Building to the Liquid Radwaste System via the sumps is not affected by this modification.

Approach 4.

A comprehensive water inventory strategy shall be formulated with the intention of minimizing liquid discharges to the lake and placing the plant in a position to begin cavity flood-up for refueling opertion at the earliest opportunity.

MAJOR ISSUE

Condensate quality in the hotwell is out of specification without CFD processing capability. (Extended use of the solid radwaste processing system to support CFD operation will not be available in a timely manner).

Approach 1.

Discharge hotwell volume as possible via normal hotwell reject to CST, then thru the alternative temporary discharge pathway. Minimize discharge volume and recover water as possible.

Approach 2.

Restore solid radwaste processing capabilities to support spent resin processing as a priority in Radwaste System restoration.

Approach 3.

Use CFD's (once available) to cleanup final smaller volumes of hotwell water, and desludge hotwell as required.

MAJOR ISSUE

TBCCW system is filled with lake water quality and must be returned to normal purity specifications.

Approach 1.

Re-inhibit TBCCW with corrosion inhibitor. Monitor for suspended solids. Continue to filter through side stream filter already installed.

TEMPORARY MODIFICATION AND SAFETY EVALUATION SUMMARY AS OF January 18, 1994 (03:48 PM)

The following is a list of both temporary modifications and safety evaluations that have been written to support the plant after the December 25, 1993 Turbine event.

Temp Mod 93-0011 SE 93-0078

This temporary mod was writtten to block the Turbine Building roof dampers after the fusible links melted during the event.

This temp mod has been removed.

Temp Mod 93-0012 SE 93-0080

This temporary mod provides CRT water supply to mhe vessel via the CRD system.

This mod has been installed.

Temp Mod 93-0013 SE 93-0082

This temporary modification provides a letdown path from the vessel to theCRT via the RWCU blowdown line. Also deep bed deminerlizers are installed.

This temp mod has been installed.

Temp Mod 93-0014 SE 93-0084

This temporary modifiction installed plugs in Turbine Building Basement DO28 and DO27 floor and equipment drains. This was to prevent water in Radwaste Basement from returning to the Turbine Building Basement.

This temp mod is installed.

Temp Mod 93-0015 SE 93-0085

This temporary modifiction provides a side stream deep bed deminerlizer system on the RWCU system, to cleanup the vessel.

This temp mod is installed.

Temp Mod 94-0001 SE94-0004

This temporary modifiction provides an alternate discharge path from the CST to the Circulating Water decant line. this is to replace the normal radwaste dishcarge line.

This temp mod is presently out for OSRO review.

TEMPORARY MODIFICATION AND SAFETY EVALUATION SUMMARY AS OF January 18, 1994 (03:48 PM)
Continued

Temp Mod 94-0002 SE 94-0006

This temporary modification provides a path to reject torus water to the CRT.

This temp mod is installed.

Temp Mod 94-0003 SE 94-0008

This temporary modifiction installs plugs in the Turbine Building First Floor D013 floor drains. Also dikes are to be installed at Turbine Building doors T1-1, T1-3, T1-5, T1-14. Tnis is to control water within the Turbine Building BAsement if a Frac Tank or oily waste processing equipment failure should occur.

This temp mod is presently OSRO approved but not installed.

Temp Mod 94-0005; SE 94-0012; EDP 26281

These modifictions provide higher CRD flow capabilities, using theCRD pumps, to flush the CRD system; also provides letdown and CST/CRT cleanup capabilities through temporary demins (Replaces temp mods 93-0012 and 93-0013).

Presently out for OSRO.

SE 94-0001 SE 94-0003 SE 94-0005

These safety evaluations were written to support the CST side stream deep bed deminerlizer and dike, as well as use of the CST as a batch tank for discharge of water from the plant.

These SE's are scheduled for OSRO on 1/19/94.

SE 94-0002

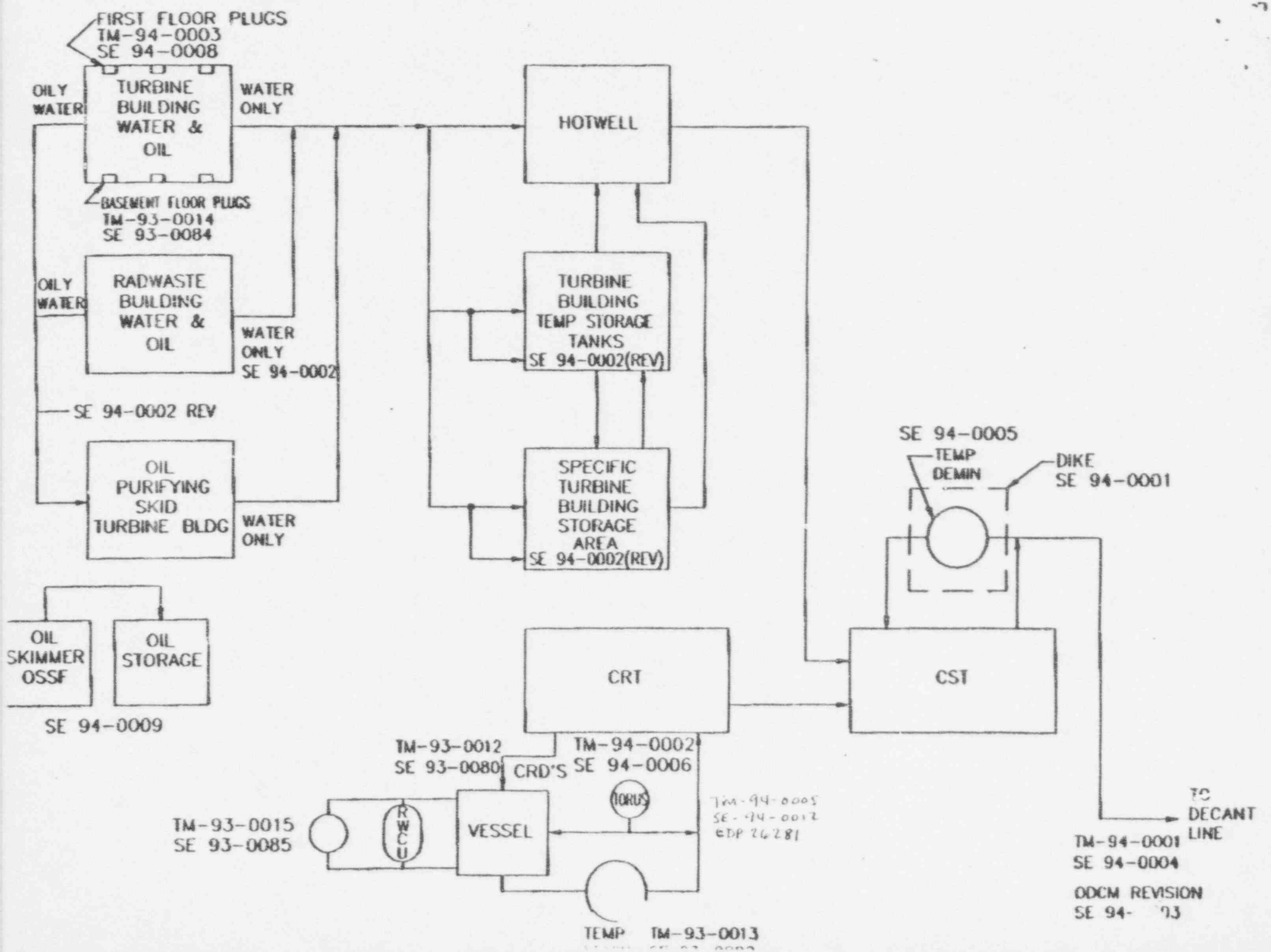
This safety evaluation was written to support transferring of water from the Radwaste or Turbine Building Basement to the Hotwell. Revision 1 was written to include storage of water in Frac Tank (located in the Turbine Building first floor) and oily waste processing equipment.

This SE has been approved.

SE 94-0009

This safety evluation was written to support oil skimming equipment to be located in the OSSF.

This SE has been approved.


FIRST FLOOR PLUGS
TM-94-0003
SE 94-0008
OILY WATER
TURBINE BUILDING WATER & OIL
WATER ONLY
BASEMENT FLOOR PLUGS
TM-93-0014
SE 93-0084
HOTWELL
OILY WATER
RADWASTE BUILDING WATER & OIL
WATER ONLY
SE 94-0002
TURBINE BUILDING TEMP STORAGE TANKS
SE 94-0002(REV)
SE 94-0002 REV
OIL PURIFYING SKID TURBINE BLDG
WATER ONLY
SPECIFIC TURBINE BUILDING STORAGE AREA
SE 94-0002(REV)
SE 94-0005
TEMP DEMIN
DIKE
SE 94-0001
OIL SKIMMER OSSF
OIL STORAGE
SE 94-0009
CRT
CST
TM-93-0012
SE 93-0080
CRD'S
TM-94-0002
SE 94-0006
TORUS
TM-93-0015
SE 93-0085
RWCU
VESSEL
TM-94-0005
SE-94-0012
EDP 26281
TEMP
TM-93-0013
TO DECANT LINE
TM-94-0001
SE 94-0004
ODCM REVISION
SE 94- 93
TOTAL P.01

PHASE 2

MAJOR ISSUE

Once bulk water volumes are processed for discharge or purified, piping deadlegs and sumps of affected systems must be flushed and cleansed. A comprehensive plan to accomplish this in a timely and controlled manner will be developed. (Phase 2).

Date: January 21, 1994

To: R. McKeon
Plant Manager

From: W. Terrasi
Water Management Team Manager

Subject: **DISPOSITION OF EXCESS WATER VOLUMES - Outage 93-06**

As a result of the turbine/generator incident of December 25, 1993, approximately one million gallons of poor quality, excess water exists in the plant As of January 17, 1994, the current total estimated volume in all affected plant systems and buildings is 3.1 million gallons. Just prior to the incident plant water inventory in the same affected systems is estimated at 1.9 million gallons. By comparison, the highest [illegible] inventory for RF04, which would allow for all necessary movements of [illegible] while preventing the need for a liquid discharge following the planned outage, is 2.3 million gallons.

It is Detroit Edison's objective to minimize the amount of liquid discharge as a result of this incident. To totally preclude any liquid discharge, temporary supplementary storage capacity must be pursued.

Following is a summary of the options evaluated.

SUPPLEMENTARY STORAGE OPTIONS:

1. Multiple portable "FRAK" tanker trucks, outside.
2. One (or two) large temporary storage tank(s), outside.
3. SEG haul all excess water offsite, disposal at Tennessee facility.
4. "Storage" of full excess volume in RHR reservoir.
5. Storage of full or partial excess inventory in Chem Waste Pond.
6. Partial inventory "storage" and use in TBCCW system.
7. Partial inventory storage in Dryer/Separator Pit.
8. Storage of full excess inventory at Fermi I.
9. Recovery of approximately 400K gallons to reactor grade purity to bring inventory in installed plant equipment to RF04 target.

ELIMINATION OF OPTIONS:

Option 1 becomes problematic for longer term storage. The relative uncertainty of storage of radioactive liquids in tanker trucks and the demurrage costs involved make this a short term option at best, until longer term provisions are made.

Option 3 was eliminated due to the high quoted cost ($5.5 M) from SEG, and potential political ramifications.

Option 4 to hold the radioactive liquid in the RHR reservoir, was eliminated for reasons relating to contamination of a clean system and potential liquid and "gaseous" radioactive effluents from a currently non-permitted pathway. (Eventual discharge is eminent anyway). See Attachment 1 for more details.

Option 5 was eliminated as [illegible]ng in the Chem Pond would lead again to eventual discharge from a cur[illegible]ly non-permitted pathway.

Option 6 was eliminated as it would again involve the intentional contamination of a clean system.

Option 7 was not viable as a significant modification to the Dryer/Separator Pit gates would be required to provide a positive seal. Subsequent impact to plant refueling operation and recovery from the modification made this option unattractive.

Option 8 was eliminated due to the significant licensing and inspection implications involved with storing the liquid at Fermi 1.

BEST ALTERNATIVE STORAGE OPTIONS:

Option 2, to install one or two large temporary storage tanks outside, is the only viable alternative for long term storage. Plant Engineering estimates that a one million gallon "Modu Tank" can be provided and installed in about 21 days at a cost of $135K. Even extrapolating these estimates to 30 days and $250K makes this a reasonable alternative to discharge. Plant Engineering also estimates that a similar half-million gallon tank could be installed in 12 days at a cost of approximately $90K.

Space requirements for a million gallon tank within the Protected Area becomes problematic, but can probably be resolved with further effort. Details involved with this option include considerations for diking, lining, access, inventory surveillance, freeze protection, transport lines and equipment, overflow, and impacts to site traffic.

A Safety Evaluation for temporary outside storage of radioactive liquids can be performed. A generic Technical Specification for such temporary outside storage already exists, essentially limiting the total activity to less than 10 curies. This should pose no problem, as total contained water inventory on site cumulatively is only about 11 curies. Further, if we were to store in temporary tanks, it is our intention to treat first, specifically targeting Cesium removal, to reduce the isotopic content. This is the same strategy being applied prior to discharge of any of this water.

Supplementing longer term storage in large tanks is the option for short term, interim storage in portable "FRAK" trucks discussed in Option 1. Their main advantage is that they are almost immediately available. At approximately 20,000 gallons per tanker, it would require about 50 tankers to hold the full one million gallons, 25 tankers to hold about a half million gallons and about 35 tankers to hold the roughly 700,000 gallons targeted for storage or discharge. (Of the 1.1 million gallon excess, up to 400,000 gallons can be restored to required purity specifications and retained to reach the RF04 target inventory of 2.3 M gallons).

Quoted demurrage fees for these tankers is $50/day, each. Twenty five tankers could be held for one month at an approximate cost of $37,500. Costs for decontaminating each tanker must yet be factored in (a large uncertainty). Diking, freeze protection and transport equipment must also be provided.

The alternative to immediate, short term storage in FRAK trucks is obviously holding all excess water volumes in their current locations until a large storage tank can be erected and functional, assuming no discharge of liquids in the interim (over 30 days).

FINAL DISPOSITION OF STORED WATER INVENTORY

To purify all of the water to reactor grade purity via conventional ion exchange, it is estimated that over 3,000 cu. ft. of spent resin will be generated. This is equivalent to about a year's normal generation of spent resin at Fermi 2. It would be stored in the OSSF until it could be shipped. Assuming the standard processing and burial costs of $\$300/ft^3$, along with the cost to process the water, a total cost of over $1 million may be assumed to purify all the water.

If only 400,000 gallons are purified and retained to bring the plant to our RF04 target inventory, an approximate $400,000 cost and over 1300 cu. ft. of spent resin generation can be assumed.

Under the current plans to purify reactor water with the side stream demins and let down demins, and to target cesium removal vs. full purification in the CST (for discharge), using special resin, and estimated 375 cu. ft. of resin will be generated, costing over $100,000.

If the excess water inventory is stored in long term temporary outside storage tanks, we can take our time to evaluate the best technologies to employ to volume reduce and/or recover the water. Technologies under consideration include reverse osmosis, vacuum drying, ultrafiltration, evaporation, incineration, dewatering (of sludges, lakes) and ion exchange. Preliminary technical information from about twelve suppliers is still coming in. Turn key operation propopsals from two vendors to process the water to reactor grade, also exceeded $1M, including processing/burial costs of remaining solid radwaste.

Finally, if the excess water inventory is stored on-site, any reactor grade purity water that is generated from the treatment processes under consideration can be brought back into the plant as needed to makeup for normal losses. Average makeup rates over the past couple of years are in the range of 250K - 275K gallons/month. If "loss" rates are similar when we restart the plant, we may not have to store the water longer than 4-6 months after restart.

Enclosure 1 provides a technical and political summary discussion of liquid discharge vs. long term storage.

Attachment 1

Consequences of Recycling Contaminated Water into the RHR Basin

1) This action would result in the contamination of system not considered as radioactive systems in UFSAR. NRC Bulletin 80-10 requires that evaluations be performed for operating non-radioactive systems with contamination.

   - All equipment services by EESW would have to be considered as contaminated system, including EDG cooling water systems, etc.

2) Potential atmospheric releases through the mechanical draft cooling towers would have to be evaluated.

3) Sediments within the system would most likely become contaminated. Upon periodic clean-out, these sediments would have to be treated as radioactive material (waste). Regulatory issues surrounding low level contamination control and disposal would have to be addressed. Potential impact on decommissioning.

4) All waters within these systems would have to be controlled as radioactive liquid. Cross-ties between other systems would have to be controlled. Releases to the environment would have to be controlled. UFSAR and ODCM evaluations/changes would be required. Technical Specification compliance would have to be evaluated.

5) Radiological controls would have to be established for all maintenance on these systems.

Summary of Technical and Political Issues Related to Using Temporary On-Site Storage for the Excess Water Volumes

Advantages

1) Use of temporary storage, short-term, will facilitate interim water management and facilitate plant recovery.

2) Temporary storage will limit, or eliminate, the volume of water that must be released to the lake in the next several months. Limiting the volumes should also limit the total radioactive material releases. (Note, however, there are potentials that this storage and reuse could have longer term implications related to radwaste and future discharges. See discussion on disadvantages.)

3) Fermi-2 has been a near-zero liquid release plant. Providing the opportunity to continue this status, while at the same time continuing with recovery, requires that additional storage capacity be secured. In doing so, Detroit Edison would clearly present to the public its commitment to minimizing radioactive liquid effluents, even under extreme adverse predicaments, such as this event.

4) Additional storage will provide time to explore processing options. Advanced processing capabilities, not currently on-site, could not only further reduce radioactive material levels but could also yield re-usable water.

5) Zero release of liquid radioactive water will limit potential for future shoreline deposits of Co-60. Shoreline deposits have been detected, and levels are within the UFSAR modeling. However, long term political and decommissioning concerns for any levels identified in the environment should not be over-looked.

Disadvantages

1) Storage within temporary tanks will carry with it many regulatory and technical issues, such as dikes, liners, level indications, freeze protection, methods for transferring contaminated water, capabilities to identify/control/isolate any leaks, structural stability, flooding, routine surveillance, radiation protection, etc.

2) Political issues can also be expected. It could be a bigger public perception problem than actually conducting the release, that NRC has endorsed. NRC pressure to release may also be possible.

3) Use of temporary storage, in lieu of processing and releasing the excess water, only extends the time for addressing the issue of excess water with very poor water quality - water unacceptable for use (without extensive processing) within the plant. Storage will only make it more difficult to release the water at a later date. It will force the position that the water will have to be re-used. Having to release 6 months from now will only be worse.

4) Re-use could have longer term chemistry problems. The key to the success of a near-zero plant is good water management and chemistry. Temporary storage of this water will not help either cause. Trying to re-use water of marginal quality could result in more problems in the future. The result could cause continued water quality problems for some time, causing more radwaste and water that has to be handled and possibly released in the future. This is not to imply that processing this water to reactor grade is impossible, but that it will come at a premium cost, well in excess of $1M.

5) Water management, especially tied to re-using the water, will be a continuing operational activity. Water will have to be periodically sampled and moved back into the plant for make-up. Transport methods will have to be developed. Additional processing will be needed to bring the water within acceptable chemistry guidelines. Chemical additions may be needed to minimize potential microbial/bacterial growth.

Attachment A presents a summary of safety, radiological, and public concerns that can be expected.

Conclusion

The technical problems are associated with the large quantity of poor quality water - not the radioactive material levels. The political issues are more related to release of any radioactive material, and also with the public perception of the safety condition of the plant. The release of radioactive material to the lake will not be received favorably by the public, but neither will the continued storage of this million gallons of contaminated water that overflowed in the buildings, which leaves the plant in a perceived unsafe condition. The approach that needs to be taken is one that balances all these issues.

Is is recommended as a first step that the CST be processed and released. Processing will reduce the radioactive material levels to close to non-detectable levels. Our evaluations have shown that the release will result in potential offsite doses of 0.02 mrem to the total body and 0.03 mrem to the maximum organ (liver). These doses are a small fraction of the NRC's annual limits specified in the Technical Specifications and ODCM.

The release of the CST will provide 600,000 gallons of storage capacity and will provide flexibility for additional processing. Temporary storage does not provide the same level of processing/storage/water management flexibility. FRAC tanks, located inside the Turbine Building, can be used to facilitate small water volumes, expected over the short time for the continuing decon efforts. Construction of a 1 million gallon outside, longer-term storage tank carries with it too many regulatory and operational problems.

A position paper has been prepared addressing the radiological consequences of the event and the need to conduct limited liquid releases.

Considerations for On-Site Storage

Safety/Site Impact

1. Impact of tank failure on plant operations (e.g., unreviewed safety question regarding flooding of site structures).

2. Location must consider site traffic patterns, access to plant installed equipment.

3. Freeze protection must be included.

Radiological

1. Evaluation of UFSAR accident analysis and applicable limits on tank inventory would be needed.

2) Location within the protected area is needed. The tank will contain licensed material and must be controlled.

3) Leak control must be included. Rain water control may be needed if area is diked.

4) Storing a large volume of water greatly increases potential for creating a worst problem - leaks/spills resulting in a large volume of low level contaminated soil.

5) Radiological protection measures must be instituted (e.g., spill recovery, periodic surveys, access control, water movement controls).

6) Tank will become contaminated and will have to be treated as radioactive material after use.

Public Perception

1) Gives the impression that even these very-low-levels pose a significant radiological safety concern.

2) Plant has not been returned to a safe condition. The 1 million gallons of radioactive water, continuing to pose a threat to the public, the lake and its fish/drinking water. How long will it take to return the plant to a safe condition?

3) DECo is not capable of solving the problem of the large volume of contaminated water.

4) Precedent set for any future liquid releases. Near-zero does not mean absolutely zero.

Radiological Significance of the December 25, 1993 Turbine Failure Event

The malfunction of the turbine and generator at he Fermi 2 Nuclear Power Plant on December 25, 1993, while representing a significant equipment failure, was not a radiological event. Even considering the magnitude of the turbine and generator damage, those systems necessary for the safety of the plant, including reactor shutdown, cooling, and control of radioactive materials, operated as designed, effectively eliminating the potential for any radiological safety concerns.

The ALERT emergency condition that existed for a short time was in response to the turbine failure and subsequent fire - not because of any radiological safety concerns. No increases in plant radiation levels or in radioactive effluents above those typical for the operation and shutdown of the plant were encountered.

A very conservative assessment has been made of the highest radiation exposure for this event. An individual located at the site boundary of the plant would have received a dose of 0.00005 mrem to the total body and 0.0002 mrem to the thyroid. These doses were calculated based on conservative modeling of potential atmospheric releases associated with the turbine failure and steam releases following the initiating event. These doses are 0.001% of the NRC's annual limit for exposure to members of the public and 0.01% the dose an individual receives each day from natural background radiation. Another comparison to put these doses in perspective is that the individual at the site boundary would receive a greater dose from a person standing next to him for the day. The natural levels of radioactive potassium (^{40}K) in our bodies give us a dose of 30 mrem per year and expose others around us to 1 to 2 mrem per yr.

The issue that Detroit Edison is most concerned with is the large amount of radioactively contaminated water that resulted - approximately 2 million gallons. This water is safely contained at the plant; there have been no releases to the environment. Its storage does not pose a short term concern. The dilemma is how to best handle this excess water.

The philosophy that Detroit Edison operates the Fermi 2 Plant under is to maintain radiation exposures and radioactive effluents well below the NRC's allowable limits - in other words, "as low as reasonably achievable" - ALARA. For liquid releases, this philosophy has translated into a maximum reuse of water within the plant. The practical application of this has been for the past year, the plant has operated with near zero liquid releases.

At this time, with the excess water caused by the event, continued operation with zero liquid releases is essentially impossible. That is not to mean that this contaminated water will be dumped into the lake. Extraordinary efforts are being taken to not only minimize the quantity of water needing to be released but also to reduce the radioactive material levels to almost background levels. Very little radioactive materials will remain in the water by the time processing is completed and the water is determined to be acceptable for release.

The issue that plagues the reuse of this water within the plant is its chemical characteristics. During the event, the fire suppression system, that uses lake water as its source, actuated. This lake water got mixed with the normal radioactive waste waters, resulting in the excess volume of contaminated water. The lake water contains calcium carbonates, calcium sulfates, chlorides, and other impurities - chemical constituents that are normal for Lake Erie water.

These chemicals, if introduced into the reactor systems, are detrimental and can cause system and reactor fuel damage. These degradations, if they occur, can lead to higher plant radiation levels and greater volumes of radioactive waste. These actions would further impede Detroit Edison's efforts to maintain doses and radioactive effluent ALARA. In essence, by not releasing some of the excess water, the long term effect could be worse. The success of Detroit Edison's program for reducing radiation doses and radioactive effluents rests largely on maintaining good chemistry.

Detroit Edison is taking special efforts to clean-up the water that will effectively reduce the radioactive material levels but will do little in removing the lake constituents. This approach will provide for more efficient waste processing, will significantly reduce processing times, and limit the volumes of solid radioactive wastes generated as a result of processing the water.

Our plan is to initially clean-up approximately 500,000 gallons of water containing lower levels of radioactive material. This water will be evaluated for release to the lake. Our goal is to maintain releases that are necessary to a minimum. Based on projections on the processing efficiency, it has been calculated that the potential dose to an offsite individual for the release will be less than 0.02 mrem to the total body and 0.03 mrem to the maximum exposed organ (liver). The pathways of exposure included in this calculation include drinking water and eating fish. These doses are a small fraction of our natural background radiation exposure and well within the NRC's established limits of 3 mrem/yr to the total body and 10 mrem/yr to any organ for routine releases.

This release represents a big step in the management of the excess water and provides additional storage capacity needed for more efficient management of the excess water.

A fact sheet is provided as an attachment that includes a summary of the radiological consequences of this event compared with the NRC's limits and other radiation doses we receive in our daily lives.

Comparison of Radiological Consequences with NRC's Limits and Background Radiation Exposures

Doses from Event

NRC's Limits

Gaseous Effluents at Time of Event

- 0.00005 mrem, total body
- 0.0002 mrem, thyroid

Gaseous Effluents

- 5 mrem/yr, total body
- 15 mrem/yr, max.organ

Projected CST Liquid Releases

- less than 0.02 mrem, total body
- less than 0.03 mrem, max.organ (liver)

Liquid Effluents

- 3 mrem/yr, total body
- 10 mrem/yr, max.organ

Doses from Natural Background and Man-Made Sources

Natural Background Radiation Doses

- 0.8 mrem per day (this daily background dose is greater than all doses associated with the event)
- 27 mrem/yr from cosmic radiation
- 28 mrem/yr from terrestrial radiation (natural uranium and thorium)
- 40 mrem/yr from radioactive materials in our bodies (predominantly potassium-40)
- 200 mrem/yr from radon exposure
- 1 to 2 mrem/yr from living with your spouse

Man-Made, Enhanced Doses

- 10 mrem/yr from consumer products (tritium watches, smoke detectors, ceramic dinnerware, etc.)
- 40 mrem/yr from medical diagnostic x-rays (average individual exposure)
- 1 to 2 mrem for an air flight from Detroit to San Francisco
- 2 to 3 mrem for a transcontinental flight

PHASE 2

MAJOR ISSUE

Once bulk water volumes are processed for discharge or purified, piping deadlegs and sumps of affected systems must be flushed and cleansed. A comprehensive plan to accomplish this in a timely and controlled manner will be developed. (Phase 2).

1-18-94

WASTE CLARIFIER

LEVEL 559'-5"

CHEM WASTE TANK —

LEVEL 560'-8"

DATE 1-18-94 @ 1800 hrs

TANK FARM

LEVEL 559'-11"

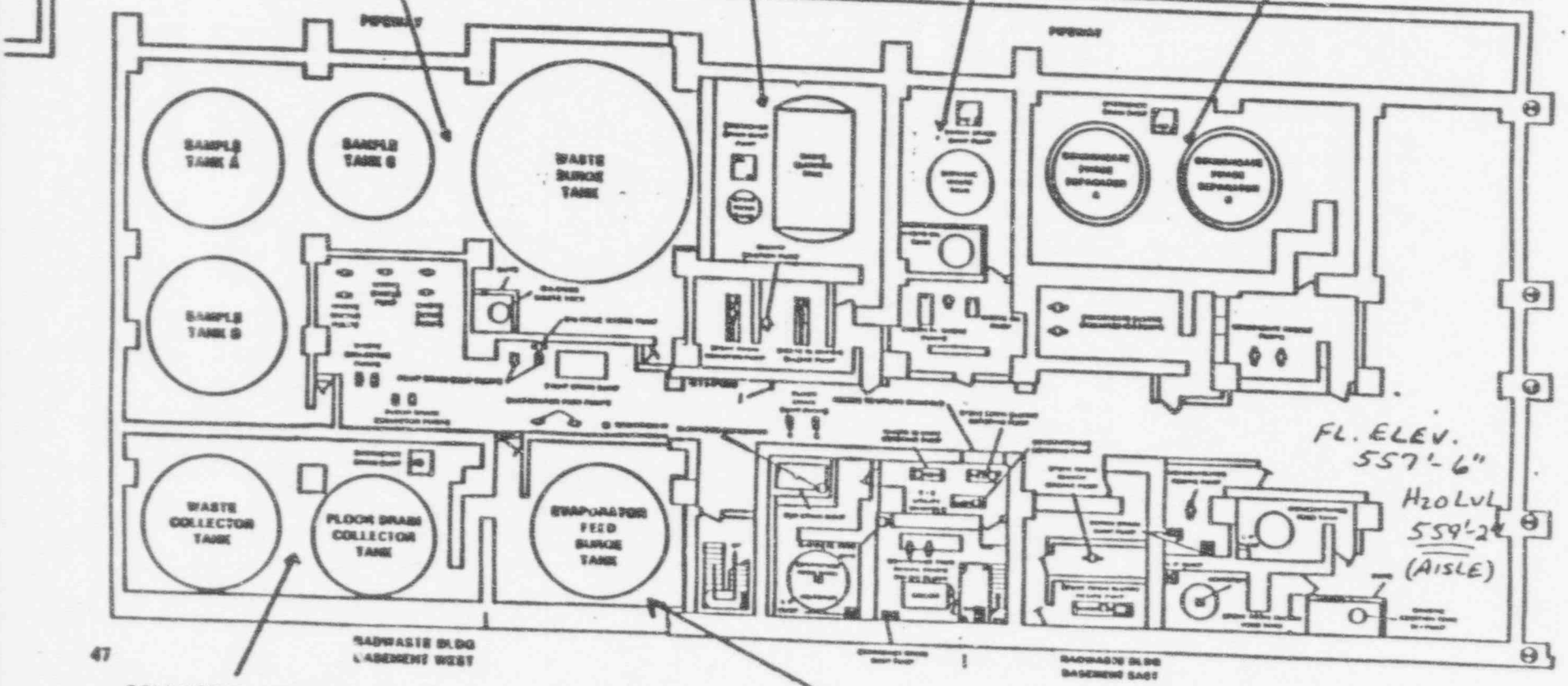
DATE 1-18-94 @ 1800 hrs

PHASE SEPARATOR ROOM

LEVEL 558'-10"

DATE 1-18-94 @ 1800 hrs

Radwaste Building — Basement
Elevation 564' — 0"



COLLECTOR TANK ROOM

LEVEL 559'-8"

DATE 1-18-94

COMBINED

EVAP FEED TANK ROOM

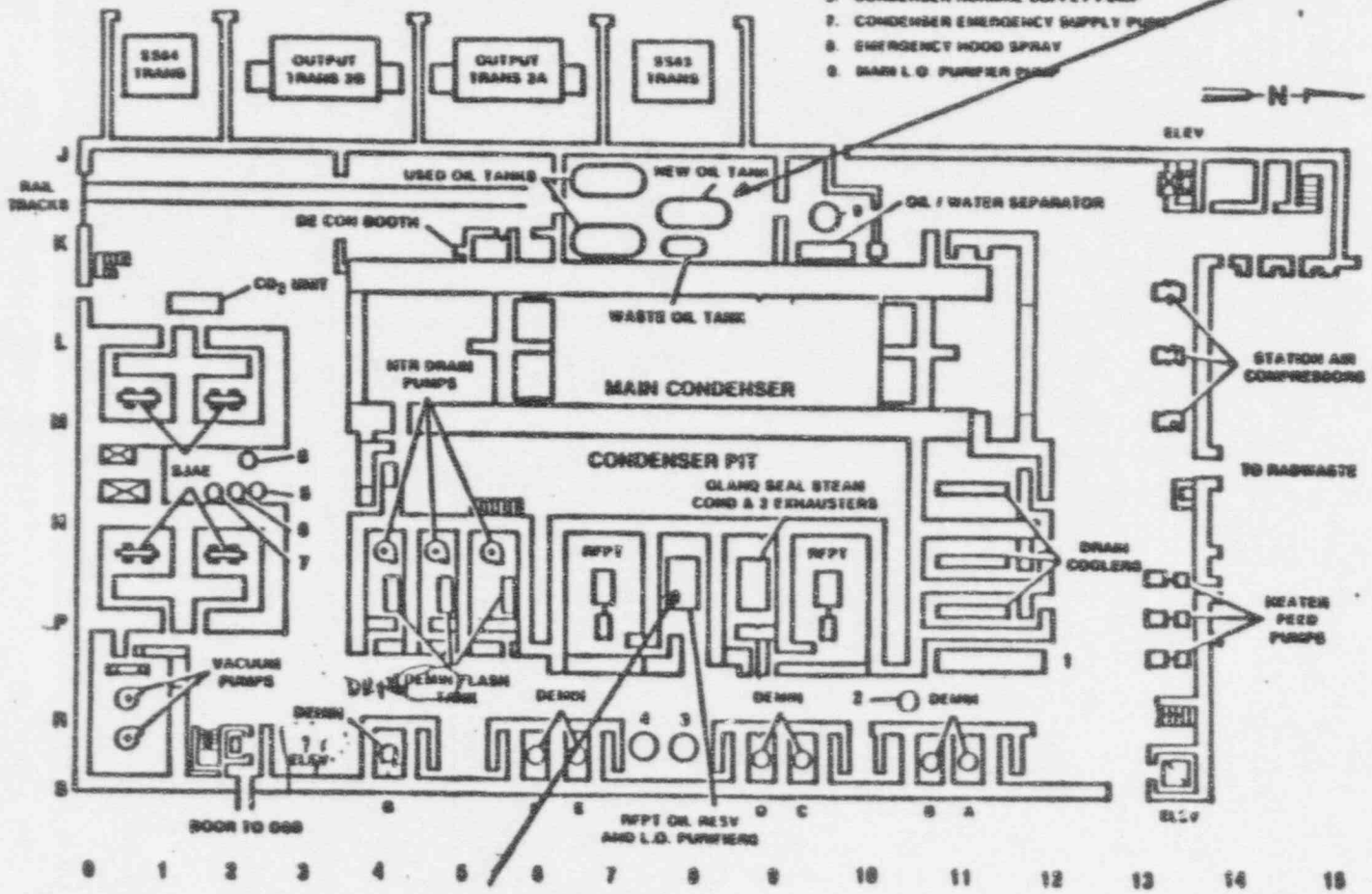
LEVEL

WTE rev

Turbine Building — 1st Floor
Elevation 583' — 6''

VOL 54,529 gals

CURIES _____

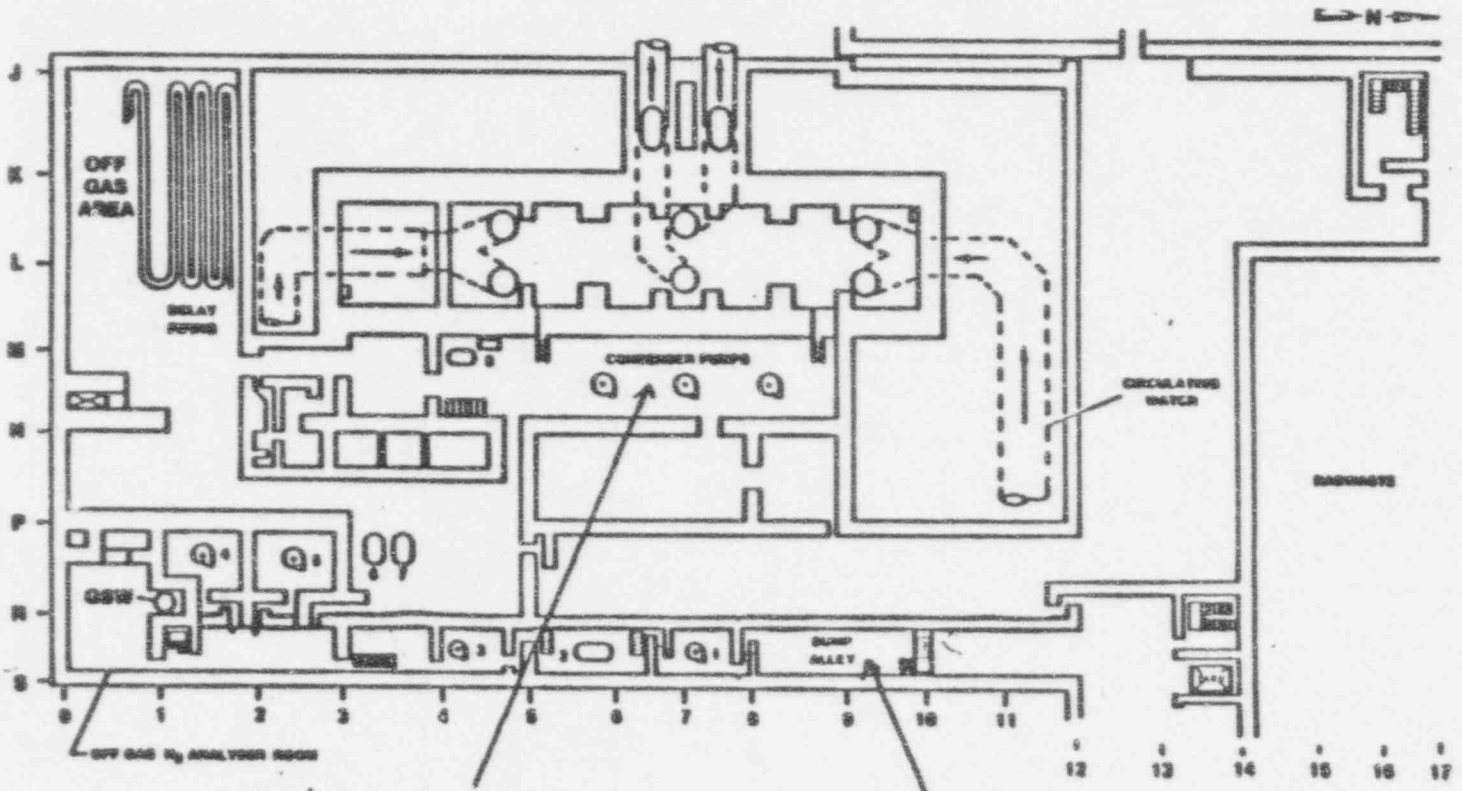


VOL 47,963 gals

CURIES _____

Turbine Building — Basement
Elevation 564' — 0"

1. CONDENSATE BACKWASH TRANSFER PUMP
2. CONDENSATE BACKWASH RECEIVER TANK
3. CONDENSATE BACKWASH TRANSFER PUMP
4. OFFGAS CONDENSATE RETURN PUMP
5. OFFGAS CONDENSATE RETURN PUMP
6. OFFGAS CONDENSATE RECEIVER TANK
7. OFFGAS DRAINS RECEIVER TANK
8. RFPT SEAL WATER RETURN TANK AND PUMP



VOL 27,227 gals

CURIES _____

VOL 264,000 gals

CURIES _____

WATER MANAGEMENT TEAM

Team Manager
TERRASI

Facilitator
A.HICKMAN

MAINT	CHEMISTRY	IRP	OPs	PURCHASING	RW	WORKCONTROL
CASSISSE	BARTMAN	RAD ENG	PETERMAN	ALLEN	OERN	MOREN
	PARRISH	(CRAINE)	MANN	WILLIAMS	OSTROM	LOVALLO
	SHIELDS	RO OPs	TAGESON	LOTTER	PETTINARI	
	LOVALLO	BLAND & ASSC.*	LAUBENSTEIN		CHEM NUC	
					MPC	

OVERVIEW
IGE - SKARPELOS
- SUNDBERG

ITES - WYSOCKI
- ESTES
- PALMER

IQA - GNAEDINGER
- SWEENEY
- HOFFMAN

MODS
YOUNG

ENGINEERING

PLANT	SYSTEMS
WILDS	MACK
BEAUDRY	CUMMINGS
GRIMES	BOZNYAK
WILGER	CARTER
PATEL	ESSEX
GONDEK	HARE
WOLFE	LEHMANN
JAX	MOFFETT
	CONTO

* CONSULTANT

FERMI 2
TURBINE-GENERATOR
ASSESSMENT TEAM

Action Plan

January 14, 1994
Rev. 1

Approvals

Approved: D B Smith for J D Black
J. D. Black, Team Chairman

Approved: L. C. Fron 1-14-94
L. C. Fron, Team Manager

Approved: P. Fessler 1-14-94
P. Fessler, Technical Manager

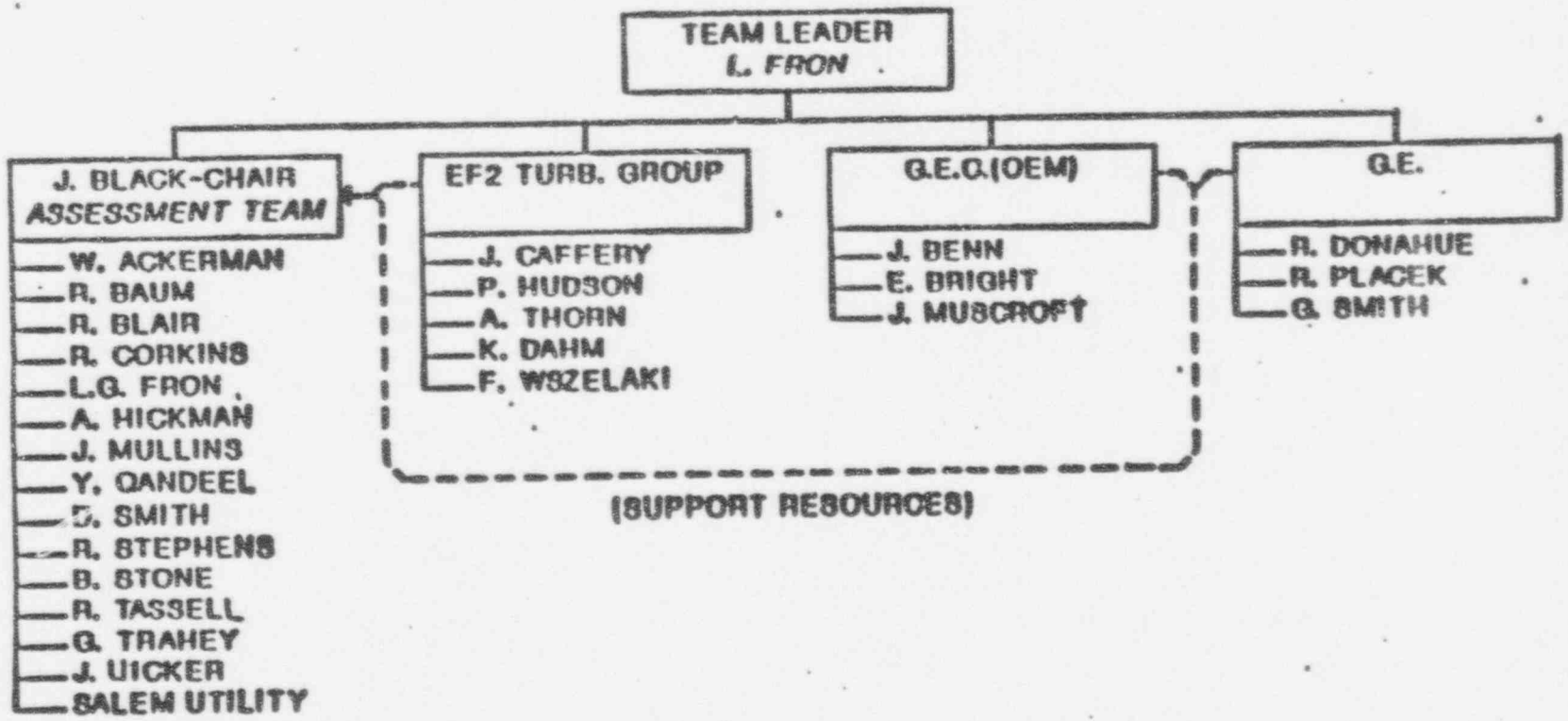
Approved: P. Fessler for (per telecon) 1-14-94
R. McKeon, Plant Manager

CONTENTS

CONTENTS

6. Attachments: (continued from previous page)

TURBINE & GENERATOR ASSESSMENT
TEAM ORGANIZATION



Mission Statement

Determine root cause of Fermi 2 Main Turbine-Generator (MTG) trip on December 25, 1993 and develop a plan for damage assessment, repair options, corrective action to prevent recurrence, reassembly, startup, monitoring of effectiveness of corrective action, and coordinate commercial, insurance and legal efforts.

GOALS

1. Develop plan on how to accomplish goals.

2. Develop sequence of events leading to the failure.

3. Determine extent of damage to the turbine, generator and auxiliary systems.

4. Determine root cause of the turbine/generator failure.

5. Determine corrective actions to prevent recurrence.

6. Develop a Restoration Plan
   (Labor-Material-Budget-Schedule, Consider Power Uprate)

7. Keep plant management informed of the team's progress.

8. Keep regulators informed of the team's progress.

9. Coordinate and assist with commercial negotiations, insurance claims, and potential legal actions.

10. Develop lessons learned.

11. Develop presentation for use with Plant Management, Regulators and Detroit Edison management.

12. Publish final report.

EXECUTIVE SUMMARY

The Fermi 2 Turbine-Generator tripped at approximately 1315 hours on Saturday, December 25, 1993, accompanied by high vibration of the turbine and generator. A preliminary inspection of the turbine generator indicated major damage to the main generator and exciter, penetration of the Low Pressure (LP) Turbine #3 exhaust hood, failure of several last stage blades from the north end of LP3, and damage to bearing covers. The Turbine-Generator Assessment Team (TGAT) was assembled to determine the root cause of the event and direct the MTG restoration. This document is the group's plan for accomplishing that mission. Contents include group goals, pre-planning and organization, instructions for damage assessment, root cause analysis, determination of remedial and corrective actions to prevent recurrences, and plans for implementing and monitoring machine restoration.

INITIAL TURBINE-GENERATOR DAMAGE ESTIMATE

The TGAT initially assessed the damage to the Turbine, Generator and Exciter by visual inspection in addition to observing pictures and videos. The damage observed includes the following:

Turbine

- Hole in LP3 Casing
- LP3 Last Stage Blade Failure
- Steam Seal Damage
- Bearing and Coupling Cover Bolting Damage
- Lube Oil Piping Damage
- Instrumentation Damage

Generator

- Generator Damage
- Exciter Damage
- Bearing 10 & 11 Damage
- Exciter Coupling/Bolt Damage
- Fire Damage

An initial estimate of outage duration is at least six months,with an update to the estimate to be provided after initial entry into the turbine and generator for damage assessment.

INTRODUCTION

Restoration of the Fermi 2 MTG to full operating capacity following the December 25, 1993 event will be an arduous undertaking involving initial damage assessment, data gathering and analysis, determination of root cause and corrective action to prevent recurrence, implementation of corrective action and follow-up to confirm the success of the corrective action. Successful completion of these tasks in a timely manner will require the coordinated, planned and structured input from several engineering disciplines, equipment specialists, GEC and other MTG manufacturers, and consultants specializing in power equipment. To assure successful completion of these tasks, a team was formed to develop and implement an action plan.

To manage this undertaking, the Turbine Generator Assessment Team was formed. Careful thought was used by L. C. Fron, the Team Manager, in establishing the membership and organization of the team. It was recognized up front that the Team focus would change as the restoration project progressed and that a critical factor in the Team's success will be a thorough, well thought-out action plan. To assure the that the Team would have a broad focus, J. D. Black, Supervisor of Metallurgy, NDE and Welding, Technical and Engineering Services, who would not be biased towards a root cause in the generator or the turbine, was selected as Chairman. This selection would also leave Fermi 2 Turbine Group personnel available to handle the many immediate tasks associated with establishing plant safety, initial damage assessment and information collection. Upon completion of the Action Plan and as material analysis and machine disassembly begin, Team direction will be shared with D. B. Smith, Supervisor of Turbines and Auxiliaries, Technical and Engineering Services freeing the Chairman to concentrate on material analysis, root cause analysis and determination of corrective action to prevent recurrence. As the restoration project evolves, it is expected that the Chairman will chair a Steering Committee which will oversee the Team's efforts and provide general guidance. Special tasks such as root cause analysis will be led by an individual trained and experienced in that task. The Team membership includes non-Fermi 2 personnel to assure that an independent, non-plant perspective is provided. Permanent Team members and a Functional Organization Chart are presented in Attachment 6.2. This membership will be augmented with DECo or external personnel on an as-needed basis.

Turbine-generator work will be controlled through the use of an Action Plan. The Action Plan will provide sufficient detail to assure that evidence required for root cause analysis is not lost or destroyed but will allow a logical approach to inspect and dismantle the turbine, generator, exciter and associated systems. Instructions will be written to cover required work activities. The general plan of approach is that, upon lifting of the quarantine, an initial entry will made to perform an overall assessment and to collect,

identify, and store loose parts. External inspections of the turbine, generator and auxiliary systems would then follow. These would be followed by internal inspections through hatches, the condenser and other access points. After evaluation of the external and internal inspection results with special emphasis on personnel safety and preservation of potential evidence for root cause analysis , disassembly will begin. Part documentation and controls will be in effect as long as necessary.

For consistency, instructi ns will be written in the format described in Attachment 6.6. Each Instruction will be added to the Action Plan using a sequential numbering system. This use of discrete Instructions allows the Team to proceed in an orderly, controlled manner and to build a knowledge base as work progresses. Except for initial access activities, the Instructions will be implemented through the normal Work Package process which will make use of previously approved procedures, technical manuals, tests, etc. The use of the Work Package process will ensure proper work control measures so that the safety of the plant and personnel will be maintained. The TEAM will work with the work control group to ensure that the details of the Instructions are included in the Work Package.

Typical instructions to be written and to be included in Attachment 6.6 include:

- Instruction Preparation
- Access Control
- Documentation Control
- Parts Control
- Collection of Loose Parts
- External Generator Inspection
- External Turbine Inspection
- Internal Generator Inspection
- Internal Turbine Inspection
- Collection of Loose Parts in the Condenser
- Generator Disassembly
- Turbine Disassembly

Note: The Turbine and Generator specific Instructions also include auxiliary systems.

1. ORGANIZATION AND PLANNING

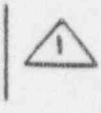
A. Determine Mission Statement

B. Determine Team Members

1) Identified by Task Manager (Refer to Attachment 6.2)

2) Augment as Necessary

C. Identify Outside Sources for Assistance (Refer to Attachment 6.3)

D. Develop Methods for Tracking, Controlling and Preserving Evidence (Refer to Attachment 6.9) 

1) Develop tagging system using information tags with central log.

2) Log to include ID number, location found, description and current location if relocated.

E. Establish Evidence Storage and Inspection Locations

1) Physical evidence storage areas (Contaminated and Non-Contaminated)

2) Document and Data Storage

3) Staging Area for Inspection (Contaminated and Non-Contaminated)

4) Warren Service Center Locations

F. Establish Action Item Tracking Program

2. DAMAGE ASSESSMENT AND INFORMATION GATHERING

A. Identify Specific Information Required (Refer to Attachment 6.5, List of Required Information)

B. Collect Information

1) Assign responsibility for gathering specific information to a designated group or person.

2) Assemble gathered information in the document and data storage area.

C. Determine How to Identify Extent of Damage

1) Develop inspection and physical evidence evaluation guidelines for loose components/parts.

2) Develop inspection guidelines for MTG damage prior to disassembly.

3) Review and modify MTG disassembly procedures for safety, physical condition and preservation of failure evidence considerations.

D. Determine Extent of Damage

1) Obtain preliminary damage assessments from vendors (G.E.C., General Electric, etc.) 

2) Obtain evaluations associated with MTG and associated systems plant walkdowns.

3) Perform TGAT inspection of MTG and auxiliary system areas (Refer to Attachment 6.4, General Guidance for Initial Access and Initial Inspection of MTG Areas).

4) Perform pre-inspection and physical evidence evaluation of loose parts prior to removal.

5) Perform inspection of MTG damage prior to disassembly.

6) Issue modified MTG disassembly procedures which includes controlled disassembly (input to work packages)

7) Controlled disassembly
   Dimensional checks
   NDE
   Metallurgical samples
   Etc.

8) Provide input to sequential disassembly based on inspections.

9) Identify and maintain control of equipment.

10) Evaluate material samples.

11) Evaluate components for return to service (repair/replace).

12) Account for all parts/pieces.

E. Analyze Data

3. ROOT CAUSE ANALYSIS

The Team will use a systematic method for determining contributing and root causes for the main turbine generator failure. A combination of Fault Tree, Kepner-Tregoe and Event Causal Factor Charts will be used ensuring the inclusion of:

A. Development of an accurate problem statement.

B. Characterizing the problem, including what, where, when, magnitude, and failure modes.

C. Analyses to determine potential causes, contributing factors and failure scenarios, including sequence of events.

D. Determination of most probable cause(s).

E. Verification and validation of root cause.

F. Identification of other structures, systems and components with potential susceptibility.

The scope of approach will include: equipment failure, human performance, and organizational/programmatic contributing factors. The Team will publish results for internal review and approval, as early as practicable.

4. CORRECTIVE ACTIONS

The Team will identify options and recommend corrective action(s) to prevent recurrence of the event.

The Team will also identify options and recommend actions to repair, replace, and reassemble damaged system structures and components associated with the main turbine, generator and auxiliaries.

Plans for implementation of corrective action(s) will include short- and long-term methods (including measures and criteria) for evaluating the effectiveness of corrective action(s).

5. INTERFACE CONTROL/PROTOCOLS

In carrying out its mission, the TGAT will comply with corporate and Nuclear Generation policies, procedures and practices. Where an activity is identified which is not addressed by existing policies, procedures or practices, the Team will propose resolution to the TGAT Manager and will proceed with the activity upon approval.

In particular, field work will be conducted in accordance with work control and barrier and protective tagging procedures. Interfaces with external agencies such as NRC, INPO, insurers; will be in accordance with Fermi Management Directive FMD-RA-1 (Interfacing with Regulatory Agencies and Industry Organizations); and the NRC Confirmatory Action Letter associated with the December 25, 1993 event.

A meeting will be conducted between the TGAT and the AIT to develop interface and coordination details including items such as contacts for specific activities, briefing frequency, activities requiring joint participation, hold points and quarantine requirements imposed by Detroit Edison and the NRC.

Initial Damage Assessment

An initial estimate of outage duration is at least six months, with an update to the estimate to be provided after initial entry into the turbine and generator for damage assessment. 

Team Membership

Manager: Leonard C. Fron, PE, Section Head, Turbine Group, Fermi 2

Chairman: Jonathan D. Black, Supervisor, Metallurgy, NDE and Welding, TES

Co-Chairman: David B. Smith, PE, Supervisor, Turbines and Auxiliaries, TES

TES Members:
R. J. Corkins, PE, Rotating Electrical Equipment Engineer
L. G. Fron, Senior Engineer, Vibration/Stress Analysis
J. R. Mullens, NDE Engineer, ASNT Level 3
Y. S. Qandeel, Senior Engineer, Turbine Specialist
R. N. Stephens, Principal Engineer, Rotating Equipment
J. I. Uicker, PE, Senior Engineer, Turbine Specialist

Fermi 2 Members:
W. D. Ackerman, PE, Senior Engineer, Plant Engineering
R. M. Baum, Supervisor, Radiation Protection
R. D. Blair, Scheduler
J. Caffrey, Turbine Group, Generator Specialist
K. W. Dahm, Turbine Group, I&C Specialist
P. K. Hudson, Turbine Specialist
A. J. Hickman, Ombudsman
B. J. Stone, ISI/PEP Group
R. L. Tassell, Senior Engineering Tech, Plant Engineering
G. M. Trahey, Principal Engineer, ISEG
F. T. Wszelaki, Senior Engineer, Fermi 2 Turbine Specialist

Detroit Edison Legal Department Representative:
S. M. Carpman, General Attorney

GEC Representatives:

E. Bright, Generator Service Engineer
S. Elliott, Technical Services Engineer
D. Llewellyn, Turbine Erector

TGAT Rev. 0

TURBINE-GENERATOR ASSESSMENT TEAM - Functional Organization

L. C. Fron - Manager

Jon Black - Chair
Dave Smith - Co-Chair

Steering	Generator	Turbine	Doc Control	Planning, Scheduling, Work Package Prep and History	Root Cause Analysis	Radiation Protection
Jon Black*	**Joe Caffrey***	**Paul Hudson***	**Roger Tassell***	**Robin Blair***	**George Trahey***	**Randy Baum***
George Trahey	Ronald Corkins	Bill Ackerman	Chris Klug			
Dave Smith	Kevin Dahm	Frank Wszelaki				
Al Hickman	Roger Stephens	Al Thorn				
Len Fron, Jr.	E.B. Bright, GEC	Yousef Qandeel				
James Mullens		James Uicker				
S. Elliott, GEC		D. Llewellyn, (GEC)				
Team Leads						

*Denotes Lead Responsibility

Attachment 6.2

Potential Outside Sources

1. Westinghouse
2. Siemens
3. ABB
4. General Electric
5. GEC
6. Salem Contact
7. Failure Prevention International
8. Maurice Adams (Consultant Turbine Failure and Damage Assessment)
9. Larry Gifford (DECo retiree, Rotating Equipment Expertise
10. MD&A
11. MTI
12. TVA
13. Kori
14. Southern California Edison
15. Ralph Ortolano

General Guidelines for Initial Access and Initial Inspection of MTG Areas

1. Establish access control: TGAT to define and present to Management.
2. Conduct visual walk thru (hands off).
3. Document/describe loose pieces and external damage including status of instrumentation.
4. Quality Assurance (QA) verification
5. Collect physical evidence, catalog, and transfer to controlled storage.
6. Clean-up area.
7. Prepare for internal MTG inspections.

Initial List of Required Information

1. DVA (Digital and Analog)
2. Timeline
3. Normal Operating Data
4. Traces (Charts)/Plant Comp.
5. Sequence of Events
6. System Data (SOC)
7. Operator Debriefings
8. List of Damaged Parts
9. MTG Operating and Maintenance Procedures
10. Turbine MTG (Manufacturing) History (Maint.)
11. History of Similar MTGs
12. History of Similar Events
13. MTG Cross Section and Drawings
14. Operating History (stops/starts)
15. Turbine Operating Tests/Surveillances
16. Alarm & Trip Logic
17. Instruction Books
18. Generator Relaying
19. Check Status of PCC on December 25.
20. Determine unique operating requirements.
21. Control Room Log and NSS Log
22. Operator Round Sheets
23. PEP (Performance Evaluation Program) Data
24. Abnormal Line-up Sheets
25. Current (latest) Functional System Description (FSD) for Turbine and Generator/Training Material
26. Torsional Vibration Study (DER 93-0101)
27. Survey of As-Found Turbine Pedestal Elevations
28. DER's

Instruction for Writing Instructions

1.0 Purpose

This section should describe the purpose of the document, and the purpose of the action to be taken.

2.0 - Scope

This section defines:

2.1 Boundary of systems and/or equipment involved.

2.2 Boundary of work activities to be included.

2.3 Specific exclusions.

3.0 Assumptions

3.1 Describe the basis for planning the work steps, such as assumed damage.

3.2 Describe any special circumstances.

4.0 Prerequisites, Precautions and Limitations

4.1 Personnel safety concerns

4.2 Evidence preservation concerns

4.3 Prerequisite major activities. Where does this activity fit in the overall scheme?

4.4 Initial Conditions

4.4.1 What initial setup is required (e.g., valve lineup, access points)

4.5 Approvals - What approvals are required before starting this activity (e.g., TGAT, Plant Management, RP, NRC, etc.)

4.6 Reference Documents

5.0 Personnel

What skill levels and numbers are required to complete the task. Suggested personnel may include:

5.1.1 Lead Engineer
5.1.2 Equipment specialist
5.1.3 OEM representative
5.1.4 Craft
5.1.5 Photographer
5.1.6 Rad Protection Technician
5.1.7 QA

6.0 Activity Steps

6.1 Describe activities to be performed, step-by-step. Refer to applicable sections of reference documents, if appropriate. Include measurements to be taken, or other data to be collected, hold points, inspection points, acceptance criteria for decisions, and contingency plans.

6.2 Revisions

6.2.1 Identification draft copies of instructions should be lettered sequentially (1E Draft A) and labeled Draft on each page. The original, first-issue approved copy shall be Revision 0; subsequent revisions shall be numbered (e.g. Revision 1).

6.2.2 Page revisions shall be identified with a bar on the right - hand margin with rev. number. 

7.0 Documentation

7.1 Describe data sheets, log sheets, etc. that are part of the instruction.

7.2 Describe disposition of documentation.

7.3 Approvals

7.3.1 Instructions shall have the name and signature of the writer and date.

7.3.2 Instructions shall be approved by the TGAT Manager, with his signature, and date.

Prepared by: D. B. Smith Date: 1/14/94

Approved by: L. C. Fron Date: 1-14-94

Approved by: R. McKeon (for telecon) Date: 1-14-94

TGATI-1, Rev. 0

Instruction for Turbine Generator Personnel Access Control

1.0 Purpose

Establish control of personnel access to the turbine generator and main condenser, as required for assurance of personnel safety, and control of parts, evidence and work.

2.0 Scope

This document covers the time frame from lifting of the Plant Manager imposed quarantine for Turbine Generator Assessment Team activities and required NRC agreement until the machine is reassembled and ready for operation. The areas include the first, second and third floors.

3.0 Assumptions

This instruction is in addition to normal site access control requirements for radiation protection and site security.

4.0 Prerequisites, Precautions and Limitations

4.1 Quarantine of the turbine generator as imposed by the Confirmatory Action Letter is lifted.

4.2 The Team Manager's and Plant Manager's approval are obtained prior to all relocations of the yellow barrier rope.

5.0 Personnel

Site security personnel as required. (Notify Security prior to entry into the quarantined area.)

6.0 Activity Steps

Turbine Building Generator Area Third Floor

6.1 Initial access

6.1.1 Yellow barrier rope will be installed to control access to the turbine generator and condenser on the first, second and third floor areas where debris and/or oil is located.

6.1.2 Security person(s) will be assigned full time to the third floor areas to control access. Access to second and third floor is controlled by NSS and authorized work packages.

6.1.3 A list of personnel permitted to enter the controlled area(s) will be provided to Security by L. C. Fron. Persons will be added to the list with the approval of the NSS, L. C. Fron, P. Hudson, J. Caffrey, or J. D. Black.

6.1.4 Other areas containing known debris will also be rope barriered.

6.1.5 Removal of parts from the area will be per TGATI-3.

6.2 Cleanup and inspection phase.

6.2.1 Yellow barrier rope will be installed to exclude access to the immediate turbine generator and condenser. The intent is to permit normal access to as much floor area as possible for cleanup but exclude access to the machine except for approved personnel.

6.2.2 Provisions of 6.1.2 through 6.1.5 also apply.

6.3 Disassembly and reassembly phase.

6.3.1 The Lead Turbine Engineer and the Lead Generator Engineers-shall make recommendations on the need for access control, boundaries, and barriers, to be approved by the Team Manager and the Plant Manager.

6.3.2 Activities, etc. will follow 6.1.2 through 6.1.4 if access control is maintained..

6.3.3 Activities will follow 6.1.5

Prepared By: J. D. Black for D. B. Smith Date: 1/11/94

Approved By: Leonard C. Fron L. C. Fron Date: 1-11-94

Approved By: R. McKeon R. McKeon Date: 1/11/94

TGATI-2, Rev. 0

Instruction for Document Control

1.0 Purpose

Develop a controlled method of logging, tracking and preserving documents required in the process of Root Cause Analysis for the December 25 1993 turbine/generator event.

2.0 Scope

This instruction addresses the following items:

2.1 Establishment of a unique numbering system for each document.

2.2 Establishment of a file storage area and filling system.

2.3 Establishment of a computer based logging and tracking system.

2.4 Establishment of an approval process for releasing certain obtained documents.

3.0 Prerequisites, Precautions and Limitations

Establish an interim listing of documents until the computer base program is in place. The interim listing will number the documents numerically, identify description, date received, storage locations and who submitted the document and also, will track if an outside agency has received a copy of the document or if the original has been signed out.

4.0 Activity Steps

4.1 Document Numbering: Each document will be assigned a unique number having a standard prefix of TGAT-D followed by a four-digit numerical sequence number. EXAMPLE: TGAT-D0001.

4.2 Storage Area and Filing

4.2.1 The TSC conference area located on the first floor of the OBA will be the designated area for storing the documents. The documents will be maintained in files, storage cabinets, boxes, etc. depending on type of documents. Depending on the content, the cabinets may be locked to preserve evidence for determining root cause.

4.2.2 The documents will be filed in numerical order base on its unique assigned document number and not by subject. The exact location, files, cabinets, boxes, etc., will be determined by the type of document. The computer based logging and tracking program will indicate location.

4.3 Computer Base Logging and Tracking

4.3.1 As a minimum, the data ba[illegible] will tabulate the following information:

- The unique assigned document number.
- The document description, including its own document number and revision level if applicable and subject.
- The date the document was received by TGAT.
- The person or group that submitted the document to TGAT.
- The type of document, such as; pictures, drawings, System walk downs, equipment walk downs, DER's, recorded plant process data, operation logs, etc.
- The location of the document, file, cabinet, etc.
- If a copy of the document has been given to the NRC or to an organization other than Detroit Edison.
- If an original document is required to be lent out, then the date issued, the recipient's name and the date required back will be logged. Also the recipient will sign for the document on the document tracking form. If possible a copy of the document will be kept on file.

4.3.2 The computer program has the capability of sorting within each field from typical information provided on the input forms, see attachment 1. Standard type searches will be; type of document, outside agencies receiving copies or requested originals, originals signed out, restricted information, date recovered and person or entity submitting document. In addition,, key word searches will be available.

4.3.3 Inputting the documents into the data base will be accomplished by having the person submitting the document fill out a standard form with all the necessary information. A standard form will also be used for inputting information related to tracking information being disseminated; see attachment 1 for information required on the forms.

5.0 Document Approvals and Documentation Required for Releasing Information

5.1 Draft, preliminary or restricted information received shall not be released to organizations outside of the TGAT group without L. C Fron, J. Black or their designee approval. Release of these documents must be logged in the computer data base indicating who received a copy and who approved it.

5.2 All information provided to the NRC must have a memo transmitting the information. It must identify who the documents are being provided to, the document description, including revision level of the document, if applicable. Copies of the memo should go to J. Tibai, L.C. Fron and the TGAT file as a minimum. The memo may be hand written or typed.

NOTE: If this is a request by someone other than the designated Edison interface with the NRC, approval is required from L.C. Fron or his designee.

5.3 Final disposition and retention of the documents will be determined later and will require approval by L. Fron or his designee.

Prepared By: R L Tassell Date: 1-11-94
R. L. Tassell

Approved By: Lennard C. Fron Date: 1-11-94
L. C. Fron

Approved By: R. McKeon Date: 1/11/94
R. McKeon

Attachment 6.8.1

DOCUMENT TURN OVER FORM

NUMBER	Unique number assigned to each document with "TGAT" prefix
DATE REC	Date received by TGAT
NAME	Name of person/entity submitting document
DESCRIPTION	Description of contents of document, including any Fermi 2 reference number and subject
TYPE	Describes type of document, such as memo, drawing, chart, strip log, etc.
ORIGINAL	Yes/No field indicating whether document is original, such as strip log, or a copy
LOCATION	Specific location where document will be maintained, usually TGAT file cabinet, but large items may be stored elsewhere
RESTRICTED	Yes/No field indicating that dissemination or information should be restricted
CONTENTS	General comments relating to document, including additional information describing contents and subject

DOCUMENT TRACKING FORM

NUMBER	Assigned TGAT document number
RECIPIENT	Name, address and telephone no. of person receiving document, including signature
ENTITY	Entity or agency (NRC, MPSC, Insurers, etc.) receiving document
DUE	Date document is to be returned to TGAT if original is given
RETURNED	Date original returned to TGAT
APPROVAL	Name of person that authorized the dissemination of restricted information, including obtaining their initials.

Attachment 6.8.2

STANDARD TYPE OF DOCUMENTS

This is an initial list of standard documents and associated codes that will be used for inputting the data in to the computer. Addition types will be added as required to allow sorting of specific data.

Document	Code
DER's	DERS
Edison Drawings	
Architectural	EDAR
Civil	EDCV
Electrical	
Schematics	EDES
Wiring	EDEW
FOS	EDFO
Instrumentation	
Schematics	EDIS
Wiring	EDIW
P&ID	EDPI
Mechanical	EDMC
Piping	EDPG
Structural	EDST
Equipment Walk Downs	EQWD
GE Correspondence	GECR
G.E.C. Correspondence	GECC
General Information	GLIF
Information on Similar Events	
Salem	ISES
Other	ISEO
Len Fron's File	LCFF
NRC Requests	NRCR
Operation Logs	OPLG
Pictures	PICT
Plant Procedures	PTPC
Recorded Plant Process Data	RPPD
Root Cause Analysis	RCA
Root Cause Development Data	RCAD
Schedules/Charts	SCHD
System Walk Downs	SYWD
T.E.S. Correspondence/Reports	TESC
TGAT Correspondence/Plans	TGAT
Vendor Drawings	
Electrical	VDEL
Mechanical	VDMC
Piping	VDPG
Videos	VIDO
Work Requests	WKRQ

TGATI-3, Revision 0

Instruction for Turbine-Generator Parts Control

1.0 Purpose

1.1 Perform the following for turbine and generator parts during initial damage assessment and during disassembly:

a. Control collection and removal of parts. The component specialist and metallurgist will have an opportunity to see all parts prior to disassembly and after removal.
b. Document the as-found condition of parts to the extent possible immediately. Further information may be added later.
c. Archive parts providing physical evidence.

2.0 Scope

This instruction describes removal of parts, but does not authorize removal of any parts. This instruction must be used with other work controlling documents.

3.0 Assumptions

3.1 Parts are accessible for visual examination by a metallurgist.

4.0 Prerequisites, Precautions and Limitations

4.1 Quarantine of the turbine-generator as imposed by the NRC Confirmatory Action Letter is lifted for these Turbine-Generator Assessment Team activities.

4.2 Prior to removal of turbine-generator parts from the machine or loose parts, authority must be obtained, normally via work package approval for a particular work scope.

4.3 A controlled, designated parts storage area shall be available, except for large parts which are to be stored in open areas designated for laydown. Also, an area designated for parts which are not required to be saved should be available.

4.4 This instruction does not supersede any plant procedures.

4.5 Radiological controls may be present during performance of this instruction and normal radiological practices and procedures apply.

4.6 Removal of parts from the controlled parts storage area must be logged and properly authorized per this instruction.

5.0 Personnel

The following personnel have responsibilities within this instruction:

5.1 Detroit Edison metallurgist

5.2 Detroit Edison component specialist (Detroit Edison person knowledgeable in the turbine-generator parts)

5.3 Detroit Edison photographer, as required.

5.4 All personnel removing parts initially or subsequently removing parts from the controlled parts storage area.

6.0 Activity Steps

6.1 Prior to removal of parts, a Detroit Edison metallurgist and a Detroit Edison component specialist must authorize removal. This is to provide them with an opportunity to see parts in place, when they deem necessary.

6.2 When possible, photograph the part in place prior to removal.

6.3 Remove the part.

6.4 Perform initial condition assessment.

6.4.1 The metallurgist will perform a visual examination using a low power loupe to evaluate the surface condition/fracture morphology such as ductile or brittle fracture, high or low cycle fatigue or environmentally assisted cracking. A wide field microscope and a portable alloy analyzer may also be used.

6.5 Photograph the part, if desired by the metallurgist or component specialist.

6.6 If the part(s) is loose or damaged, as a minimum, tag, label or mark the part(s) for identification, avoiding fracture surfaces.

6.6.1 Prefix as follows: "T" for turbine parts, "G" for generator parts, "E" for exciter parts, "U" for unknown parts.

6.6.2 Follow with sequential numbering unique for each prefix.

6.6.3 Examples: T-23, G-23

6.7 Place the part(s) in a bag, if desired.

6.8 Complete documentation log (Attachment 1) to the extent possible at the time. The log may be appended later as more information becomes known. Initial and date all entries and changes.

6.9 The part should be moved to the specified storage location according to the following and logged on Attachment 1:

6.9.1 Evidence? Re-use or repair? Location?

Evidence	Re-Use or Repair?	Location?
Y	Y	Controlled area or laydown area (if large)
Y	N	Controlled area or laydown area (if large)
N	Y	Laydown area
N	N	Non-required parts area

6.9.10 Parts shall be logged into and out of the controlled evidence storage area using Attachment 2. Only the Turbine-Generator Assessment Team manager or delegate(s) may authorize removal of parts from the controlled storage area.

7.0 Documentation

7.1 Original log sheets (Attachment 1) shall be attached to the work package.

7.2 A copy of the log sheets shall be provided to the Turbine-Generator Assessment Team chairman.

7.3 A controlled storage area log (Attachment 2) shall be maintained until the area is removed.

Prepared By: _____ Date: 1/11/94
W. D. Ackerman

Approved By: _____ Date: 1-11-94
L. C. Fron

Approved By: _____ Date: 1/11/94
R. McKeon

Parts Condition and Disposition Log

Item #	Part Name	Photograph #'s	NDE Req'd	Met. Exam Req'd	Condition Description, Precautions, and Location Found	Evi-dence	Re-use	Re-pair	Storage Location	Replace-ment Req'd	Initial Date

C = Controlled evidence storage area; L = Floor laydown area; N = Area for parts not required for evidence or re-use.

Controlled Parts Storage Area Inventory Log

Item #	In	Out	Print and sign name	Date	Comments

Instruction for Third Floor Initial Access Plan

1.0 Purpose

To assure that no evidence important to root cause analysis is lost and to expedite clean-up to reduce fire and personnel hazards, perform an initial metallurgical examination, identify to the extent possible, mark and/or bag, and collect and place in controlled storage all loose parts/debris remaining in the Quarantined Area on the third floor following the December 25, 1993 event.

2.0 Scope

Only parts/debris lying loose on the third floor away from the MTG will be collected during this phase. Also included will be attachments (piping, I&C equipment, electrical leads, etc...) that are still attached at one end or the other and which may interfere with clean-up will be evaluated on a case by case basis to determine the most expeditious way to free the area for clean-up. Loose parts/debris lying on the turbine-generator will not be collected at this time nor will any extensive inspection of the turbine-generator be performed at this time.

3.0 Prerequisites, Precautions and Limitations

3.1 All existing Plant Policies and Procedures will be followed.

3.2 An Action Plan covering the over-all Turbine-Generator restoration activity including damage assessment, data and information gathering, root cause analysis, corrective action to prevent recurrence, turbine-generator dissassembly and assembly, and monitoring to confirm corrective action has been developed.

3.3 Access to the third floor Quarantined Areas until completion of the Initial Access and Loose Part Collection will be restricted to Inspection Teams or by recommendation by L. C. Fron and authorization by the NSS and L. C. Fron.

3.4 Crane rails should be walked down looking for loose parts/debris that may pose a safety hazard or be evidence for root cause analysis.

3.5 Two Inspection Teams, one for the Turbine side of the bio-wall and one for the Generator side will be selected. All Inspection Team members shall read the Action Plan referenced in Item 3.2.

3.6 Bags, tags, and markers are to be made available for the Quarantined Area.

3.7 Controlled storage/staging areas which may be temporary have been established.

3.8 Loose parts/debris will be identified to the extent possible, by location, part name, general condition, and significant metallurgical features in accordance with Instruction TGATI-3.

4.0 Implementing Actions

4.1 Select Inspection Teams which may include the following:

TURBINE	**GENERATOR**
* LEAD: Paul Hudson	*LEAD: Joe Caffrey
* DECO Metallurgist	*DECO Metallurgist
* TES Specialist	*TES Specialist
* Photographer	*Photographer
* Quality Assurance	*Quality Assurance
* RP Tech	*RP Tech
*Bagger	* Bagger
*Storage person	Storage person
NRC Metallurgist	NRC Metallurgist
Insurance Metallurgist	Insurance Metallurgist

* Required DECO participants

4.2 Before the initial entry and each morning before Team entry and at the end of each day, a DECO photographer shall video tape the third floor area and the storage areas to monitor control.

4.3 The Initial Entry into the Quarantined Area shall be by the Team Lead and the Team Metallurgist to conduct an initial survey on which to plan the loose parts/debris collection sequence.

4.4 The Team Lead and the Team Metallurgist will exit the Quarantined Area and the Team Lead will brief the rest of the Inspection Team.

4.5 Team members to enter the Quarantined Area will be selected by the Team Lead, all others to remain at barrier until called.

4.6 The Inspection Team will enter the Quarantined Area and begin loose parts/debris examination, collection, and storage following the sequence laid out by the Team Lead.

4.7 Loose parts/debris will be identified to the extent possible by location, part name, general condition, and significant metallurgical features. The loose parts/debris will then be marked, bagged, documented, and stored in accordance with TGATI-3.

4.8 As appropriate, loose parts/debris may be selected for metallurgical analysis before completion of the collection and storage phase. Approval shall be obtained from the Team Manager and Plant Manager before material is removed from site.

4.9 As the collection proceeds, the barrier ropes will be moved to encompass only those areas including loose parts/debris and will eventually be moved up to the turbine-generator.

4.10 Samples for chemical analysis shall be taken from each side of the bio-wall to determine the origin of the patterns apparent.

5.0 Protocol

The Team Lead will have absolute control of the Inspection Team while in the Quarantined Area. Non-DECO participants may examine loose parts/debris with permission of the Team Lead as long as the collection process is not unduly delayed. Under no circumstances shall Non-DECO participants be allowed to take samples during this phase.

6.0 Documentation

6.1 Documentation will be as described in TGATI-3.

6.2 Original log sheets and drawings shall be kept with the work control documents.

6.3 Copies of the logs and drawings will be submitted to the TGAT for evaluation and root cause analysis.

Prepared by: J. D. Black Date: 1/11/94

Approved by: L. C. Fron Date: 1-11-94

Approved by: R. McKeon Date: 1/11/94

GAME PLAN FOR CONDENSER INSPECTION

I. STEAM SPACE CONDENSER-NORTH

ACCESS TO THE CONDENSER STEAM SPACE WILL BE STRICTLY CONTROLLED, AND AUTHORIZED BY F. WSZELAKI, OR P. HUDSON AND NSS.

1. W/R 000Z940968 WAS USED TO OPEN THE TWO 42" MANWAYS DONE BY MODIFICATIONS

2. INITIAL CONFINED SPACE SURVEY WAS UNSAT WITH LOW OXYGEN AND HIGH "LEL" RESULTS RESAMPLE GOOD JAN 10, 1994 1330 AND JAN 11, 1994, 2010.

ESTABLISH VENTILATION BY INSTALLING FANS ON THE FIRST FLOOR, NORTH IN AND SOUTH FILTERED OUT. USE THE ABOVE WORK REQUEST. RADWASTE AND MODIFICATIONS WILL DO.

DO NOT GO PAST OUTLET WATERBOX

SHORT CYCLE WILL HAVE TO BE SECURED TO ALLOW ACCESS TO EAST SIDE OF THE SOUTH END. USE SEPARATE ALS.

3. INITIAL ENTRY WILL BE UNDER W/R 000Z940418. MAINTENANCE TO SUPPORT.

RWP 94-1050 TENTATIVELY REQUIREMENTS WILL BE PLASTICS, WITH NO RESPIRATOR ENTER THROUGH THE 42" MANWAY. OPERATIONS AND RP FIRST IN.

4. VISUALLY INSPECT THE STEAM SPACE FOR THE FOLLOWING:

DEBRIS
TUBE DAMAGE, PAY PARTICULAR ATTENTION TO AREA BELOW THE NORTH EAST 20" MANWAY
INTERNAL DAMAGE, GET PICTURES.
DAMAGE TO THE OVERHEAD, PARTICULARLY LP3 AND EXTRACTION STEAM LINES

FIRST TEAM PLAN IS FOR TWO ENGINEERS, WSZELAKI, AND MCCOMISH TO FOLLOW OPS/RP IN FOR INITIAL INSPECTIONS.

5. SECOND TEAM PHOTOGRAPHER, PE-STRUCTURAL, J. ODONNELL, QA, TURBINE GROUP.

DEBRIS RETRIEVAL WILL BE PART OF ITEM III. REFERENCE PAGE 5-8. INSTRUCTION FOR COLLECTING LOOSE AND ENTRAPPED PARTS/DEBRIS IN THE MAIN TURBINE CONDENSER.

II. WATER BOX TUBE INSPECTIONS

MAINTENANCE/TECH GROUP TO SUPPORT. W/R 000Z935001. CURRENTLY MAINT. IS WALKING DOWN PROTECTION.

1. INSPECT FOR MAJOR TUBE DAMAGE BY GOING INTO THE OUTLET WATER BOXES.

   INSPECT FOR DAMAGE TO TUBES BY VERIFYING LINE OF SIGHT FROM OUTLET TO THE INLET.

   VERIFY THAT DAMS AND LADDERS ARE INSTALLED.

   VERIFY THAT WATER IS BELOW THE TUBE SHEET.

2. PLUG TUBES AS APPROPRIATE. MAINTENANCE

III. SOUTH STEAM SPACE INSPECTION

CAUTION NO ACCESS BELOW LP3!!!

TEMPERATURE AND HUMIDITY WILL LIMIT STAY TIMES IN THIS AREA. SEVERAL TEAMS WILL BE REQUIRED. TEMPERATURE WILL BE 125 F.

BASED ON RESULTS OF THE ABOVE INSPECTIONS, DETERMINE IF LIMITED INSPECTION OF THE FALSE FLOOR AND OUTER EDGE OF TUBE BUNDLES IS APPROPRIATE. HARNESS AND TIE OFF WILL BE REQUIRED TO GO UP AND DOWN THE TUBE BUNDLE.

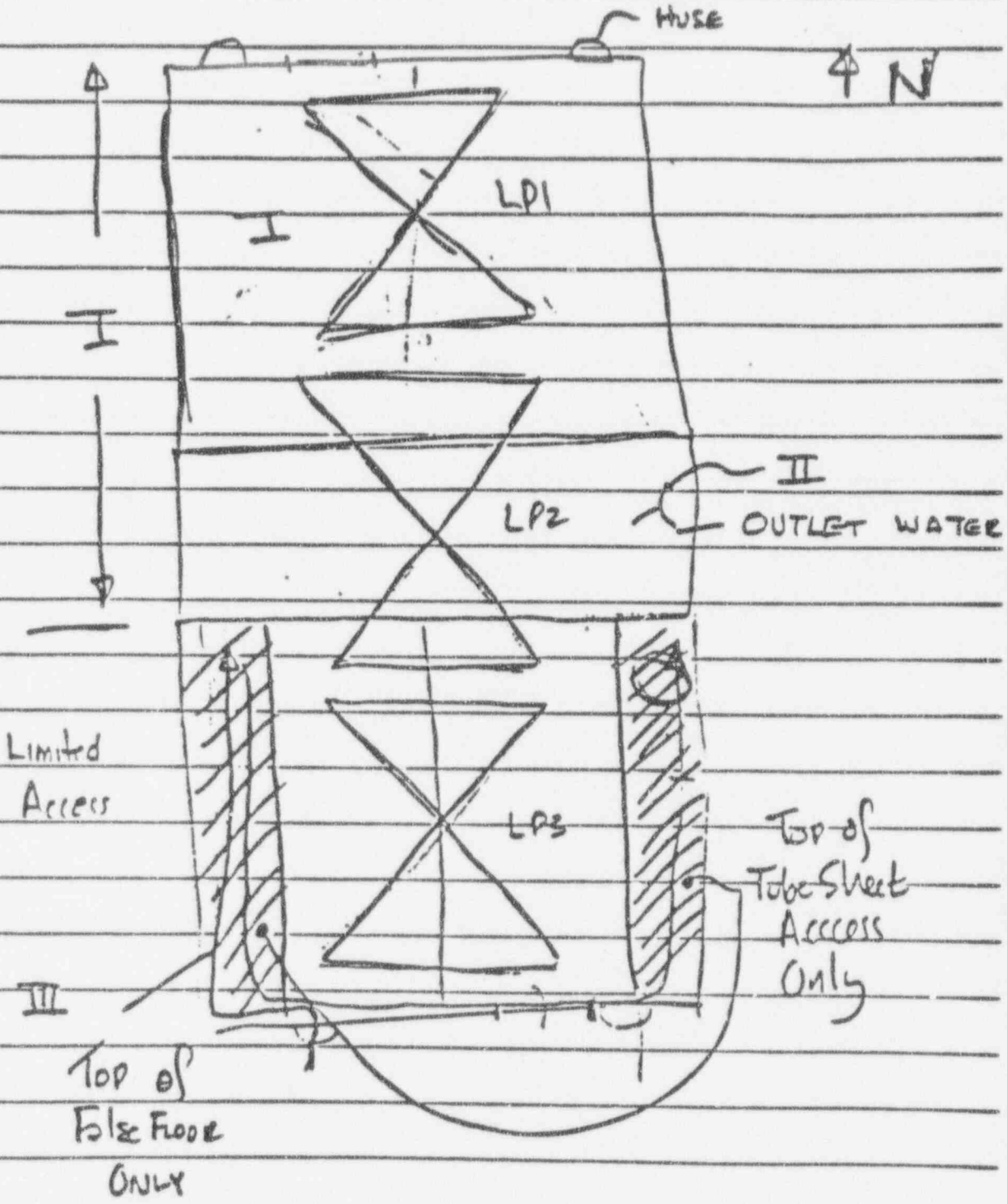
OBTAIN PLANT MANAGER'S APPROVAL, STAY BELOW THE OUTER EDGE OF THE TUBE BUNDLE. INSPECT FALSE FLOOR FOR DEBRIS BY GOING NORTH ALONG THE WEST WALL, RETURNING TO THE SOUTH END, CROSSING TO THE EAST SIDE AND GOING NORTH ALONG THE EAST WALL. DO NOT GO UP THE CENTER AREA BETWEEN THE EAST AND WEST BUNDLE.

PREPARED BY PHIL MCCOMISH AND FRANK WSZELAKI JAN 10, 1994

REVIEWED BY L. FRON L. C Fron 1-11-94

APPROVED BY R. MCKEON R. McKeon

CONDENSER INSPECTION - BY AREA.



Attachment to Condenser Inspection Jan 10, 94
page 5 of 10

Instruction for Turbine-Generator Parts Control

1.0 Purpose

1.1 Perform the following for turbine and generator parts during initial damage assessment and during disassembly:

a. Control collection and removal of parts. The component specialist and metallurgist will have an opportunity to see all parts prior to disassembly and after removal.

b. Document the as-found condition of parts to the extent possible immediately. Further information may be added later.

c. Archive parts providing physical evidence.

2.0 Scope

This instruction describes removal of parts, but does not authorize removal of any parts. This instruction must be used with other work controlling documents.

3.0 Assumptions

3.1 Parts are accessible for visual examination by a metallurgist.

4.0 Prerequisites, Precautions and Limitations

4.1 Quarantine of the turbine-generator as imposed by the NRC Confirmatory Action Letter is lifted for these Turbine-Generator Assessment Team activities.

4.2 Prior to removal of turbine-generator parts from the machine or loose parts, authority must be obtained, normally via work package approval for a particular work scope.

4.3 A controlled, designated parts storage area shall be available, except for large parts which are to be stored in open areas designated for laydown. Also, an area designated for parts which are not required to be saved should be available.

4.4 This instruction does not supersede any plant procedures.

Game Plan for Condenser Inspection
Jan 10, 94
Page 6 of 10

4.5 Radiological controls may be present during performance of this instruction and normal radiological practices and procedures apply.

4.6 Removal of parts from the controlled parts storage area must be logged and properly authorized per this instruction.

5.0 Personnel

The following personnel have responsibilities within this instruction:

5.1 Detroit Edison metallurgist

5.2 Detroit Edison component specialist (Detroit Edison person knowledgeable in the turbine-generator parts)

5.3 Detroit Edison photographer, as required.

5.4 All personnel removing parts initially or subsequently removing parts from the controlled parts storage area.

6.0 Activity Steps

Turbine Building Generator Area Third Floor

6.1 Prior to removal of parts, a Detroit Edison metallurgist and a Detroit Edison component specialist must authorize removal. This is to provide them with an opportunity to see parts in place, when they deem necessary.

6.2 When possible, photograph the part in place prior to removal.

6.3 Remove the part.

6.4 Perform initial condition assessment.

6.4.1 The metallurgist will perform a visual examination using a low power loupe to evaluate the surface condition/fracture morphology such as ductile or brittle fracture, high or low cycle fatigue or environmentally assisted cracking. A wide field microscope and a portable alloy analyzer may also be used.

6.5 Photograph the part, if desired by the metallurgist or component specialist.

6.6 If the part(s) is loose or damaged, as a minimum, tag, label or mark the part(s) for identification, avoiding fracture surfaces.

6.6.1 Prefix as follows: "T" for turbine parts, "G" for generator parts, "E" for exciter parts, "U" for unknown parts.

6.6.2 Follow with sequential numbering unique for each prefix.

6.6.3 Examples: T-23, G-23

6.7 Place the part(s) in a bag, if desired.

6.8 Complete documentation log (Attachment 1) to the extent possible at the time. The log may be appended later as more information becomes known. Initial and date all entries and changes.

6.9 The part should be moved to the specified storage location according to the following and logged on Attachment 1:

6.9.1 Evidence? Re-use or repair? Location?

Evidence	Re-Use or Repair?	Location?
Y	Y	Controlled area or laydown area (if large)
Y	N	Controlled area or laydown area (if large)
N	Y	Laydown area
N	N	Non-required parts area

6.9.10 Parts shall be logged into and out of the controlled evidence storage area using Attachment 2. Only the Turbine-Generator Assessment Team manager or delegate(s) may authorize removal of parts from the controlled storage area.

7.0 Documentation

7.1 Original log sheets (Attachment 1) shall be attached to the work package.

7.2 A copy of the log sheets shall be provided to the Turbine-Generator Assessment Team chairman.

7.3 A controlled storage area log (Attachment 2) shall be maintained until the area is removed.

Prepared By: For W. D. Ackerman Date: 1-11-93
W. D. Ackerman

Noted By: L. C. Fron Date: 1-11-94
L. C. Fron

Approved By: R. McKeon Date: 1/11/94
R. McKeon

Parts Condition and Disposition Log

Item #	Part Name	Photograph #'s	NDE Req'd	Met. Exam Req'd	Condition Description, Precautions, and Location Found	Evi-dence	Re-use	Re-pair	Storage Location	Replace-ment Req'd	Initial/ Date

C = Controlled evidence storage area; L = Floor laydown area; N = Area for parts not required for evidence or re-use.

Attachment 6.11

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Jan 10 90
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Instruction for Turbine-Generator Parts Control

Attachment 2

[illegible] Conduct Inspection Jan 10, 9[illegible] page 10 of [illegible]

Controlled Parts Storage Area Inventory Log

Item #	In	Out	Print and sign name	Date	Comments

FERMI 2

FIRE PROTECTION ACTION PLAN

MARCH 29, 1994

Approval R. McKeon Date 3/31/94

R. McKeon

March 29, 1994

Revision 2 of The Fire Protection Action Plan

Team Manager: Robert J. Kilroy

Team Members:
Mark B. McDonough (Plant Engineering)
Ken Locke (Work Control Group)
Larry Mills (Work Control Group)
Fire Protection Personnel as assigned

Mission Statement:

Maximize the current level of protection afforded by the fire protection program by recovering and restoring both the fire detection and fire suppression systems to their intended design configurations.

Major Actions:

1) Restoration of the Turbine Building sprinklers via Work Request 000Z935226. The work was completed on 12/30/93.
   a) The second floor sprinkler system isolation valve (U8000F004E) which was leaking by, was cleaned and closed (see major action item number 2).
   b) The main Turbine Building sprinkler header isolation valve (U8000F003) was opened and the sprinkler system supply/distribution header was recharged.

2) Recovery of the Second Floor Turbine Building and Pipe Chase Sprinkler System (including that part of the system under the turbine bearings): The work on the sprinkler piping on the second floor area, below the generator, was finished on 2/21/94 via Work Request 000Z935226. **The restoration of the sprinkler piping under the turbine bearings will begin on 06/15/94 and be completed by 06/24/94.**
   a) As detailed below, the following work is being performed in two stages using the Quarantined Area Restrictions found on page 5 of this Action Plan. Note: these restrictions were required by the Senior Resident on 12/29/93.
   b) Erect Scaffolding as required and inspect the system piping and supports for possible damage caused by debris falling down from the generator and turbine bearing areas on the third floor.

2) Recovery of the turbine building sprinkler system (continued)
   c) Repair damaged pipe/supports and replace all fused (open) sprinkler heads with UL Listed heads (replacement sprinkler heads are on site; however piping and support parts requirements, if any, have not yet been identified).
   d) Open valve U8000F004E and recharge the sprinkler system after each piping section is restored.
   e) Perform the required PMT testing for both sprinkler system piping sections and restore the system to operability.

   Note: This sprinkler system was designed to provide automatic spray coverage for both the second floor area under the generator as well as up on the third floor under the turbine bearings. Because the third floor piping cannot be worked on until after the turbine itself is cleared for disassembly, it was intended that the system be divided into two sections with the second floor sprinkler piping being restored as soon as possible, and the third floor piping restored after the turbine is disassembled. Upon completion of the second floor piping repairs, Temporary Modification 94-0006 installed a pipe cap on the line supplying water to the third floor (at column line K-5) to separate the now repaired piping from the then still damaged third floor piping. This allowed the second floor system piping to be returned to service. Once the necessary inspections and repairs have been made to the third floor portion of this system, the cap will be removed and the entire system restored to its original configuration.

3) Recovery of the Hydrogen Seal Oil Unit Deluge System via Work Request 000Z936036: The recovery work and PMT testing was completed with the deluge system itself being returned to service on 01/26/94.
   a) The following work was to have been performed using the Quarantined Work Area Restrictions found on page 5 of this Action Plan. However, this requirement was waived by the Senior Resident on 01/14/94 for this specific effort. The deluge system was photographed on 01/15/94, and its as found condition documented in the work package in case this information was needed for the Root Cause Evaluation of the 12/25/93 Event.
   b) An evaluation was conducted of the deluge system control panel (U80P455) and its associated heat detector circuitry since water intrusion was suspected due to the amount of water and steam released in the vicinity of this system during the 12/25/93 event.
   e) All alarms were verified to be clear.
   d) Using procedure 28.501.17, the required PMT testing for the deluge system was performed.
   e) The deluge system isolation valve (U8000F029F) was opened and the system was restored to operability.
   f) A copy of the vendor manual for this system is being obtained for entry into the ARMS database outside of this work request.

4) Determination if any Zebra Mussels were introduced into the fire protection system piping as a result of the 12/25/93 event: This work was completed on 01/28/94.
   a) The two turbine building fire protection supply headers were drained via Work Request 000Z940014. Drainage was through the supply line drain valves and into a transformer drainage pit adjacent to the building.
   b) The actual check for evidence of Zebra Mussel contamination consisted of using a strainer in the drainage discharge flow from both supply headers. Plus, for additional assurance, a fiber optic probe was inserted into the sprinkler header to look into the piping itself.
   b) No contamination was found in either of the supply headers.
   c) The results of this investigation were reported to Senior Management.

5) Inspection and restoration of the turbine building fire barriers: The inspections began on 01/03/94 and were completed on 01/28/94. **The repair of the damaged seals is in progress and will be completed by 04/29/94.**
   a) The Fire Protection Group (Operations) inspected the Turbine Building fire barrier penetration seals as part of their fire watch patrols to locate and identify damaged penetration seals caused by falling debris/pipe movement.
   b) Work requests are being prepared to have Mechanical Maintenance repair or replace the sixteen damaged fire barrier penetration seals.

6) Repair of the Turbine Building Roof Vents via Work Request 000Z935917: The physical work was begun on 01/05/94 and completed on 01/07/94.
   a) The wood and wire devices holding Eight (8) of the twenty-six (26) Turbine Building Roof Vents closed (installed on 12/25/93 by Temporary Modification 93-0011) were removed.
   b) The open hatches were secured and UL Listed thermolatches were installed in the open vent doors (the replacement parts were received on 1/03/94 via Purchase Order 286862).
   c) The annuciator for the vent alarms cleared and the roof vents were restored.
   d) The Temporary Modification was removed once the work package was closed.

7) Inspection and restoration of the fire detection system (Fire Detection Zone 22) in the Radwaste Building basement: This work was completed on 02/14/94 via Work Request 000Z940685.
   a) The integrity of the formerly submerged fire detection components and alarm circuits were tested for water damage and cleaned/repaired as required. The submerged components were two manual alarm (pull) stations and a remote alarm panel (V82P401).
   b) A functional test of the fire detection system was performed and the system was returned to service. This testing included sensitivity checks for the ionization detectors in Fire Detection Zone 22.

8) Fire Risk Assessment of the Existing Condition: This effort was completed and a formal document was issued on 01/10/94.
   a) A fire protection/personnel safety analysis of the plant(with the main emphasis on the Turbine and Radwaste Buildings) was conducted with respect to the presence of Turbine oil and water in several places.
   b) This analysis also addressed the temporary lack of automatic suppression on the Turbine Building second floor and the Hydrogen Seal Oil Unit along with the lack of automatic detection in the Radwaste Building basement(due to high water level).
   c) This analysis took credit for the high flash point of lubricating oil (430 degrees F) and the lack of any type of ignition source capable of heating the oil to its ignition temperature.
   d) Credit was also taken for both the continuous fire watch patrol and the permanent fire watch assigned to the two inoperable suppression systems.
   e) Finally, the analysis was presented to a third party reviewer for a peer review.

Miscellaneous Actions:

1) Matt Murtha (fire Protection Engineer for the Davis-Besse Plant) conducted a peer review of both this Action Plan and the Fire Risk Assessment (Major Action Item number 8) on 01/06/94. Both documents were found to be acceptable.

2) The Site Fire Protection Engineer is conducting inspections of on going work activities to ensure that no unsafe practices/conditions exist.

3) The System Engineering Group issued Temporary Modification number 94-0006 on 02/10/94 to allow the capping off of the turbine building second floor sprinkler system as described in Major Action Item 2.

4) The Site Fire Protection Engineer provided support as required to the various audit and inspection teams to assist them in their determination of the root cause of the 12/25/93 event.

5) All material purchased as part of the fire protection system restoration effort is being identified to the insurance claim coordinator for reimbursement.

6) The Fire Protection Group (Operations) inspected, and replaced as necessary, the fire hoses and portable fire extinguishers in the Radwaste Building as the area became accessible for work.

7) Fire protection Engineering support was provided to the Modifications Group to support their Turbine Building HVAC system restoration effort.

Quarantined Area Restrictions

1) The area must be released for work by the Plant Manager and the Commission. Documentation of this release shall be documented in the work package itself.

2) Work Packages for this area will be reviewed by the Senior Resident or his designee prior to their implementation.

3) Compliance to these restrictions will be verified by a member of the Quality Assurance organization.

4) Before any component (panel, pipe, detector, sprinkler, etc.,) can be opened, moved, repaired, or replaced, its as-found condition will be documented in writing and a photographic record of that as-found condition will be made.

5) After a component has been moved or worked on, its new condition will also be documented and a photographic record of that new condition made.

6) Any and all readings and measurements taken with respect to electrical circuitry/components will be documented.

7) The disturbance of equipment and debris is to be minimized.

8) Any components removed shall be placed in a plastic bag and provided documentation as to what it is and exactly where it came from.

9) Adequate controls are to be in place to assure that these instructions are passed on in their entirety during shift turnovers.

FERMI 2

B3105F031B REACTOR RECIRC PUMP "B" DISCHARGE VALVE DUAL INDICATION

LER RESPONSE TEAM

JANUARY 13, 1994

APPROVAL Robert McKeon 4/14/94

Robert McKeon Date

B3105F031B REAC. RECIRC. PUMP B DISCHARGE VALVE DUAL INDICATION
LER 93-015 / DER 93-0701
LER RESPONSE TEAM

Team Leader: Leon B. Collins / Quang H. Duong (Acting)
Team Members:

Plant Engineering:	Joel Melito
Technical Engineering:	Robert Slottke, Mark Kluka
Safety Engineering:	Jack Fischer
Maintenance:	Dan Thomas, Ed Cavey
Licensing:	Joe Pendergast
Operations:	Hal Higgins

Support:
Warren Service Center T&ES Test Lab.
Leonard Kantola, Outage Management

Mission Statement:
Determine findings and conclusions and recommend corrective actions.
Determine root cause(s) and recommend actions to prevent recurrence.

Actions:
1- Physically verify the status (open/close/mid-position) of the valve once drywell is accessible.
2- Troubleshoot to determine the cause of: a) dual indication and b) why the valve would not move in either direction.
3- Recommend remedial corrective actions
4- Analyze data to determine the cause(s).
5- Review conditions of the recirc. line during and after the transient of Turb./Gen. event and when trying to close the valve on Sunday 12/26/93.
6- Review previous events: Work history, past DERs, LERs, GE, NPRDS as applicable:
   - On F031B
   - Similar type of problems (wiring-related) on Limitorque operators.
7- Review past performance of the valve: surveillance testing and response time tests.
8- Determine root cause(s) and recommend actions to prevent recurrence.

Approved by: Robert McKeon Date: 1/5/94
Robert McKeon
Plant Manager

QHD/010494

Status of Actions

1 & 2 & 3. Physical verification , troubleshooting and remedial corrective actions:

- o Drywell entry was made c Tuesday 12/28/93: Valve was approximately 2/3 opened.
- o Opened up the Limit Switch compartment cover to discover that 3 internal wires (jumpers) broke off from the lugs which were terminated on the LS upper fingerboard. These wires disable both the open and close coil circuits.
- o Re-lugged wires and landed on respective terminals. No other discrepancies found. Re-installed LS compartment cover. Meggered satisfactory the control circuitry. Manually stroked valve approx. 5% closed, very smooth and easy to stroke. PMT satisfactory.
- o Valve is stroked closed and declared operable. At 0230 hour on Wednesday 12/29/93, NSS cleared LCO 93-482A on Loop Select logic.

4- Analyze data to determine the cause(s)

- o The broken lug was sent to T&ES for testing. Findings on 12/30/93 were inconclusive and preliminary. Needed additional samples.
- o On Friday 12/31/93, re-opened the LS compartment cover, replaced 4 wires and lugs (3 previously broken wires/lugs and 1 undamaged wire/lug in same area/ condition). Sent all wires and lugs removed to T&ES Lab for analysis. Additionally sent new samples made of Okonite and Rockbestos wires and lugs to T&ES for analysis and comparison.
- o Awaiting for results.

5- Review conditions of the Recirc. line.

- o In progress.

6- Review previous events:

- o Work history: No similar failure. Stroked 5 times in 1993. Last successful stroke was on 9/19/93.
- o DERs: One wiring-related failure. See LER.
- o LERs: One wiring-related failure. Failed to stroke closed twice in August 1988. Cause of first failure: 3 of the 4 connections on the TS loose. Causes of the second failure: 1) TS incorrectly set and 2) TS improperly installed resulting in pre-loaded condition.
- o GE/BWR plants: In progress.
- o NPRDS: In progress.
- o Limitorque experience: In progress.

7- Review past performance: Stroke times are all within acceptance criteria. Line B vibrates more than line A. Action completed 12/28/93.

8- Root cause(s) and CATPR: In progress.

FERMI 2

AREA CLEAN UP ACTION PLAN

JANUARY 13, 1994

Approval Robert McKeon 1/14/94
Robert McKeon Date

Area Cleanup

TEAM MANAGER: D. Pettinari

TEAM MEMBERS

Jon Carter
Bryan Weber
Ed Kokosky
Shaun Ohern

Mission Statement: Restore the plant areas to original condition. Minimize radwaste generation during cleanup.

Actions:

1. Cleanup oil and water on lst and 2nd floor of the Turbine Building.
2. Collect oil/water waste for offsite processing.
3. Install oil processing skid in OSSF.
4. Collect oil in polymer boxes for offsite processing.
5. Recover Radwaste in Turbine basements.
6. Support drawing of tanks and lines.
7. Prepare to and clean CST and Hotwell as necessary.
8. Support Turbine Group to clean areas as they are available.
9. Establish method to handle large volumes of solid waste (i.e. metals) which are generated during cleanup.

FERMI 2

NUCLEAR FUEL CONCERNS

April 5, 1994

Approval G. Smith 4-5-94 Date

Approval R. McKeon 4-5-94 Date

NUCLEAR FUELS CONCERNS

TEAM MANAGER: G. SMITH
TEAM MEMBERS
REACTOR ENGINEERS
NUCLEAR FUEL ENGINEERS

Mission Statement

I. Verify fuel reliability is satisfactory for Reactor Startup and for power operation

II. Determine correct core design loading for Cycle 5

III. Determine Startup Testing Requirements

I. **Fuel Reliability Actions:**	Completion Date
1. Contact other plants known to have had serious chemical intrusions in the reactor vessel:	
a. Contact the Hatch, Millstone, and Brunswick plants.	Completed
b. Evaluate the fuel reliability impact of the chemical intrusion at the 3 plants.	Completed
c. Evaluate potential relevancy to Fermi 2's fuel situation.	Completed
2. Continuously monitor reactor temperature and water chemistry.	
a. Evaluate potential short and long term fuel reliability impact of reactor water impurities.	Completed
b. Share data and work with GE to help with these evaluations.	Completed
c. Share information with S.M. Stoller who will independently assess the short and long term impact on fuel reliability.	Completed
3. Fuel sipping to find the fuel bundle that failed near the end of July, 1993:	
a. Will be performed after core offload as originally planned.	
b. The number of fuel bundles to be sipped should <u>not</u> be changed due to the turbine-generator incident.	
c. After sipping, a GE irradiated fuel inspection, similar to those done during RF01 and RF02, should be considered. GE will submit a proposal for a contingent irradiated fuel inspection.	Completed
d. Nuclear Fuel will make recommendations regarding an irradiated fuel inspection based on the evaluation described in Tasks #1 and 2 above. If an irradiated fuel inspection is to be performed, Nuclear Fuel and GE will mutually agree upon the scope of the inspection, i.e. - which bundles and which rods within bundles are to be inspected.	Completed

4. Continuously monitor fuel pool water chemistry for new fuel:

a.	The shipment of the new 228 GE11 fuel bundles to Fermi 2 will be delayed to January 25, 1994.	Completed
b.	New fuel receipt date changed to February 15, 1994.	Completed
c.	The new bundles will not be channeled and placed into the fuel pool until the pool chemistry is confirmed to be in an acceptable condition.	Completed

II	**Core Design Loading Actions:**	Completion Date
1.	Compare DECO and GE Core Physics Codes to obtain a method to better predict eigenvalue characteristics.	
a.	Provide GE SIMULATE-DE thermal hydraulic inputs for Cycle 4 to help diagnose GE PANACEA modeling deficiencies.	Completed
b.	Conversion back to older CASMO/SIMULATE-DE methodology and document benchmark report.	Completed
c.	Comparison of Cycle 5 GE Design Basis Fuel Cycle Schedule with SIMULATE-DE.	Completed
d.	Document GE PANCEA methodology and benchmark report.	2/04/94 (5/05/94)
e.	Recommend to GE the Cycle 5 eigenvalue characteristic curve for Fermi. Items b, c, and d will be used to assist in evaluating and generating these characteristics.	Completed
f.	Letter addressing SIMULATE-DE weaknesses, code enhancements, and identify work schedule for these enhancements.	Completed
g.	Executive summary of both SIMULATE-DE and PANACEA benchmarked methodologies.	2/18/94 (5/07/94)
h.	Trip to GE to assess progress in Cycle 5 Design Control Audit responses and eigen value characteristics.	Postponed until Mid-summer
i.	Implement enhanced SIMULATE-DE code.	7/31/94
2.	Three different cycle lengths (12 month, 18 month, and 24 month cycle) have been established. This provides more operating flexibility and the ability to return Fermi to a Spring and Fall outage schedule quickly. Key unknowns are the proposed Cycle 5 startup and shutdown dates. Plan of Action is based on Cycle 5 Startup date of 7/1/94.	
a.	Assess different cycle lengths and determine Cycle 5 revised energy requirements.	Completed
b.	Inform GE of revised energy requirements and operating strategies.	Completed
c.	Obtain from management Startup dates. Revised GE work schedule accordingly.	Completed
d.	Obtain from GE detailed proposal for Cycle 5 reload licensing rework.	Completed
e.	Obtain from GE final core loading pattern	Completed
f.	Obtain from GE revised reload licensing report.	5/15/94

g.	If necessary, obtain from GE detailed proposal for Cycle 5 safety analysis	5/01/94
h.	Obtain OSRO approval of COLR, 50.59 Safety Evaluations, and UFSAR updates.	6/15/94
i.	Submit COLR to NRC before startup of Cycle 5	6/30/94

3. Changes in BOP plant configurations (turbine modifications) may impact transient analysis inputs for Cycle 5 redesign. These parameters would need to be assessed and provided to GE by January 31 to support a July 1 startup.

a.	Assess transient analysis inputs for reload licensing analysis. Key parameter is turbine configuration for Cycle 5.	2/21/94 (4/15/94)
b.	Provide GE revised parameters.	2/28/94 (4/22/94)

FERMI 2

SYSTEM LAY-UP ACTION PLAN

JANUARY 13, 1994

Approval _____ _____
Robert McKeon Date

SYSTEM LAY-UP

TEAM MANAGER: P. Lovallo

Mission Statement: Provide recommendations to:

A. Minimize corrosion product formation and transport to plant systems.
B. Minimize interference with required outage activities.
C. Preserve plant component integrity.

Action Plan

1. Before any routine lay-up activities begin, establishment of "normal" water chemistry condition is prerequisite (ex: Draining a system with aggressive species depositing on the surface does not fulfill the mission).
2. Once individual systems are returned to normal conditions, Chemical Engineering will recommend the necessary actions be implemented. Those items marked with an asterisk (*) can be commenced as soon as practicable.
3. Based on limited assessment to date of recovery plans and progress, the following actions items are anticipated:
    a. Heater Drains System, including MSRs, drainage verified.
    b. Main Steam Systems, including Main Turbine, drainage verified.
    c. Condensate portions of HPCI, RCIC, Offgas Systems should be drained.
    d. When heat loads tolerate, TBCCW should be drained and refilled with DST, possibly to be repeated. Feed and Bleed is not a good option here.
    e. Feedwater system should be drained when radwaste systems are returned to functional status.
    f. Condensate should remain in short cycle (1 pump 3 CFDs) until alternative cleanup schemes are available.
    g. Torus water level should remain high until other water volumes have cleaned up, then lowered to condensate (via TWMS)
    h. CFDs should be drained and isolated, to be used as needed for water cleanup.
    i. GSW, RBCCW and RWCU should remain in service throughout the outage, except for isolable component outages for repairs.
    k. Small steam turbines should be verified drained, including, RFPs, RCIC and HPCI.
    l. Process monitoring instrumentation per appropriate SOPs

Reference: FIP-CH1-01 Lay-up

12/27/93

SYSTEM WALKDOWN

AND

ASSESSMENT PLAN

January 7, 1994

Team Manager

Plant Manager

System Walkdown and Assessment Plan

Team Manager: D. R. Bergmooser

Team Leaders: G. J. Carter
P. J. Fallon
D. R. Bergmooser
G. DePalma
L. J. Lehman, Jr.

Team Members: System Engineers, Plant Engineers, ISI/PEP Engineers and others as assigned

Mission Statement

Identify corrective and preventive maintenance needed to return systems to service in a reliable condition.

Objectives

1. Integrated assessment to identify physical damage and potential damage to Turbine building system component (Mechanical, Electrical, and I&C functions). Structure (Arch/Civil) and Turbine Generator evaluation to be controlled separately from this plan.
2. Perform leakage inspections, support and attachment inspections, and snubber inspections as required.
3. Perform inspections to identify any small bore taps needing rework to prevent future leaks at root connections.
4. Perform inspections to identify components needing additional or replacement insulation coordinated with RF04 Steam Tunnel Reliability Improvement Team.
5. Coordinate work to minimize overlap and impact on Operations' resources.
6. Perform any required regulatory (eg: RF04) inspections.
7. All findings are discussed with appropriate individuals prior to taking corrective actions to ensure that information necessary to determine root cause of event is not lost.
8. Costs associated with the walkdowns are tracked using work orders assigned by Financial Management.

Scope

Priority Systems	*Additional Systems*			
P4300	E5100	N2003	P3400	U3100
P5001	G1100	N2100	P4100	U4500
P1100	G1101	N2200	P5002	U8000
N2103	N1100	N6100	P7000	V4500
N6200	N2000	N7100	P9500	V8000
	N2002	P3300	R1700	W2500

Actions

1. Engineering to develop and obtain approval of walkdown checklist.
2. Operation and Engineering to prioritize above systems.
3. Define resources required for each system walkdown.
4. Review and incorporate BOP reliability issues into corrective actions.
5. Establish training for leakage inspection and support and attachment inspection for System Engineers performing walkdowns.
6. Schedule initial assessment walkdowns in accordance with prioritized systems.
7. Issue punch-listed finding and corrective actions required for walkdown open items.

Reviewed by:

G. J. Carter

P. J. Fallon

G. DePalma

Plant Engineering Representative

Turbine Group Representative

A. D. Kowalczuk

hjs
010694

General Guidelines
System Walkdown Checklist

- Markup P&ID(s) to identify system walkdown scope.

- Divide system into subsystems based on one or more of the following criteria.
  - Component functional groups
  - Component area proximity
  - Component similarities (form or function)

- Identify and mark up drawings for subsystems to define inspection scope.

- Develop walkdown checklists for subsystems for the disciplines that apply.
  - Mechanical
  - Electrical
  - Instruments and Controls

- Perform walkdown in accordance with criteria developed on checklists. Document results of inspection.

- During inspection period identify the performance monitoring or intrusive inspections to be subsequently performed. It may be appropriate to call up a special issue PM event to further investigate the material condition of a component.

- Assemble all results together in a report format. Include a Report Technical Summary containing the following sections.
  - System and inspection scope
  - Results of inspection
  - Remaining work to be performed.

CAUTION: *Any debris found which may have come from the Turbine Generator should be noted but not disturbed. Findings will be reported to the Turbine Generator Assessment Team.*

System Walkdown Checklist

Cover Sheet

System _____

Subsystems _____
_____
_____
_____
_____

Walkdown Complete:

Subsystems		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date
		Initials	Date

Approved:

Superintendent,
Technical Engineering : _____
W. E. Miller Date

Superintendent, Operations: _____
J. H. Plona Date

Mechanical Checklist Instructions

Engineer to identify drawings that define the mechanical scope of the walkdown. These drawings may include:

1. FOSs
2. P&IDs
3. Isometrics
4. Vendor Drawings

Engineer to identify those components that apply to this checklist. More than one mechanical checklist can be used to cover a system. For example, one mechanical checklist can be used for piping, another for pumps, another for hangers and restraints, another for snubbers, etc. Components must appear on the checklist or a justification must be provided.

Visual inspection requirements for components on the checklist are to be identified. The requirements are to be as detailed as necessary to produce a thorough visual examination. For example:

(Poor example) "Check foundation"
(Good example) "Check foundation for cracks at holes, tightness of nuts, and integrity of grout"

Performance monitoring requirements for components on the checklist to be identified. These requirements will provide additional assurance that components are ready for extended service.

NDE requirements for components on the checklist to be identified. This section is primarily for "code required" inspections that are required as a result of the transient.

System_____
Subsystem_____
Page __ of __

Mechanical Checklist

Drawings: _____

Components: _____

Visual Inspection Requirements: _____

Visual Inspection Results: _____

Performance Monitoring Requirements: _____

Performance Monitoring Results: _____

NDE Requirements: _____

NDE Results: _____

System_____
Subsystem_____
Page __ of __

Mechanical Checklist

Vent or Drain Valves, 2nd Floor Steam Tunnel:

- PIS No. _____
- Feet from Floor _____
- Scaffold Needed _____
- Valve Size _____
- Length of Nipple _____

Insulation Repair Required (significant heat loss): _____

_____

_____

Process Exceeds 140°F - Insulation Required: _____

_____

_____

Electrical Checklist Instructions

Engineer to identify drawings that define the scope of the components in the walkdown. These drawings may include:

1. P&IDs
2. Schematic Diagrams
3. Wiring Diagrams
4. One-Line Electrical Diagra...s

Engineer to identify those components that apply to this checklist. More than one electrical checklist can be used to cover a system. For example, one electrical checklist can be used to cover motors, another for heaters, another for breakers and/or switchgear, etc. Components must appear on the checklist or a justification must be provided.

Visual inspection requirements for components on the checklist are to be identified. These requirements are to be as detailed as necessary to produce a thorough visual examination. For example:

(Poor example) "Check breaker position"
(Good example) "Check breaker position for signs of water intrusion or main contactor arcing"

Engineer to identify functional testing requirements for components listed. Functional tests include activities like:

1. Insulation Resistance Testing
2. "Hi-Pot" Testing
3. Motor bumping and running
4. Circuit continuity testing

NOTE: Particular attention to be given to potential water intrusion and thermal degradation of wires and equipment.

System_____
Subsystem_____
Page __ of __

Electrical Checklist

Drawings: _____

Components: _____

Visual Inspection Requirements: _____

Visual Inspection Results: _____

Functional Testing Requirements: _____

Functional Testing Results: _____

Instruments & Controls Instructions

Engineer to identify drawings that define the I&C scope of the walkdown. These drawings may include:

1. P&IDs
2. Schematic Diagrams
3. Wiring Diagrams
4. Vendor Drawings (as required)

Engineer to identify those components that apply to this checklist. More than one I&C checklist can be used to cover a system. Components must appear on the checklist or a justification must be provided.

Visual inspection requirements for components on the checklist are to be identified. These requirements are to be as detailed as necessary to produce a thorough visual examination. For example:

(Poor example) "Check instrument"
(Good example) "Check instrument for signs of being wetted or being struck by foreign objects"

Engineer to identify functional testing requirements for components listed. Functional tests include activities like:

1. Circuit continuity testing
2. Component calibration checks
3. Loop calibration checks

System_____
Subsystem_____
Page __ of __

Instruments & Controls Checklist

Drawings: _____

Components: _____

Visual Inspection Requirements: _____

Visual Inspection Results: _____

Functional Inspection Requirements: _____

Functional Inspection Results: _____

FERMI 2

STRUCTURAL SUPPORT
ACTION PLAN

MARCH 31, 1994
REV. 2

TEAM MANAGER Abdul Alchalabi 3/31/1994
ABDUL ALCHALABI DATE

APPROVAL Robert McKeon 4/3/94
ROBERT MCKEON DATE

STRUCTURAL INSPECTION ACTION PLAN

Mission Statement:

Walkdown and visually inspect plant structures, supports and components for structural damage. Evaluate potential impact of "Seismic Alarm."

Team Manager: Abdul Alchalabi

Team Members:

G. Abdallah
R. Bryer
R. Buck
A. Burg
H. Sahiner

A. Walkdown/Inspection of Structures

A1. Turbine Pedestal Structure

The turbine and its associated equipment (exciter brush gears, generator, etc.) are independently supported by their own pedestal. Third floor slab is supported independently of the Turbine Pedestal by its own structural framing.

The inspection plan will include all of the structural elements associated with Turbine Pedestal and associated equipment.

- Visual inspection of turbine generator and exciter connections to the concrete structure. The initial local damage assessment must be performed prior to the disturbance of connections and debris.
- Visually inspect concrete pedestal all around interior and exterior (where possible) from basement (El. 564') to third floor (El. 643'-6").
- Visually inspect steel wall and its concrete support on south and turbine shield wall on north side.
- Visually inspect isolation joints and concrete on both sides of joints of third floor.
- Inspection will also include areas under checker plates.

A2. Turbine Building Structure

Perform an overall walkdown of Turbine Building structure including:

- Foundation slabs, floor slabs, walls, columns, beams, siding, roof, and structure.
- Inspect structure for possible turbine missile damage.
- Inspect turbine slab near the isolation gap.
- Inspect flooded area for water damage.
- Inspect equipment foundation for grout/anchorage damage.
- Inspect Turbine Building overhead cranes support structures.
- Inspect stairway, platforms, specifically at concrete attachment locations.
- Inspect condenser structure, its foundation, shell, stiffeners.

A3. Reactor/Auxiliary Building Structure

- Inspect QA1 equipment anchorage. Extent of the walkdown will be determined based on seismic data evaluation by the Consultant.
- Performed a walkdown in Reactor/Auxiliary Building specifically in areas adjacent to Turbine Building on 12/29/93 and found no signs of damage or displacement.
- Accessible areas were selected for a walkdown as representative of the Reactor/Auxiliary Building structure. The walkdown was completed on 1/24/94. No evidence of structure damage or distress were found.
- Perform visual inspection of drywell concrete floor slab and Reactor pedestal.
- The need for further walkdown will be determined based on seismic data evaluation by Consultant.

A4. Radwaste Structure

Perform an overall walkdown of Radwaste Building structure including:

- Foundation slabs, floor slabs, walls, columns, beams and other related structures.
- Inspect flooded area for water damage.
- Inspect equipment foundation for grout/anchorage damage.
- Inspect stairway, platforms, hoists, specifically at concrete attachment locations and others.
- Inspect tanks located in the basement for structural integrity
- **Coordinate with Radwaste Recovery Team for inspection of all flooded area.**

A5. RHR

Due to distance from the Turbine Building, RHR is excluded from the walkdown. It will be reviewed later based on seismic data interpretation.

A6. Inspection of the Turbine Support Steel Structures

The LP and HP Turbine Support steel structures will be inspected including:

- o Bearing support beams and bearing boats.
- o LP Frame body support beams.
- o Turbine support feet over the concrete pedestal wall.
- o Turbine alignment keys.

The above listed structures will be visually inspected for:

- o Welded connections integrity per inspection criteria.
- o Bolted connections for loose or broken bolts, enlarged bolt holes, etc.
- o Steel plates, shapes for permanent deformations, cracks and tears.
- o Other unusual or unexpected conditions.

(SEE SKETCH NEXT PAGE)

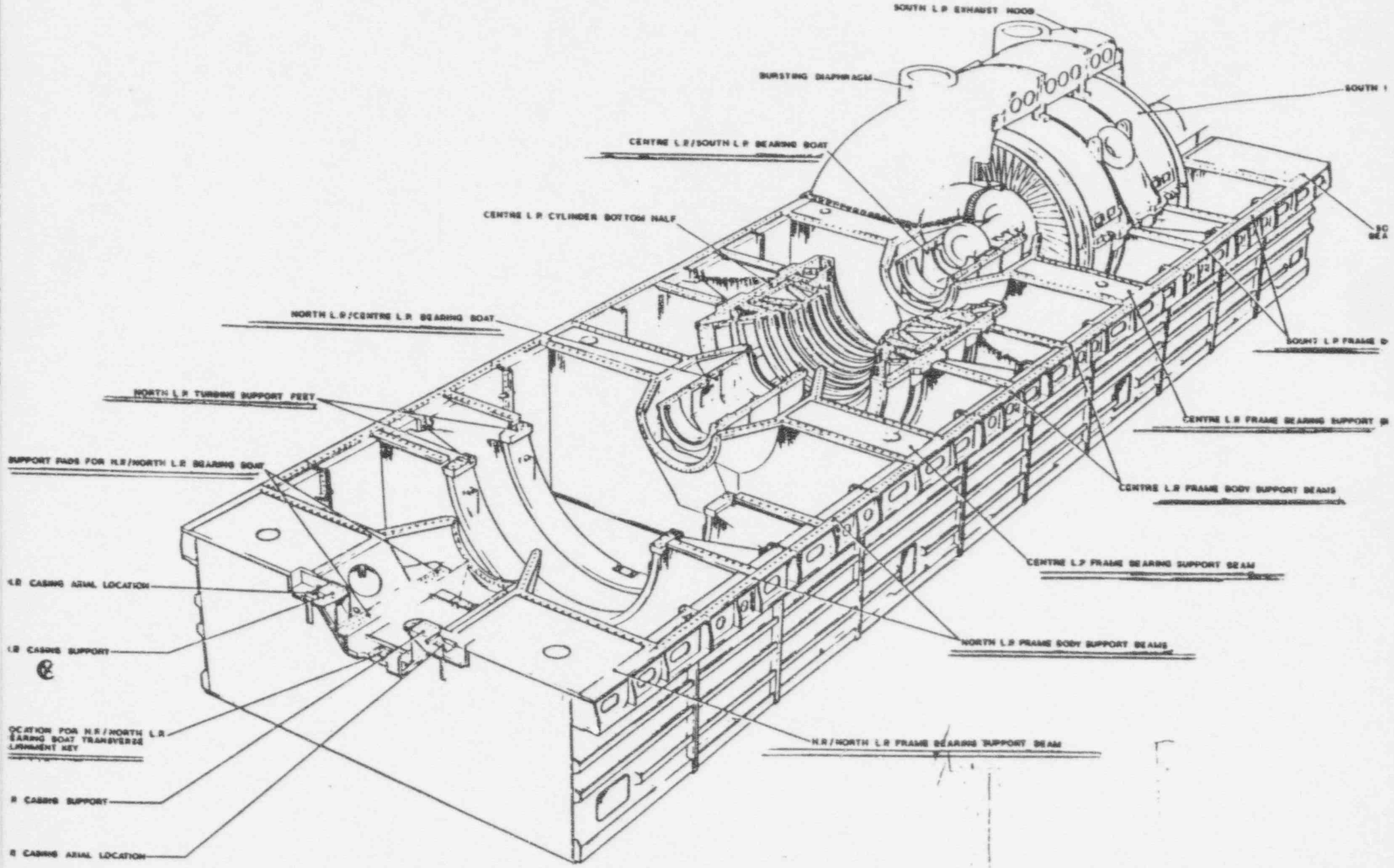
B. System Supports and Components Inspection/ Evaluation

System Engineering will perform system walkdowns. The structural team will inspect and evaluate the system support findings.

C. Evaluation of Potential Impact of Seismic Alarm

Detailed data evaluation documentation activities are underway and a formal assessment report is now being prepared by the consultant with a currently scheduled February 4, 1994 completion date.

D. Prepare a final walkdown report documenting the walkdown/evaluation results upon completion.



Items to be inspected are underlined

FIG.2 L.P TURI

B. **System Supports and Components Inspection/ Evaluation**

System Engineering will perform system walkdowns. The structural team will inspect and evaluate the system support findings.

C. **Evaluation of Potential Impact of Seismic Alarm**

Detailed data evaluation documentation activities are underway and a formal assessment report is now being prepared by the consultant with a currently scheduled February 4, 1994 completion date.

D. **Prepare a final walkdown report documenting the walkdown/evaluation results upon completion.**

4

STRUCTURAL WALKDOWN CHECKLIST

Walkdown Guideline:

Visually examine structural elements for signs of damage or displacement. The following evidence may indicate that the structural member experienced some distress:

1. Concrete members: Look for fresh cracks, concrete spalling, crushed concrete, cracks in painted surfaces
2. Structural steel: Look for signs of impact, chipped paint, dents, bending, twisting, warping, loose bolts, cracked welds.
3. Penetrations: Look for breaks in the penetration seal due to displacement of pipes or conduit.
4. Masonry walls: Look for fresh cracks in mortar joints and blocks, paint chips.
5. Doors: Look at alignment of door with frame.
6. Anchorages: Look for loose or missing nuts or bolts, stripped threads, grout damage.

Walkdown Data:

Building: AB RB RWB TB

Floor: SB B 1st 2nd 3rd 4th 5th Mezz. Other

Area column lines:_____

Elevation:_____

Elements examined:

- Concrete slab:_____
- Concrete walls:_____
- Concrete beam:_____
- Concrete column:_____
- Concrete pedestal:_____
- Masonry wall:_____
- Structural steel : Beams, Columns, Bracing, Stair stringers:_____
- Doors:_____
- Penetrations:_____
- Anchor Bolts:_____
- Drawing reference:_____

Comments:_____

_____

_____

_____

_____

_____

Name:_____ Date:_____

Name:_____ Date:_____

RAB: 1/14/94

file: P/CHKLIST

FERMI 2

SCRAM TEAM ACTION PLAN

JANUARY 13, 1994

Approval Robert McKeon 1/14/94

Robert McKeon Date

Scram Team

TEAM MANAGER: J. CONTONI

TEAM MEMBERS:

John Nyquist	Kris Bahl	Paul Hudson	John Tibai
Kevin McMahon	Walt McNeil	Anthony Peluso	Joe Bond
Anil Patel			

Mission Statement: Identify the initiating signal for the Scram. Review the plant systems and equipment responses to the scram. Evaluate any significant challenges encountered while responding to the event.

Actions:

Establish Team	Complete
Gather Data	
Preliminary	Complete
As Needed	Complete
Conduct Interviews	Complete
Review / Analyze Data	
Review SOER in detail-Identify BOP Anomalies - Bond	Complete (SCRAM report scope)
Comparison to past SOER's - McMahon	Complete (SCRAM report scope)
Question System Engineers regarding system responses	
Reactor building HVAC - Hart	Complete
Turbine building HVAC - Hart	Complete
CRD Pump Trip and Restart - Schuman	Complete
RWCU - Coseo	Complete
FPCCU Pump Trip - Cummings	Complete
Question Plant Engineering Personnel regarding System responses	
MSIV Closure - Melito	Complete
DST - TBCCW Interfaces -Patel / Mudar	Complete
Fire Protection - Kilroy	Complete
E4150 F011 - Drotar	Complete
UFSAR Blade Loss vs. Actual Experience - Deora / Alchalabi	Complete (Memo is progress)
Question Support Personnel On Specific Issues	
HPES Review	
Garbled Communication of Fire Status - Rhodes	Complete
Confusion over operability of E4150 F011 - Rhodes	Complete
Hydrogen usage history - McNeil, McMahon	Complete
Establish Timeline	Complete
Determine Initiating Event	Complete

Conduct Lessons Learned Dry Run Meeting	Complete
Conduct Lessons Learned Meeting	Complete
Prepare Initial Response to DER 93-0699 Part 4A	1/14/94
LER Submittal	1/24/94

Updated 1/13/94
J. W. Contoni/s/

FERMI 2

FINANCIAL CONTROLS

FEBRUARY 8, 1994

APPROVAL Robert McKeon 2/10/94
Robert McKeon Date

FINANCIAL CONTROLS

Revision # 2: 02/08/94

Bob Franklin - Team Manager

Team Members

Jim Mohler	Ron Pauwels	Terry Swedenberg
Dennis Henry (Plant Accounting)	Jackie Stone	Terry Hallett (BMI)
Dennis Dascenzo Human Resources		

Mission Statement: To account for all costs associated with damage assessment, cleanup, repair, and/or replacement and Root Cause Analysis.

Actions:

A. Work Orders for Cost Tracking are divided into three sections:

1. Damage Assessment and Cleanup
2. Repair, Replacement and/or Removal
3. Root Cause Analysis

1. DAMAGE ASSESSMENT AND CLEANUP

a. All Straight Time, Overtime for both DECo and Contractors, All Material, and Stock directly related to damage assessment and cleanup as a direct result of the turbine incident for the following:

Work Order	Job	Description
519 D0 012	001	Plant Cleanup and Water Management (work associated with the temp mods and water removal in order to return the plant water inventories to acceptable quantity and quality levels. This job number also includes the restoration of plant areas to original condition)
	002	Radwaste Building Restoration (work associated Temp Mods and water removal in Radwaste Bldg. Basement. Equipment, Cleanup, Restoration is included with Job 170)
	003	Radiation Protection (all work associated with damage assessment, cleanup, repair and replacement including Surveys / RWP's including work associated with area surveys and issuance of RWP's as required)
	006	System Walkdowns and Assessments (work associated with system walk downs to identify corrective and preventative maintenance needed to return systems to service in a reliable condition)

Work Order	Job	Description
519 D0 012	007	Fire Protection / Detection Restoration (work associated with recovering and restoring both the fire detection and fire suppression systems to their intended design configuration)
	008	Fuels and Reactor Engineering including reactor fuel assessment (work associated with the verification of fuel reliability for reactor startup and power operation)
	010	Reactor Water Cleanup (work associated with the cleanup of the reactor water)
	011	Structural Walkdowns and Assessments (work associated with the walkdown and visual inspections of plant structures, supports and components for structural damage)
	012	Turbine Condenser Inspection and Assessments (work associated with the walkdown and inspection and cleaning of the main turbine condenser)
	013	Reactor Vessel Internals (ISI) Assessment (work associated with the inspection of the reactor vessel internals and restoration to operating condition)

(Note: Planners, Plant Engineers, and System Engineers should charge directly to the project / packages that they are working on.)

b. **Support work**. All DECo and contractor straight time and overtime, and all materials and stock as a direct result of the turbine incident not included as part of damage assessment and cleanup or the repair, replacement and/or removal for the following support organizations:

Work Order	Job	Description
519 D0 012	020	Information Management / Procedures
	021	Nuclear Procurement (including expediting)
	022	Nuclear Materials (including warehouse)
	023	Security
	024	Quality Assurance
	025	Licensing
	026	Inprocessing (Security, Training & Rad Pro use only)
	027	Nuclear Training
	028	Radiation Protection (transfer to Job No. 003)
	029	Radwaste (transfer to Job No. 001)
	030	Chemistry
	031	Work Control Process
	032	Material Engineering
	033	Fuels and Reactor Engineering (transfer to Job No. 008)
	034	Safety Engineering
	035	Maintenance and Modifications Support

2. REPAIR, REPLACEMENT AND/OR REMOVAL

Work Order	Description	Job Numbers		
		O&M	CAPITAL REPLACEMENT OF UNITS OF PROPERTY	
		Repair	Replacement	Removal
519 D0 012	Exciter	100	101	102
	Generator	110	111	112
	LP1	120	121	122
	LP2	130	131	132
	LP3	140	141	142
	Condenser	150	151	152
	High Pressure	160	161	162
	Radwaste Bldg. / Equip	170	171	172
	PCCD Equipment	180	181	182
	Turbine Building / Equip	190	191	192
	TBCCW	200	201	202
	Auxiliary Bldg. Seismic Monitor Equipment	210	211	212
	Reactor Bldg. Seismic Monitor Equipment	220	221	222

(Note: Please contact Ron Pauwels prior to charging any of the above mentioned work orders.)

Job Number 999 should be used for all Shift Turnover time associated with the damage assessment, cleanup, repair, and/or replacement and Root Cause Analysis.

3. ROOT CAUSE ANALYSIS

All Straight Time and Overtime for DECo and Contract Labor should be charged to the following work order for Root Cause Analysis (contact Len Fron prior to use of this work order):

728TD291 971

Additional job numbers will be added as required. If you have any questions regarding these job numbers, establishing new job numbers, or questions in general, please contact Bob Franklin on ext. 6-4019, Ron Pauwels on ext. 6-5387, or Jim Mohler on ext. 6-1647.

B. DEVELOP SUPPORTING DOCUMENTATION.

Action Items

1. Attend morning Task Manager's daily status meeting (8:45 am meeting)

2. Establish a working relationship with Team Managers and System Engineers

3. Obtain and categorize:
   a. System walkdown punch lists
   b. Work Request Initiation Forms (WRIF's)
   c. Plan of the Day (POD)
   d. Inspection reports (based on system/structural walkdowns)
   e. Purchase Orders, Invoices, and related contractor timesheets
   f. Vendor Analysis reports
   g. DECo timesheets (weekly and daily)
   h. Listings of all Work Requests from WST (INS-93)

4. Conduct discussions and reviews with a "Questioning Attitude" toward the following decisions:
   a. Is the work claimable
   b. Decisions to repair Vs replace
   c. Replacements 'like for like' Vs betterment
   d. Other prudency issues (Tax, Plant Accounting, Public Service Commissions, Etc.)

5. Obtain or develop supporting documentation as required

C. PROPERTY DAMAGE INSURANCE

Accidental property damage insurance provides coverage for the direct physical damage to or destruction of property that results from an insured incident. The intent of this policy is to make the plant and systems operational to the extent they were prior to the incident. The policy will respond to both direct damage resulting from the incident as well as consequential damage.

Common Loss Adjusting Terms

- Replacement Cost
- Repair Vs Replace
- Consequential Damage
- Damage Assessment
- Expediting Expense and Temporary Repair
- Obsolete Equipment
- Salvage
- Regulatory Code

REPLACEMENT COST: The cost to replace damage property with material of like kind and quality, without allowance for any increased cost of repair or reconstruction by reason of any ordinance or law regulating construction or repair.

REPAIR Vs REPLACE: Coverage will only respond to the lesser of the cost of repair or the cost to replace. If during the adjustment period the insurer has reason to believe that the difference will be significant, estimates will be made. The coverage will not pay for enhancement to or betterment of the damaged property.

CONSEQUENTIAL DAMAGE: The failure of or damage to any component or system that can be traced back to the initial accident as the ultimate responsible event. It may include items such as pumps that fail due to loss of cooling, fuses blown due to overloads or circuit malfunction, gauges or meters damaged due to over or under pressure.

DAMAGE ASSESSMENT: The cost incurred in order to investigate and determine the extent of damage due to the incident. This may include inspection activities to look for damage, even though none is found, if it is reasonable to expect that some damage may exist due to the incident.

EXPEDITING EXPENSE AND TEMPORARY REPAIR: The cost incurred in order to hasten repair or replacement of property --including overtime, and/or for the temporary repair or temporary replacement of property. A sublimit of $2,500,000 exists for this coverage.

OBSOLETE EQUIPMENT: Equipment no longer available or manufactured. If it is not repairable, then it should be replaced with a like kind and quality.

SALVAGE: The insurance company has all rights to salvageable material; therefore, the material must be saved until the insurance company has released it.

REGULATORY CODE COVERAGE: Coverage for the additional cost of repair or replacement of damaged property necessitated by enforcement of any state or federal statues (*Code*) relating to minimum standards of construction or engineering or licensing, qualification or certification which is in effect at the time of the loss and to which the property is subject. Subject to a total sublimit of $2,500,000.

COSTS THAT ARE POTENTIALLY NOT COVERED

- Inspection costs which have no direct relationship to the incident.
- Costs which were incurred for inspection of systems not related to the damage.
- Cost to update systems for NRC compliance (*See Regulatory Code above*)
- Cost for design changes which are in excess of repair and replace and not related to the damage.

FERMI 2
OUTAGE TRANSITION PLAN

JANUARY 28, 1994

ROBERT EBERHARDT

ROBERT McKEON DATE: 2/5/94

FERMI 2
OUTAGE TRANSITION PLAN

TEAM MANAGER: R. EBERHART

TEAM MEMBERS

J. Plona	G. Pierce	J. Davis	J. Walker
J. Malaric	P. Radovich	A. Anderson	R. Franklin
A. Kowalczuk	J. Nolloth	W. Miller	

MISSION STATEMENT

Determine the best means to transition from the present plant status into the refueling outage without jeopardizing the safety of the public, plant personnel or the plant while maintaining such routine items as operability of key control room indications. Determine what projects and maintenance items need to be performed to improve the operation and maintainability of the B.O.P. This plan must also be made in such a way as to not compromise defense in depth.

INTRODUCTION

The plant shut down on December 25, 1993, resulted in a number of teams being established to restore the plant to a normal status. This has resulted in the need to develop a plan to transition from the present plant status into the refueling outage. This plan is to include activities to improve the operation of the balance of plant, taking into account the financial resources that are available. Items of improvement that are needed and exceed this amount are to be presented to management for determination of future action. The shutdown of the plant also resulted in the accumulation of approximately 1 million gallons of excess water in the plant that is not of the quality needed to operate the plant, and cannot be stored within the present capacity of plant storage systems. This water also has resulted in the inoperability of the radwaste systems. These systems must be returned to operation (or temporary systems installed) before plant systems may be drained for outage work.

TEAM RESPONSIBILITIES

B.O.P. IMPROVEMENT PLAN

Develop detailed scope and plans from resources such as Operations Personnel, SystemEngineers, work request backlogs, Radiation Protection data, etc.
Coordinate the incorporation of these items into the refueling outage schedule and site financial plans based on the priority as determined by the Plant Manager. Coordinate items that require engineering or field resources that exceed those presently planned and available.

TRANSITION PLAN

Develop the plans to transition from the present plant status into the refueling outage in a smooth well coordinated manner that optimizes the effectiveness of the organization. This plan should include the restoration of plant systems, such as radwaste, and the return of the proper water quality and inventory for refueling.

DESCRIPTION OF PLAN

SUMMARY OF PRESENT PLANT STATUS

Radioactive waste systems are inoperable due to the flooding that occurred. These systems need to be restored to a status where they can process normal plant drainage to reactor quality and process the resultant resin that is generated. The radwaste system recovery plan is in the process of development. This plan is being developed in phases. The objective of the first phase is to restore the ability (on a temporary basis if necessary) to process liquid in a basic manner to acceptable purity. Phase 2 will be to restore the solid (resin) waste processing function. Phase 3 will restore the remaining redundant equipment, and other processing hardware.

Plans have been made and work packages developed so that when access to the facility is available, work can start immediately. Arrangements with vendors have been made to refurbish motors and replace instrumentation if required. These plans are being coordinated with the Work Control organization and added to the schedule, thereby assuring that there is only one coordinated site schedule.

THIS IS THE CRITICAL PATH TO ENTERING RF-04

1.5 million gallons of water (including the water in most storage tanks) is not suitable for reactor use nor for floodup of the reactor cavity.

1.3 million gallons of water exist that is in excess of the maximum amount that is needed for RF04. This includes accounting for the tankage that is needed for holding the volumes that will be generated when the systems are drained during the outage.

The Turbine assessment plan is in progress, and as the engineered inspection takes place, the determination of the extent of damage and the length of time required to complete repairs will be determined. **This time frame will be the determining factor for the when to start the time sensitive RF04 testing (18 month surveillances).**

The fire protection system has been restored to service in all locations except the areas under the turbine/generator and the radwaste basement. Completion of this work will take place later in the outage.

The reactor water clean up side stream demineralizer on the refueling floor is in operation and has had a very positive effect on the reactor water quality, bringing it into Technical Specifications in all parameters except pH. This temporary modification may have raised the background in the area to the point that surveys of the boxes (for free release) that new fuel arrives in cannot take place on the floor. Also, due to the potential unnecessary exposure to personnel working on the floor, access has been restricted to only those personnel necessary for the work associated with the temporary modification. This has, therefore, had the effect of delaying receipt of new fuel, refuel floor preparations, and needs to be evaluated.

The water that had not drained to the radwaste basement has been kept in the turbine building. Temporary modifications that plug the floor drains in the affected areas have been used. This water (and oil) will also have to be processed. Equipment in the affected areas will be assessed for damage and required repairs.

The B Recirc Discharge valve, B31-F031B, failed to close fully when called upon to go into shutdown cooling. To inspect the valves of the opposite division, shutdown cooling must be swapped to the other division.

The cleanup of plant areas affected by the incident has progressed. All areas that are accessible (not in quarantine or flooded) have been restored and are available for normal access. Areas that are in quarantine or flooded are now becoming available for cleaning. The deconners and the Radiation Protection personnel are addressing these areas as they become available.

Nuclear Fuels has been working with General Electric to perform an assessment of how this incident effects the integrity of the fuel. Items that develop from this assessment will be added to the fuel inspection plan in RF04. The Nuclear Fuels group has also contracted the S.M.Stoller Company to perform an independent assessment of the condition of the fuel and assessment of reactor pressure vessel internals. Items, as appropriate, may also be added to the plans for future outages.

The System Engineers are performing walkdowns of the systems that could have been affected by the incident. As items are identified that are of concern, the engineers are initiating work requests for repair. These items will be reviewed and added to the outage schedule as appropriate. Areas that are under quarantine are being walked down as they become available.

All necessary areas that are accessible have been walked down for structural integrity. Those areas that have not been, such as the turbine pedestal, will be as soon as they become available.

A plan is being developed by the ISI department to inspect those components of the reactor that may be affected by the poor water quality, both for this outage and those in the future. Plans for flushing reactor components are also being developed.

TRANSITION PLAN WATER QUALITY AND INVENTORY

To get in a position to receive new fuel the reactor water cleanup side stream demineralizer operation needs to be assessed. The operation of the unit results in dose rates on the refueling floor that may prevent the ability to survey the fuel boxes for free release, or result in unnecessary radiation exposure to personnel on the floor.

In parallel with the task above, determination of needs for reactor vessel disassembly and cavity flood up need to be determined. These are:

a- having the right water inventory of the proper quality on hand for flood-up.
b- completion of new fuel receipt.

Sufficiently restore the radwaste liquid and solid processing systems to handle present water inventories (per the Water Management Plan) and the expected water input during RF04.

Prior to drainage of systems to radwaste for system outages, the plant drains and sumps must be cleaned to remove residual oil and other impurities that entered during the event. System flushing and lay-up plans need to be prepared, and the effect added to the water management plan, so the inventory may be taken into account. This is being assessed by the Water Management Team.

PRE-RF04 PREPARATIONS

The general work philosophy for RF04 needs to be determined. This entails determination of the length of the major projects in the outage and their effect on support personnel. Based on the determination of the above, man loading, subsequent contractor needs, and the new in-processing/training schedule can be determined.

Re-examination of the personnel matrix needs to be performed. The Recovery Plan and the RF04 personnel matrix has a number of common people. These common assignments necessitate the need to re-examine the roles of these people. Many of these individuals were going to use this time frame prior to RF04 to prepare for the outage and this time is not available.

Contract Administrators need to re-examine their contracts to determine the effect of the length of the outage. Issues, such as the availability of experienced personnel and tooling, may be critical and need to be assessed.

Financial Controls needs to reassess the 1994 budget in light of this situation.

WORK PACKAGE AND EDP PREPARATION

At this time 23 EDPs still need to be engineered. The impact of the added engineering work for Temporary Modifications and the resulting design changes needs to be assessed and integrated into the workload.
Work Package preparation for RF04 work versus the added package preparation for the Recovery plan needs to be assessed.

OUTAGE SCOPE ADDITIONS

Balance Of Plant improvement items that will be added to the scope of the outage will be determined based on their priority as determined by the Plant Manager, Superintendent Operations, Superintendent Maintenance, Director Technical Engineering, and the General Supervisor Work Control. This team will supply a list of improvement items using financial funds available as the determining cut-off.

Inclusion of system outage work that was to be complete prior to and following RF04 needs to be examined.

Urgent\Plant Manager requested EDPs need to be reviewed to decide if they need to be included in the outage.

Examination of future EDPs that, due to the length of this outage, may be prudent for us to do now versus in the future.

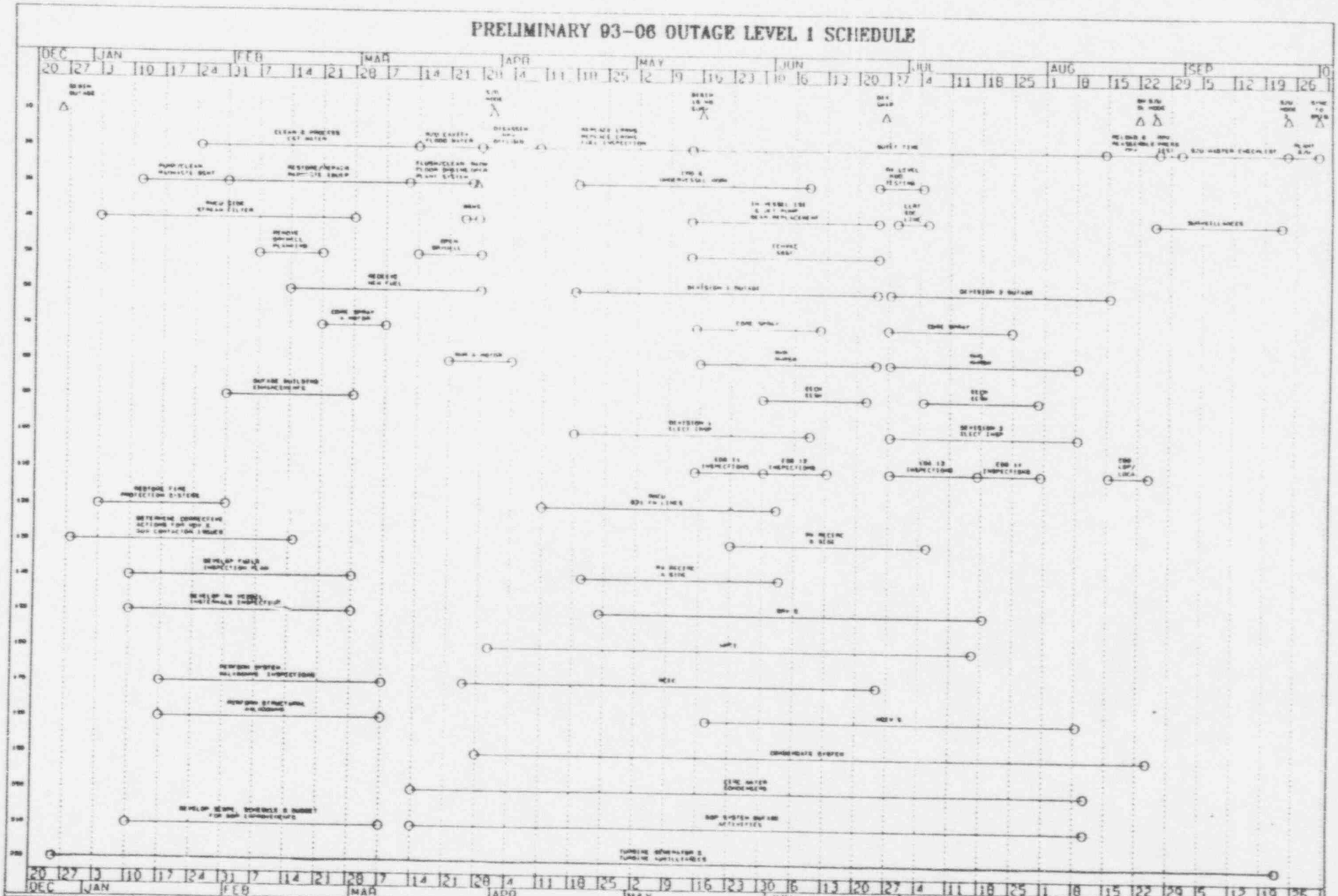
A determination of additional MOV scope must be made based on such items as:

a- static and dynamic testing
b- pressure locking corrective actions
c- corrective actions coming from the B31-F031B LER.
d. corrective actions from auxiliary contactor problem.

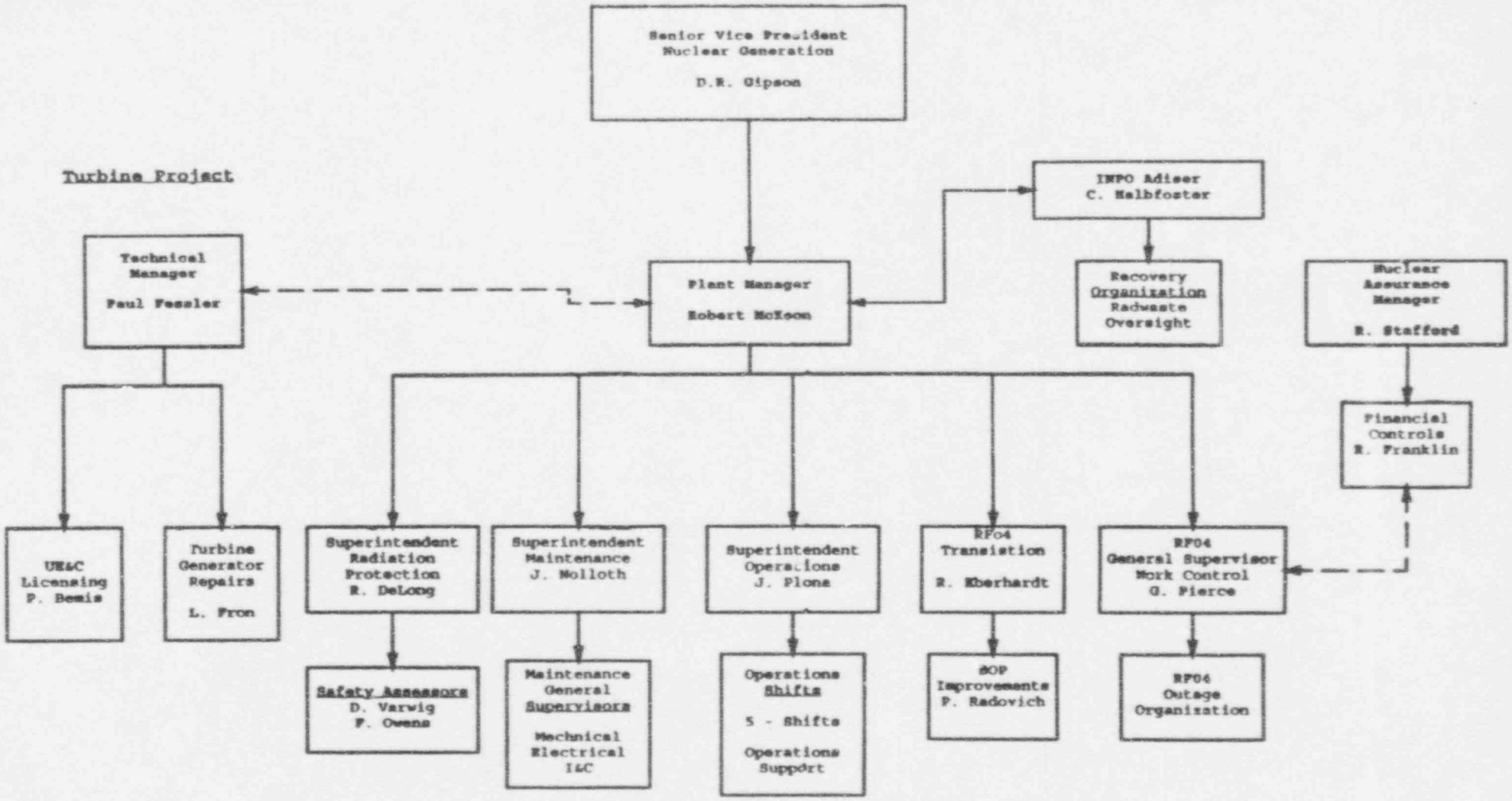
Review which of the Cycle 5 EDPs, if any, need to be added to the scope of the outage.

Determination of outage scope additions must be done, keeping in mind the total financial impact and funds available versus the priority of the item.

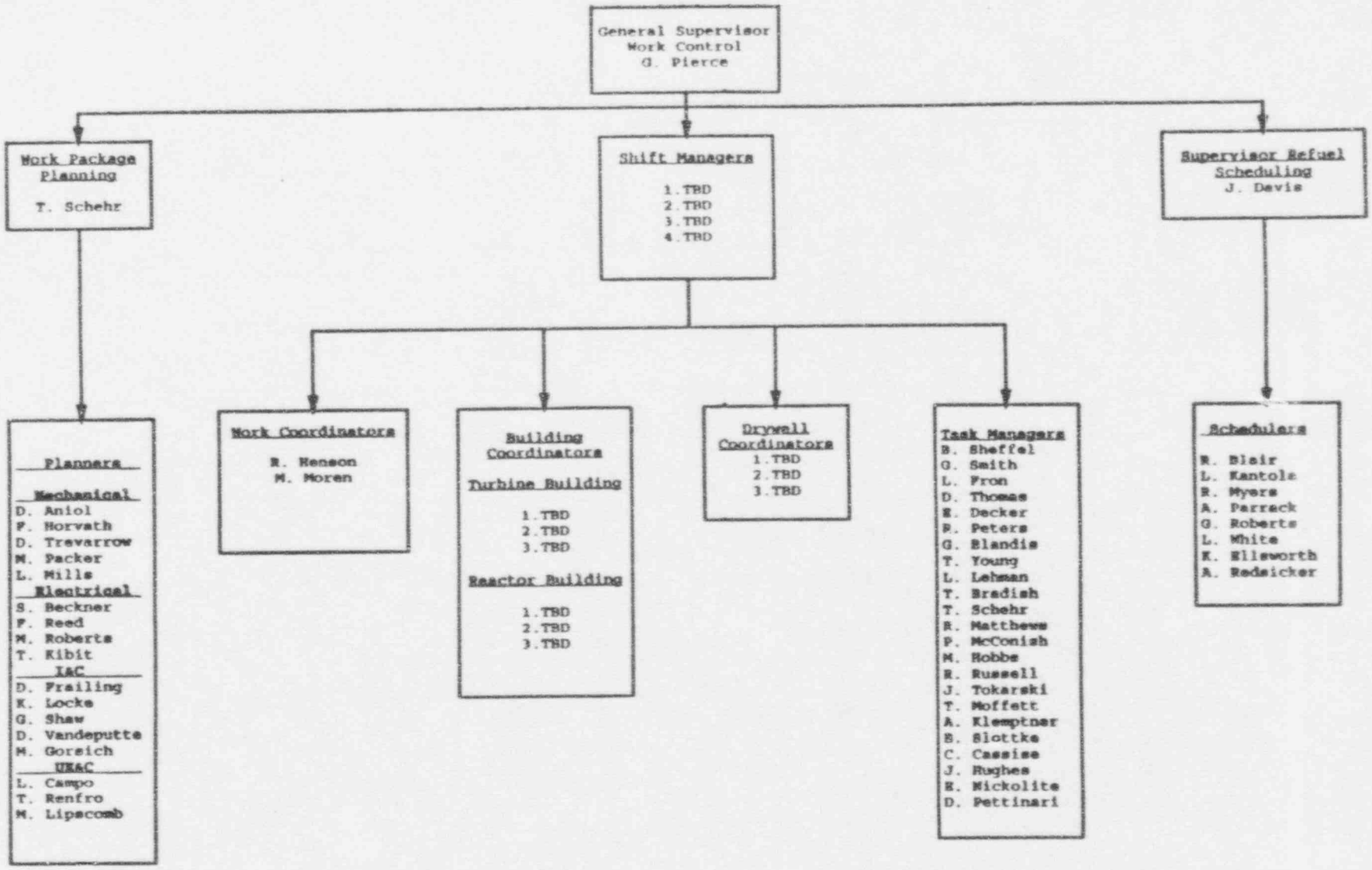
PRELIMINARY 93-06 OUTAGE LEVEL 1 SCHEDULE



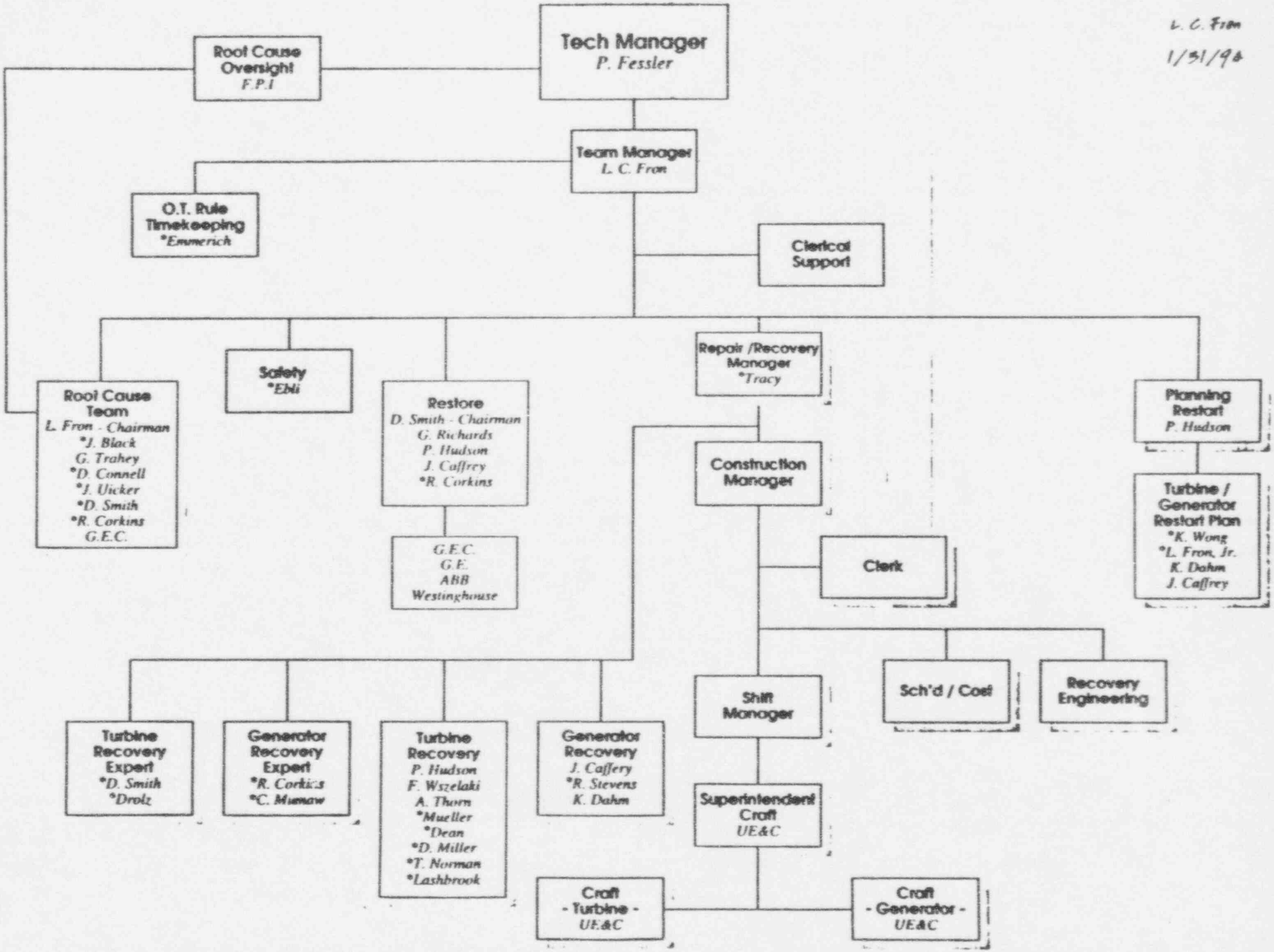
OUTAGE 93-06/RF04 TRANSITION ORGANIZATION



RF04 OUTAGE ORGANIZATION



L. C. Fron
1/31/96



Radwaste Restoration Action Plan

March 25, 1994
(Rev. 1)

Approvals:

W. Tucker, Team Manager

R. McKeon, Plant Manager

Team Members

Team Manager:	Bill Tucker	
Team:	Joe Doyle	System Engineering Support
	Bruce Cummings	System Engineering Support
	Dan Mesaros	I&C Component Restoration Process
	Manny Sierra	I&C Component Restoration Process
	Mike Hobbs	Electrical Component Restoration
	John Wiegand	Electrical Component Restoration
	Dave Pettinari	Radwaste
	Shaun O'Hern	Radwaste Operations
	R. Laubenstein	Radwaste Operations
	Ed Vinsko	Scheduling
	Bruce Wood, Van Vuyovich	I&C
	Rob Peters, John Thompson	Electrical
	George MacAdam	Radiation Protection

NOTE: Other System Engineers will be used as their expertise is needed.

Mission Statement

The objective of this action plan is to restore Radwaste to full, reliable operation. First priority will be placed on establishing process streams, and secondly on full restoration of component operability and reliability.

Major Objectives

NOTE: Equipment recovery is broken into five objectives as described below:

Objective 1: Restore flow path for radwaste liquid processing. This essentially will cover liquid receipt, processing, and release or recycle.

Objective 2: Restore the solid waste processing path to facilitate acceptance of design, decant and dewatering.

Objective 2.5: Restore Radwaste and Turbine Building floor and equipment drain sumps, including pumps and instrumentation to normal operating status.

Objective 3: Restore remaining normally used equipment to normal level of reliability, operability and calibration. Corrective maintenance backlog items will also be incorporated into this phase.

Objective 4: Restore the Waste Evaporators to their level of readiness prior to the December 94 event. (Since this equipment is not normally used, only limited component checkout will be performed.)

Objective 5: Place equipment that is not used and has no prospect of future use in a permanent, safe abandoned condition. This will include primarily the asphalt solidification system. The intent here will be to provide adequate cleanup, removal, and modification to leave these items in a safe, clean condition, with minimum expenditure of resources.

NOTE: Objectives 1 and described above are supported by actions listed below. In some cases, it will be necessary to modify the detailed items to be repaired to support an objective due to equipment damage, parts availability etc. This plan will not be revised to incorporate such changes which may be approved by the project team. Detailed component level plans and schedules will be incorporated with the support of the work control group for all objectives. Objectives 1, 2, 2.5 and 3 will be completed in a manner to support RF04. Objectives 4 and 5 may be completed after RF04.

The initial two objectives are intended to restore minimal equipment to operation. Some automatic valves may be positioned manually, and not all instrumentation or redundant equipment will be made operable.

General Actions:

1. Develop schedule/plan Work Packages:
   Develop overall integrated schedule and plan work packages.
   It is anticipated that several changes may be necessary as the extent of component damage is identified and as cleanup and restoration techniques are developed.

   A. Develop Objective 1 & 2 component lists (complete)
   B. Develop Objective 3 component lists (complete)
   C. Plan Objective 1 Packages (complete)
   D. Plan Objective 2 Packages (complete)
   E. Plan Objective 3 Packages
   F. Schedule Objective 1 (complete)
   G. Schedule Objective 2 (complete)
   H. Schedule Objective 3
   I. Plan and Schedule Objectives 4
   J. Plan and Schedule Objective 5

2. Develop Component Recovery Methods:
   Develop method to remove, cleanup, and restore various types of electrical instruments, motors, etc. Methods will require revision as experience is gained. Initial methods developed by: (complete).

3. Remove water and oil from radwaste basement area. This will include cleanup to remove oil film and contamination to the greatest extent possible. (complete)

4. Develop water management plan to handle and reduce water coming to Radwaste (about 1000 gal/day) while equipment restoration is in progress. (complete)

5. Inspection and Damage Assessment
   When water/oil is removed the following damage assessments will be performed:

   A. Inspect mechanical/structural features to identify damage to walls, tanks, structural integrity.

   B. Walk systems with drawings and electrical and I&C component planning lists to validate initial planning lists.

6. Accumulate CECO, drawings, and other design document errors identified during restoration and incorporate in permanent document updates.

7. Review outstanding work request and incorporate needed corrective maintenance into the appropriate restoration objectives.

Objective 1 Tasks:

1. Waste Surge Tank (G1101A005) - Largest Tank and also receives Condensate Phase Separator Decant.

   A. Level Indication
   B. Pump (either G1101-C015A or B)
   C. Valves G11-F115
      G11-F119

2. Waste Sample Tanks (G1101A004A&B) Require 2 to allow discharge of one while processing to and/or receiving the other. Recommended Tanks A and B they are the largest. (NOTE WSAT C Motor is different than the others).

   A. Level indications
   B. Pumps - G1101-C014A
      G1101-C014B
   C. Valves - G11F101A
      G11F101B
      G11F540A
      G11F540B
      G11F709
      G11F713
      G11F184
      G11F185
      G11F733

3. Discharge Rad Monitor and Valves G11-FW25 and G11FW26 and Discharge Flow Recorder FIR-R703.

4. Condensate Phase Separator (G1101D040A&B) to allow for backwashing of filters in radwaste used during process.

   A. Level indications
   B. Pumps - Decant Pumps G1101-C024A or B
   C. Valves - G11F519
      G11F213A
      G11F213B
      G11F791

5. Floor Drain Collector Tank - (G1101-A006) Assume using the Waste Collector Filter to preclude using Evap Feed Surge Tank.

   A. Level Indication
   B. Pump - G1101-C016A or B
   C. Valves - G11-F385
      G11-F523

6. DO-28 Sump Pump - To allow us to pump sump alley in Turbine Building to Radwaste via floor drains to keep level down until other sump pumps can be repaired.

   A. Level probes if required.
   B. Pumps G1101 - C005A or B

7. Temporary pumps from the WCT to the Waste Surge Tanks of FDCT to allow processing of the tanks.

8. Assumption is to move resins but not process due to capacity available in tanks at this time.

   Condensate Backwash Receiving Tank (G1101A014)

   A. Level indication
   B. Pumps G11 - C022 A or B
   C. Valves - P11-F167
      G11-F208A or B

Objective 2 Tasks:

1. Condensate Phase Separators (G1101D040A&B)

   A) Pumps: Sludge G1101-C025 B or C
   B) Valves G11-F792 A and B
   G11-F793 A and B
   G11-F794 A and B
   G11-F795 A and B
   G11-F265
   G11-F788

2. Centrifuge Feed Tank (G1105-A032)

   A) Level indication
   B) Pumps - G1105C049 A or B
   C) Valves - G11-F775
   G11-F779
   G11-F781
   G11-F787
   G11-F666
   G11-F774

3. Isolok Sampler and Associated Equipment (G1105-0139)

4. Waste Clarifier (G1101-A022)

   A) Level indication
   B) Sludge Pump (Allow Transfer of Spent Resin Tank) G1101-C048
   C) Slurry Dilution Pump (G1118C068)
   D) Valves - G11-F765
   G11-F712
   G11-F761

5. Spent Resin Tank (G1101-A001)

   1) Level indication

FERMI 2

REACTOR PRESSURE VESSEL INTERNALS

FEBRUARY 25, 1994

APPROVAL: R. McKeon
R. McKeon
Plant Manager

2/26/94
Date

REACTOR PRESSURE VESSEL INTERNALS

TEAM MANAGER: B. SHEFFEL
TEAM MEMBERS:
R. Hambleton, A. Brooks, H. Kantrowitz, G.E. Co.

1.0 PURPOSE:

A) To assess the effects of off normal RPV water chemistry on Reactor Pressure Vessel Internals. This will include both near term and long term effects.

B) To determine the effect of off normal RPV water chemistry on planned and unplanned Inservice Inspections.

C) To take all actions necessary, cost effective and practical to mitigate the negative effects of off normal RPV water chemistry.

2.0 ACTIONS:

A) Review Fermi 2 water chemistry since startup and its related effects on Reactor Pressure Vessel Internals and Intergranular Stress Corrosion Cracking (IGSCC). This action has been assigned to General Electric Company under the direction of ISI.

1) Preliminary results (**01-28-94**) (**may be later based on when chemistry is restored to normal**). **Preliminary results received. Will require additional visual examinations of RPV internals and possibly up to 4 RPV Nozzle UT additional inspections.**

2) Final results (**03-31-94**).

B) Assess the probability of immediate adverse impacts of the vessel transient (**01-17-94**). No immediate impacts, all long term.

C) Specifically determine the effects of the off RPV water chemistry on RPV internals materials for the period starting 12/25/93 and continuing until the RPV water chemistry is returned to normal. This action has been assigned to General Electric Company. This will include a review of other plants who have experienced similar transients in water chemistry such as: (**02-28-94**)

- o Millstone
- o Hatch
- o Brunswick

1) Develop a Fermi 2 matrix of components with high probability of being impacted by the transient. Currently in progress, expected to be completed by 03-31-94.

D) Review current and future ISI RPV Internals inspection plans and modify them based on the following:

1. Effects of off normal RPV water chemistry on Reactor Pressure Vessel Internals and IGSCC initiation / acceleration (**Preliminary 1-28-94**). No early negative effects, all longer term. Final evaluation will be completed by 03-31-94.

2. Specific effects on the inspection plans for the RPV Core Shroud and Jet Pump Hold Down Beams. No impact on Jet Pump Beams as they are being replaced. Little effect on Core Shroud Inspections except for increased area of inspections. Final Scope by 03-31-94.

E) Investigate the effects of the off normal RPV water chemistry on RPV sediment retention of chlorides and sulfates and the need to hydrolaze RPV internals to reduce trapped chlorides and sulfates against sensitive RPV internals. **(2-28-94)** A RPV internals flushing plan/scope is currently being developed by G.E.. This is expected to be completed by 03-31-94. Flushing will be applied to only those components necessary.

F) Review previous data available from other plants with respect to off normal RPV water chemistry and the associated negative effects. Ongoing expected completion date of 03-31-94.

G) Assess the water transient metallurgical effects, long term, on those systems affected by the out-of-specification water (i.e., Feedwater and associated RPV Nozzles). **(03-31-94)**

1) Provide recommendations for inspections.

H) Modify RF-04 ISI Inspection Plans to address recommendations resulting from the above investigations by both GE and ISI. **(03-31-94)**

I) Perform a detailed assessment of inspection results, provide a disposition of any positive indications as well as recommendations for further inspection or more detailed metallurgical analysis, if necessary. Also include the long term impact assessment of stress corrosion cracking of RPV components **(03-31-94) and RF-04.**

J) Provide any required input to support a Plant restart. A Safety Evaluation addressing RPV Internals will be prepared by 03-31-94.

FERMI 2

SEQUENCE OF EVENTS
RECORDER INVESTIGATION

JANUARY 13, 1994

Approval Robert T McKeon 1/14/94

Robert McKeon Date

INVESTIGATION OF SEQUENCE OF EVENTS RECORDER ANOMALIES

TEAM MANAGER: G. DePalma

TEAM MEMBERS

R. Hessler J. Bond B. Thompson R. Welliver A.Banek

Mission Statement: Investigate Sequence of Events Recorder (SOER) anomalies which occurred during the 12/25/93 scram.

Actions:

1. Generate memo on SOER operation and known limitations.
2. Obtain list of SOER points where anomalies occurred.
3. Contact Salem Nuclear Power Plant about spurious alarms which have occurred there.
4. Search completed work requests for previous history of spurious alarms.
5. Search DER records for related activities.
6. Develop work request for knife switch testing of anomalous points.
7. Conduct knife switch testing of anomalous points.
8. Develop work request to replace anomalous point input boards.
9. Replace anomalous point input boards for off-site testing.
10. Investigate NO/NC bus switch positions for input board 1000 - 1009.
11. Send anomalous input boards to TES for testing.
12. Review results of TES testing.
13. Develop report on findings and develop corrective actions if required.
14. Implement corrective actions.

FERMI 2

CONDENSER REPAIR ACTION PLAN

REVISION 2

March, 31, 1994

Date 3/31/94

J. W. O'Donnell

J. W. O'Donnell

Date 4/5/94

R. McKeon

R. McKeon

CONDENSER REPAIR ACTION PLAN

TEAM MANAGER: J. W. O'DONNELL

TEAM MEMBERS

Field Engineering	Design Engineering	System Engineering Support
P. Offerle	None	P. McComish

Operations Support	Contract Support	R.P./ALARA
K. Burke	Heat Exchanger Service Heat Exchanger Systems O.B. Cannon UE&C Armstrong & Sons Inland Water	S. Dyer D. Scheller

Mission Statement

Repair the main surface condenser to a state to support design power levels. Implement EDP-13764 (Extraction Steam Piping) and PDC-13819 (Waterbox Manway Replacement).

Major Actions:

- Determine scope of damage via floodup, air pressure and eddy current testing. (South side complete)
- Determine scope of repair activities with include: tube and stake replacement, dog bone inspection/repair, coating repair. (On going)
- Based on work scope define work window. (On going)
- Prepare joint strength test specification. (Complete)
- Perform joint strength tests. (Week of 4/11/94)
- Integrate work activities into Plan of the Day. (On going)
- Purchase and receive new tubes in accordance with specification 3071-B00-Pur-110 Rev A. (On going)
- Prepare TSRs to support work scope.

Miscella eous/Support Actions

- o Decon water boxes. (Complete)
- o Determine the configuration a salvage contractor will accept the old Titanium tubes in; straight vs. chopped and split. (Complete - Alaron will provide 36 B25 LSA boxes)
- o Tube inspections at TIMET. (On going)
- o Joint strength tests at HES.
- o Equipment/tooling inventory/packing/shipping with security and RP. (On going)
- o Design/establish a craft break room/office to support condenser and turbine activities. (Complete)
- o Issue requisitions for materials/contracts. (Majority Complete)
- o ALARA plan. (Complete)
- o Establish interface requirements with OPS, RP, MODS, and Turbine Group.

General Summary

A detailed eddy current test/testing of the tube damage identification plan was prepared with system engineering, condenser group and heat exchanger consultant input. During the month of March the southeast and southwest tube bundles were completed. Based on the results of the testing, (see attached maps), both the upper steam lanes will have to be retubed. To repair the damage, 2500 additional tubes have been ordered, with a delivery date of April 4, 1994. Because of the damage identified on the south end additional testing will be conducted on the north end.

JWo:vlp

FAX

GEC ALSTHOM

ELECTROMECHANICAL

LARGE STEAM TURBINES

Date: 21 February 1992

To: NORMAN W. MIMS, JR.
ASSISTANT SUPERINTENDENT
ENRICO FERMI

Fax: (313) 586-5209

From: D.G. HARRIS
SERVICE MANAGER
CONSTRUCTION & SERVICE

Fax: (0788) 531109

Tel: (0788) 531003

No. of Pages: 4 (inc. this one)

Subject: FERMI 2 - LP3 STAGE 8 BLADES

Copy To: Mr. Bruce Hravatic, Fermi Purchasing

In confirmation of my telephone discussion with you last week I reply as follows to your faxed letter dated 7th February (reviewed 10th).

It was not until a telephone discussion with Bruce Hravatic during late January that I first became aware DECO were excluding from RF03 an inspection of L.P.3 turbine and a change out of the last row stage 8 blades.

Historically, we understand the position as follows:

All three L.P. turbines were opened and inspected in RF01. As a consequence of extended turning gear operation before and during first start-up the stage 8 blades in all three L.P. turbines showed excess tip rock and wear at the lacing spool pins and the pin holes in the blades.

Ripple springs were inserted under the stage 8 blade roots of all six flows to deal with the tip rock and minimise wear during future turning gear operation.

It was agreed, at the time, that ideally all six rows of blades should be repaired or replaced. Time was against a repair and since only one rotor set of spare stage 8 blades was available only two flows of moving blades could be replaced.

The wear was worst on L.P.1 stage 8 blades and it was agreed therefore to replace those blades and refurbish the used, worn blades for fitting on a rolling basis to L.P.2 and L.P.3 during RF02 and RF03 respectively, to restore all six flows of Stage 8 to design standard at the completion of RF03. Accordingly, on completion of RF01, our Technical Service Report TS 1410 dated 19 January 92 recommended on Sheet 30, Item 13.2.4, that L.P.3 stage 8 blades should be replaced using the refurbished ex-L.P.1 blades during RF02.

Some time after this report was issued a decision was taken to replace L.P.2 stage 8 blades at RF02 instead of L.P.3 stage 8 blades. This caused us no concern because:

1) Inspection of the blades during RF01 indicated no significant difference in the stage 8 blade wear in L.P.2 and L.P.3.

2) We understood it was still DECO's intention to replace L.P.3 stage 8 blades in RF03.

Barry Ingle's report TS 1523 on RF02 duly reflected the original agreement we had made with DECO and recommended on Sheet Nos. 23 and 31, Items 5.1 and 11.2.1 respectively that L.P.3 stage 8 would be changed at RF03 using refurbished ex-L.P.2 blades, which would complete the L.P. stage 8 refurbishment started in RF01 to restore all L.P. stage 8 blades to design configuration.

I believe this was also well discussed and agreed between our Technical Service Engineer, Barry Ingle and Paul Hudson during RF02. To confirm this I attach for your information a copy of each inspection data sheet for L.P.3 stage 8 lacing hole wear during RF02. Both sheets were signed/initialled by Barry Ingle and Paul Hudson on 31 May 1991. On the front flow record sheet in Barry Ingle's hand and the rear flow record sheet in Paul Hudson's hand there is a short note to the effect that L.P.3 stage 8 blades would be changed in RF03.

To support this, Paul Hudson, during a telephone conversation with me in late November 1991, stated that L.P.3 turbine would be opened during RF03.

I hope the foregoing explains adequately our understanding of the position with respect to changing L.P.3 stage 8 blades in RF03.

While we do not think the reliability of the turbine will be prejudiced as a consequence of not changing L.P.3 stage 8 blades at RF03, we continue to be of the opinion that this stage should be restored to design configuration as soon as convenient. However, should DECO wish to defer this change to RF04, since these blades are accessible during refuelling outages without removing the L.P.3 turbine top half covers and the wear between RF01 and RF02 was not significant, a close in-situ inspection of the lacing spool pins and holes, during RF03, would identify excessive wear which may require the replacement option to be adopted.

The erection of simple staging inside the exhaust chamber at each end of L.P.3 turbine will allow the measurement of stage 8 tip rock, lacing spool wear and wear at the lacing spool holes in the blades. We have in any event already recommended this level of inspection of L.P. last stage blading for any Fermi L.P. turbine not being opened at a refuelling outage. For this recommendation refer to our RF01 Inspection Recommendations Issue A dated July 1988 and Issue B dated August 1989. We therefore recommend that you consider applying this level of inspection to all three L.P. turbines at RF03.

In your letter you indicated that you had already completed your plans for RF03. If the Work Specification for this is made available to us we would be most willing to provide you with an outline Inspection Specification appropriate to your planned scope of work.

Should you have any further questions on the content of this letter please do not hesitate to contact me.

D.G. HARRIS

MTG LOW PRESSURE BLADING VISUAL INSPECTION

Revision Summary

1) Procedure revised to incorporate field comments.
2) Revised Attachment 1 and 3
3) Revised Enclosure A
4) Added Attachment 2
5) See revision bars

Implementation Plan

[ ] Revision effective immediately - ongoing work impacted

[X] Ongoing work may proceed using previous revision

CONTROLLED
NOV 13 1992
DATE EXPIRED

CONTROLLED
OCT 14 1992
EXPIRES DM

Attachments

1	040892	Tip Rock Data Record
2	040892	Lacing Spools Axial Movement
3	040892	Lacing Spools Wear Record

Enclosures

A	040892	Blade Tip Rock Measurement
B	091688	Planning and Preparation

ARMS - INFORMATION SERVICES

Date approved _____ Release authorized by: _____

Change numbers incorporated: 92-0513

DSN 35.109.005 Rev 21 Date _____

DTC TPNPP File 1703.02 Recipient 367

1.0 PURPOSE

To prescribe the method for visual inspection of the portions of low pressure turbine that are accessible from inspection covers of L.P. exhaust hood.

2.0 PRECAUTIONS AND LIMITATIONS

1. The turbine must be cooled to ambient conditions before turning gear may be secured and turbine inspected.

2. Prior to commencing visual inspection, notify PQA to perform a surveillance of visual inspection in progress.

3.0 PREREQUISITES

1. Condenser Hotwell to be drained by Operations.

   Initial/Date 042392

2. Confined Space Entry Permits completed.

   Initial/Date 042392

3. Turbine rotor inspection platforms erected inside condenser.
   Placed scaffolding pipe 4" diameter and secured on outside.

   Initial/Date CMC 4-24-92

4. Last stage erosion shield joint preservative to be applied?
   (Turbine Outage > 12 weeks)

   NO (yes/no)

   Initial/Date

4.0 PROCEDURE

Work Request 1017131919121013111121

NOTE 1: Only those sections required by Work Request need be performed.

NOTE 2: This procedure may be performed at each end of each low pressure cylinder. Procedure may be performed concurrently at more than one inspection point if manpower and material are available. Due to distance between inspection points, each site shall have a person to attend worker performing inspection.

4.1 Turbine Entry

1. ✓ Remove inspection cover from end of low pressure exhaust hood.

2. ✓ Coordinate with Operations to analyze atmosphere inside turbine cylinder.

3. Erect special scaffolding for inspection.

4.2 Inspection

1. Conduct a thorough visual inspection of portions of last stage blading and disc visible from inspection opening and inside condenser, paying particular attention to condition of erosion shields.

   NOTE: Erosion shields are hardened metal inserts along leading edge of some blades.

2. Measure blade tip rock and record results.

   NOTE: Blades being checked must be near vertical (11 o'clock through 1 o'clock).

   a) Position a depth gauge against discharge edge of blade being checked.

b) Establish a reference point on the adjacent blade. (see Enclosure A)

CAUTION

The use of excessive force to move blade may cause bending of blade.

NOTE: Verify that lacing spools are not binding in blade.

c) Rock blade being checked toward then away from adjacent blade with reference point on it.

d) Measure distance blade rock's and record on Attachment 1

3. Inspect lacing rods.

NOTE: See Enclosure A for part location.

a) Set up a 1 inch travel dial indicator and measure total axial movement of lacing spools. Record on Attachment 2

NOTE: Blades being checked must be near vertical (11 o'clock through 1 o'clock).

b) Visually inspect lacing spools and blade holes for wear. Record on Attachment 3

NOTE: See Prerequisite 4.

4. If turbine rotors are exposed (hoods removed) or turbine is to be out of service for more than twelve weeks, apply krylon crystal clear acrylic lacquer to last stage erosion shield joints.

CAUTION

Ensure personnel and equipment are clear of rotating members while jacking the turbine.

---

5. Jack turbine through approximately 90^{O} of rotation to expose subsequent blading and disc area to inspection.

NORTH LP TURBINE

North End
Satisfactory [ ]
Unsatisfactory [ ]

N/A 10/14/94
Initial/Date

6. Repeat Steps 4.2.1 through 4.2.5 until entire circumference of blading and all visual portions of last stage disc have been inspected.

South End

Satisfactory [ ]
Unsatisfactory [ ]

N/A FRW 10/14/92
Initial/Date

7. Record any unexpected or unusual inspection results in Remarks Section

Remarks _____

4.3 Turbine Close Out

1. Thoroughly clean seating surfaces on inspection cover and exhaust hood facing

NORTH LP TURBINE

North End

Satisfactory [ ]
Unsatisfactory [ ]

N/A FRW 10/14/92
Initial/Date

2. Ensure no foreign material has been left inside turbine.

South End

Satisfactory [ ]
Unsatisfactory [ ]

Installed exhaust hood inspection doors on east and west side only. ECN 10-13-92

N/A 10/14/92
Initial/Date

3. Install new gasket and reinstall inspection cover.

Remarks _____

4. Repeat Steps 4.1 through 4.3.3 for Center LP Turbine.

CENTER LP TURBINE

North End

Satisfactory [ ]
Unsatisfactory [ ]

N/A FTW 10/14/92
Initial/Date

South End

Satisfactory [ ]
Unsatisfactory [ ]

N/A FTW 10/14/92
Initial/Date

Remarks Removed and reinstalled only the right and west exhaust hood inspection cover doors

TURBINE CLOSURES COMPLETE

CMC 10-13-92
Initial/Date

5. Repeat Steps 4.1 through 4.3.3 for South LP Turbine

SOUTH LP TURBINE

North End

Satisfactory [✓]
Unsatisfactory [ ]

CMC 10-13-92
Initial/Date

South End

Satisfactory [✓]
Unsatisfactory [ ]

CMC 10-13-92.
Initial/Date

Remarks Initial bolt tensioning on #3 - south exhaust hood inspection doors. CMC

TURBINE CLOSURES COMPLETE

CMC 10-13-92
Initial/Date

6. Remove scaffolding from inside condenser and perform condenser closeout.

Signed this point off in conjunction with the per work request on dip tick measurements and tacing spool-wear. Refers to exhaust cover inspection doors only. CMC

Condenser Closeout

Satisfactory [✓]
Unsatisfactory [ ]

CMC 10-13-92
Initial/Date

Remarks _____

4.4 Post Maintenance Inspection, Testing or Restoration

1. Unusual or unsatisfactory inspection results shall immediately be reported to Nuclear Shift Supervisor and Maintenance Foreman.

2. See Work Request for additional inspections and tests.

5.0 ACCEPTANCE CRITERIA

1a. Work performed is acceptable; data are within tolerance and all steps were satisfactorily completed.

Paul Hudson 10/24/92
Supervisor/Date

OR

1b. Acceptance Criteria were not met. NSS has been notified before work package signoff for determination of equipment operability.

Supervisor/Date

NSS/Date

2. Remarks

3. Work performed by:

Name (printed)

RUSS RAY BURN
CHARLES McDOWELL
ROBERT CHART
FRANK WARE-HALL

END OF TEXT

TIP ROCK DATA RECORD

SOUTH L.P. TURBINE
NORTH BLADING INSPECTION

Paul Gladen 10/2/92
Signature/Date

Abbreviation: – T = Tight Blade with no tip rock

Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock
1	T	19	T	37	T	55	T
2		20		38		56	
3		21		39		57	
4	T	22		40		58	
5		23		41		59	
6		24		42		60	
7		25		43		61	
8	T	26		44		62	
9		27		45		63	
10		28		46		64	T
11	T	29		47			
12		30		48			
13	T	31		49			
14		32		50			
15		33		51			
16		34		52			
17		35		53			
18	T	36	T	54	T		

Blades numbered clockwise looking on outlet side

TIP ROCK DATA RECORD

SOUTH L.P. TURBINE
SOUTH BLADING INSPECTION

Signature/Date

Abbreviation: - T = Tight Blade with no tip rock

Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock
1	T	19	T	37	T	55	T
2		20		38		56	
3		21		39		57	
4		22		40		58	
5		23		41	T	59	
6		24		42		60	
7		25		43		61	
8		26		44		62	
9		27		45	T	63	
10		23	T	46		64	T
11		29		47			
12		30		48			
13		31		49			
14		32		50			
15		33	T	51			
16		34		52			
17		35		53			
18	T	36	T	54	T		

Blades numbered clockwise looking on outlet side

LACING SPOOL AXIAL MOVEMENT
LP 8th STAGE ROTOR BLADES

SOUTH L.P. TURBINE, NORTH LACING SPOOLS

Paul Bruder 10/15/92
Signature/Date

BLADE NO.	SPOOL AXIAL MOVEMENT	BLADE NO.	SPOOL AXIAL MOVEMENT	BLADE NO.	SPOOL AXIAL MOVEMENT	BLADE NO.	SPOOL AXIAL MOVEMENT
1-2		17-18		33-34		49-50	
2-3		18-19		34-35		50-51	
3-4		19-20		35-36		51-52	
4-5		20-21		36-37		52-53	
5-6		21-22		37-38		53-54	
6-7		22-23		38-39		54-55	
7-8		23-24		39-40		55-56	
8-9		24-25		40-41		56-57	
9-10		25-26		41-42		57-58	
10-11		26-27		42-43		58-59	
11-12		27-28		43-44		59-60	
12-13		28-29		44-45		60-61	
13-14		29-30		45-46		61-62	
14-15		30-31		46-47		62-63	
15-16		31-32		47-48		63-64	
16-17		32-33		48-49		64-1	

All spools moved within wear limits of LP blades - this wear / movement is similar to that recorded in R92 - and since blades will be replaced in R94 it was felt unnecessary to record all the movement values. PSB.

LACING SPOOL AXIAL MOVEMENT
LP 8th STAGE ROTOR BLADES

SOUTH L.P. TURBINE, SOUTH LACING SPOOLS

[signature] 10/21/92
Signature/Date

BLADE NO.	SPOOL AXIAL MOVEMENT	BLADE NO	SPOOL AXIAL MOVEMENT	BLADE NO.	SPOOL AXIAL MOVEMENT	BLADE NO.	SPOOL AXIAL MOVEMENT
1-2		17-18		33-34		49-50	
2-3		18-19		34-35		50-51	
3-4		19-20		35-36		51-52	
4-5		20-21		36-37		52-53	
5-6		21-22		37-38		53-54	
6-7		22-23		38-39		54-55	
7-8		23-24		39-40		55-56	
8-9		24-25		40-41		56-57	
9-10		25-26		41-42		57-58	
10-11		26-27		42-43		58-59	
11-12		27-28		43-44		59-60	
12-13		28-29		44-45		60-61	
13-14		29-30		45-46		61-62	
14-15		30-31		46-47		62-63	
15-16		31-32		47-48		63-64	
16-17		32-33		48-49		64-1	

See comment for north spool axial movement.

LACING SPOOLS/HOLE WEAR RECORD

SOUTH L.P. TURBINE NORTH LACING ROD WEAR

P Richardson 10/5/92
Signature/Date

Abbreviation: - "H" = Wear in hole. "R" = Wear or wastage on rod diameter. I =Inlet. E = Exhaust

Blade No.	Wear	Blade No.	Wear	Blade No.	Wear	Blade No	Wear
1 I BOTH SIDES E	H R	17 I E	H TR	33 I E	H R	49 I E	H R
2 I E		18 I E	3/8	34 I E		50 I E	
3 I E		19 I E	T	35 I E		51 I E	
4 I E		20 I E	T	36 I E		52 I E	
5 I E		21 I E	T	37 I E		53 I E	
6 I E		22 I E		38 I E		54 I E	
7 I E		23 I E		39 I E		55 I E	
8 I E	T	24 I E		40 I E		56 I E	
9 I E	T	25 I E		41 I E		57 I E	
10 I E	T	26 I E		42 I E		58 I E	
11 I E	T	27 I E		43 I E		59 I E	
12 I E	T	28 I E		44 I E		60 I E	
13 I E	T	29 I E		45 I E		61 I E	
14 I E	T	30 I E		46 I E		62 I E	
15 I E	T	31 I E		47 I E		63 I E	
16 I E	T	32 I E		48 I E		64 I E	

Blades numbered clockwise looking on outlet side

LACING SPOOLS/HOLE WEAR RECORD

SOUTH LP. TURBINE SOUTH LACING ROD WEAR

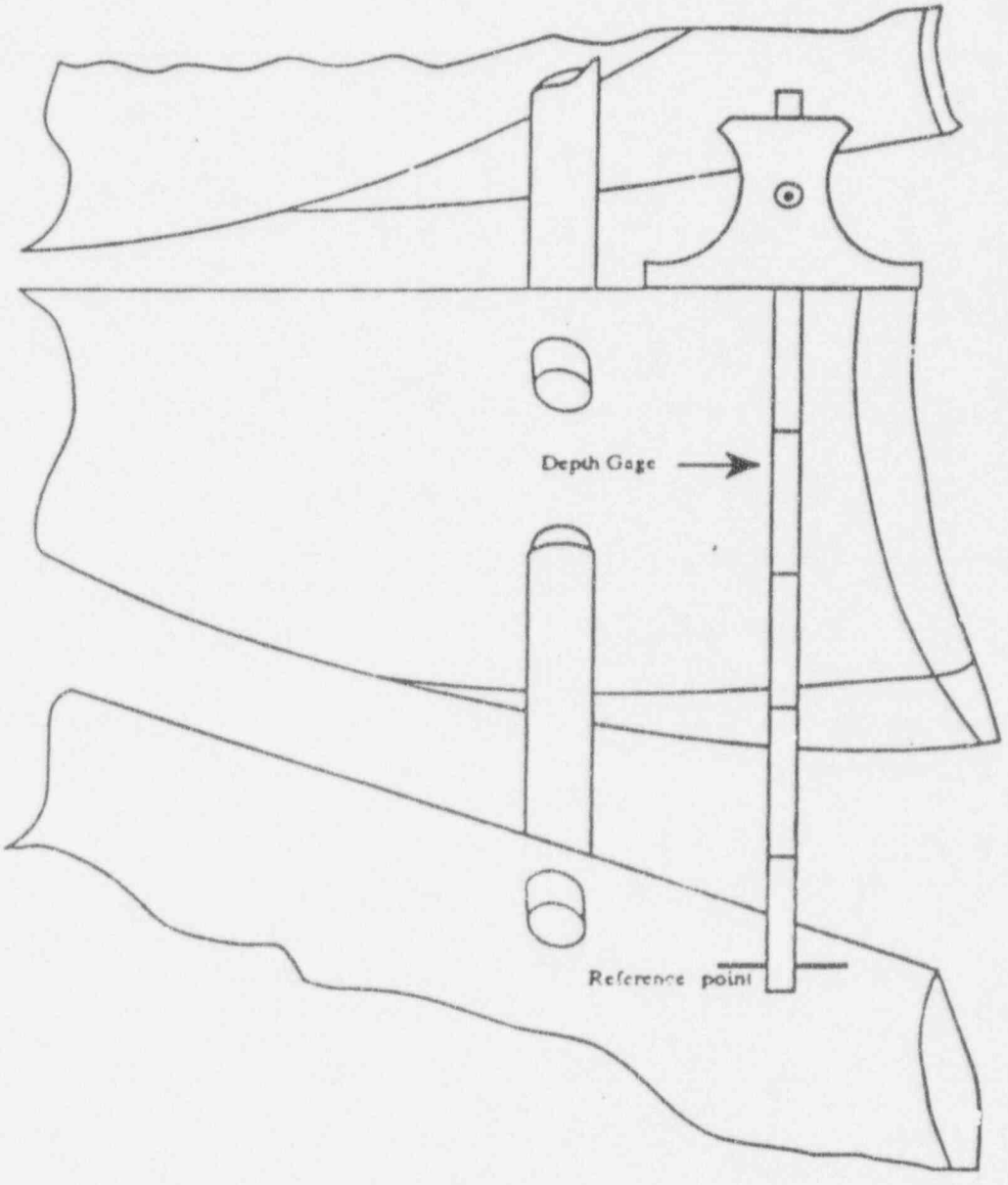
Pat Hudson 10/4/92
Signature/Date

Abbreviation: - "H" = Wear in hole. "R" = Wear or wastage on rod diameter. I = Inlet. E = Exhaust

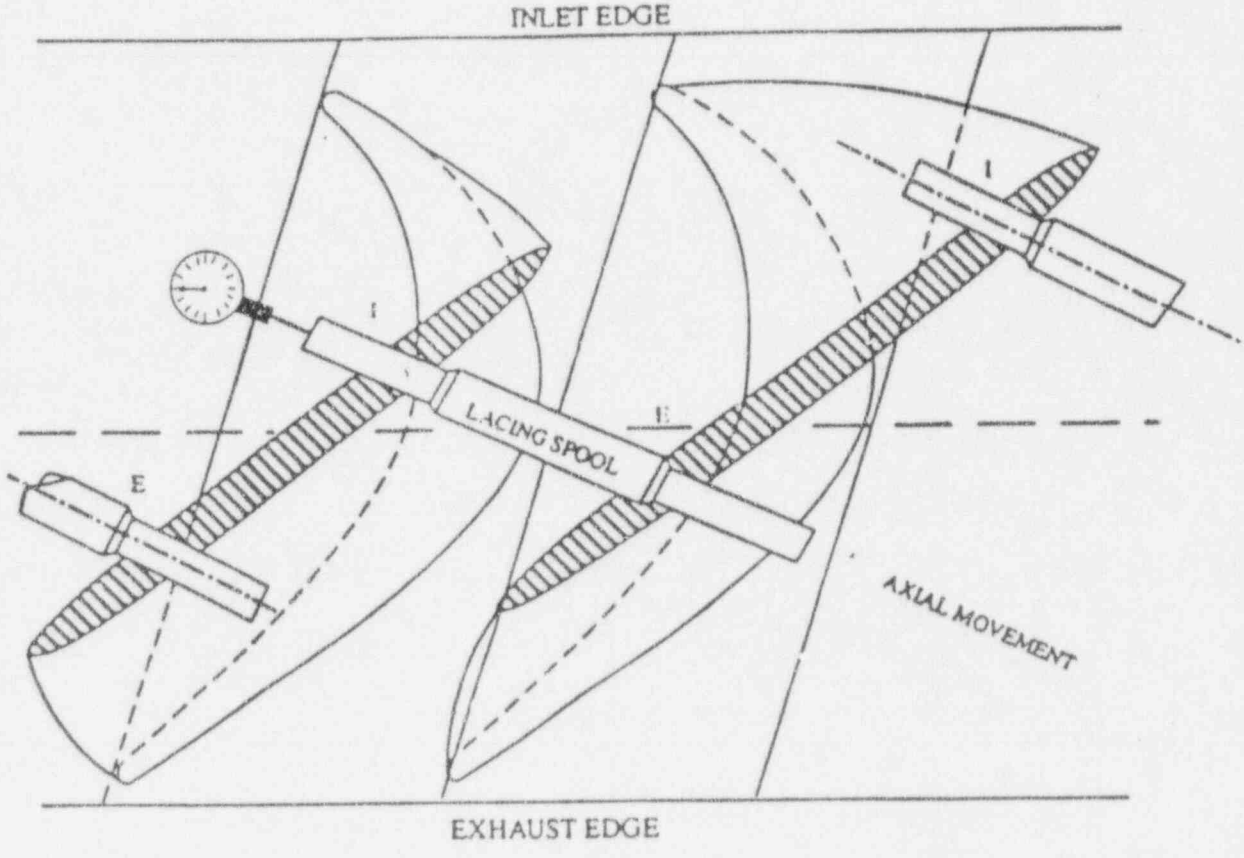
Blade No.	Wear	Blade No.	Wear	Blade No.	Wear	Blade No	Wear
1 I BOTH SIDES E	H R	17 I E	H R	33 I E	T H R	49 I E	H R
2 I E		18 I E		34 I E	1/16	50 I E	
3 I E		19 I E		35 I E	1/16	51 I E	
4 I E		20 I E		36 I E	T	52 I E	
5 I E		21 I E		37 I E	1/32	53 I E	
6 I E		22 I E		38 I E	1/16	54 I E	
7 I E		23 I E		39 I E	9/32	55 I E	
8 I E		24 I E		40 I E	T	56 I E	
9 I E		25 I E		41 I E	5/32	57 I E	
10 I E		26 I E		42 I E	3/16	58 I E	
11 I E		27 I E		43 I E	11/32	59 I E	
12 I E		28 I E		44 I E		60 I E	
13 I E		29 I E	T	45 I E		61 I E	
14 I E		30 I E	T	46 I E		62 I E	
15 I E		31 I E	T	47 I E		63 I E	
16 I E		32 I E	T	48 I E		64 I E	

Blades numbered clockwise looking on outlet side

BLADE TIP ROCK MEASUREMENT
LP 8th stage Rotor Blading



LACING SPOOL AXIAL MOVEMENT
LP 8th stage ROTOR BLADING



I = Inlet
E = Exhaust

0 0 2 0 3

ST:RPT:5:20 DETROIT EDISON - FERMI 2 DATE: 05/05/92
WORK REQUEST PAGE: 1

Plant Impact:PC Work Req#:D739920312
System :N3011
Work Group :60T Priority :A Type:PM

PART 1: COMPONENT IDENTIFICATION

A) N3011C001 MAIN TURBINE STEAM (MTS) MAIN TURBINE

B) Location:TB 3 L-8 643'06" Room:D-41 Turbine Area

C) Additional PIS Numbers:N3018B001 N3018B002 N3021F012A N3021F012B
N3021F012C N3021F012D N3021F012E N3021F012F N3021F013A N3021F013B
N3021F013C N3021F013E N3021F013F

PART 2: TASK DESCRIPTION

A) Task Id:MM8022 Event:D739
INSPECT EROSION SHIELDS, CHECK TIP ROCK,
CHK LACING SPOOL WEAR ON LP-8TH STG BLDS

Critical Complete:11/01/92 0000W

C) Initiator:COX, JOHN W Phone:6-5452 Date:03/12/92

PART 3: GENERAL INFORMATION

A) QA Level	:NQ	F) Fire Protection	:N
B) EQ Related	:N	G) Scaffolding	:Y
C) Seismic	:N	H) Secondary Containment	:N
D) Heavy Loads	:N	I) Tech Spec/Numbers	:N
E) NPRDS Required	:Y		

PART 4: WORK PREPARATION

A) PMC Review	:COX, JOHN W	Date: 03/31/92
B) Planner	:ANTOL, DAVID	Date: 05/05/92
C) RP Reviewer	:	Date: 5/8/92
D) PQA Reviewer	:NOT REQUIRED	Date: 05/05/92
E) ISI Reviewer	:NOT REQUIRED	Date: 05/05/92
F) SYS Engineer	:NOT REQUIRED	Date: 05/05/92
G) Welding Review	:NOT REQUIRED	Date: 05/05/92
H) General Sup	: Paul K Weber	Date: 6/00/92

PART 5: WORK AUTHORIZATION

A) Specific RWP :[ ]N/A Number: SPECIFIC 92-0216
B) Protection Required to Commence Work [X]No STEP #1 ONLY
Protection Leader: Date: 9-16-92
Operations : Date: 9-16-92
C) ALS :[ ]N/A Number: 92-0216
D) LCO :[X]N/A Number:
CRIS DOT :[X]N/A Number: Expires:
NSS/NASS : Date: 9/16/92
E) CRNSO : Date:
F) SSS :NOT REQUIRED Date: 05/05/92
G) Request for Cancellation: Date:
Reason:
NSS/SSS Concur: Date:

Rev: 082691 DTC: VSWKRQ FILE: 1230

STEP #1 REQUIRES NO PROTECTION
STEP #2 CONTACT OPERATIONS FOR TEMP PROTECTION #92-0216

NUCOPS-FILE 1230

A/C N-24-92

Work Req# :D739920312

PIS:N3011C001

PART 6: WORK IDENTIFICATION

A) Problem or Request Description
INSPECT TIP ROCK OF LP-3 ONLY. BASED ON INSPECTION RESULTS OF LP-3, SCOPE OF WORK MAY BE EXPANDED TO INCLUDE LP-2 AND LP-1.

B) Impact Statement - (PLANT COLD OUTAGE)
TUBINE OFF-LINE, CONDENSER HOTWELL DRAINED, TURBINE COOLED TO AMBIENT CONDITIONS TO ALLOW TURNING GEAR TO BE SHUTDOWN FOR BLADE INSPECTION.

PART 7: JOB INSTRUCTIONS

Step: 1 MECHANICS / No Protection Required 9-16-92
CONTACT RP PRIOR TO START OF WORK FOR SPECIFIC RWP REQUIREMENTS.
RP TO SURVEY LP EXHAUST HOOD ACCESS COVERS DURING REMOVAL.
Init:
Comments: N/R
Date: 9-15-92

Step: 2 MECHANICS / Contact Ops to verify Proper Protection
CONTACT QA PRIOR TO START OF WORK TO PERFORM A SURVEILLANCE OF INSPECTION IN PROGRESS (QA MAY WAIVE INSPECTION IF THEY SO DESIRE).
Init: WHH
Comments: DAVID KOHR WAS NOTIFIED AND CHKD SIGNOFF OF THIS PROC 9-16-92 1317 WHH
Date: 9-16-92

Step: 3 MECHANICS
REMOVE LP-3 EXHAUST HOOD COVERS.
Init: JCR
Comments:
Date: 9-16-92

Step: 4 MECHANICS
CONTACT OPERATIONS TO PROCESS AND POST "CONFINED SPACE ENTRY FERMIT".
Init: DAE
Comments:
Date: 9-22-92

Step 3A. MECHANICS
Remove LP-1 Exhaust Hood Coders as Required by Turbine Supervision. Continued Required by Entry/Access Point. Confined Space Permit
Init:
comments: Removed LP-1 Exhaust Hood Covers 10-5-92
DATE: 10-5-92
MW 10-5-92

PIS:N3011C001 Work Req# :0739920312

JOB INSTRUCTIONS CONTINUED

Step: 5 MECHANICS
ERECT SPECIAL SCAFFOLDING, AS REQUIRED, FOR INSPECTION.

Comments: PICK SECURED ON OUTSIDE AND PLACE [illegible] SAT ON. Init: CM^C Date: 9-24-92

Step: 6 MECHANICS
MEASURE BLADE TIP ROCK ON NORTH AND SOUTH ENDS OF LP-3 AND RECORD INSPECTION RESULTS PER 35.109.005.

Comments: TIPPE (DIS NO TIP ROCK ON PINT BECAUSE PINES TP OF LPE SPOOL- LPE-3 CLIMBS TO INSP - BLADES TO BE SUPPORTED ON TOOF Init: CM^C Date: 9-25-92

Step: 7 MECHANICS
IF NECESSARY, (BASED ON LP-3 INSPECTION REULTS), MEASURE AND RECORD TIP ROCK ON NORTH AND SOUTH ENDS OF LP-2 AND LP-1.

Comments: [illegible] Prod. Init: CM^C Date: 9-25-92

Step: 8 MECHANICS
FOLLOWING COMPLETION OF INSPECTION, CONTACT OPERATIONS TO PERFORM A CLOSEOUT INSPECTION OF LP-3, LP-2, AND LP-1 (AS APPLICABLE) FOR THE PRESENCE OF TOOLS AND FOREIGN MATERIAL PRIOR TO REPLACEMENT OF LP EXHAUST HOOD INSPECTION COVERS.

Comments: Init: CM^C Date: 10-13-92

Step: 9 MECHANICS
CLEAN GASKET SEATING SURFACES, FABRICATE AND INSTALL NEW INSPECTION COVER GASKETS, REPLACE INSPECTION COVERS AND TIGHTEN.

Comments: Init: CM^C Date: 10-13-92

Step: 10 MECHANICS
REMOVE ALL SCAFFOLDING, IF INSTALLED, FROM INSIDE CONDENSER AND CONTACT OPERATIONS TO PERFORM A CLOSEOUT INSPECTION OF CONDENSER.

Comments: Audit Inspect Findings Init: CM^C Date: 10-13-92

WST.RPT.5.20

DETROIT EDISON - FERMI 2
WORK REQUEST

DATE: 05/05/92
PAGE: 4

PIS:N3011C001

Work Req# :D739920312

PART 8: HISTORY

A) As Found Condition/Cause of Failure

B) Work Performed/Corrective Action

Checked Zip Lock and Lacing spot on Measurement was satisfactory. Exhaust Load inspection hangers were reinstalled with anti-seize and torqued.

(Ref.) Scaffolding kick was installed through door openings as a work picture.

PART 9: JOB INSTRUCTIONS COMPLETE

A) ✓ :Completed, as expected
___ :Completed, on Another Work Request - Request#: _____
___ :Completed, problems encountered

Verified work area was left in acceptable house keeping condition

Performed By: Russ Rayburn Paul Hudson Date: 10-13-92
Robert Clarke Date: 10-13-92
Charles McDowell Date: 10-13-92
Signature

B) Work Complete Supervisor: Charles McDowell Date: 10-13-92
Paul Hudson
10/2/92

WST RPT 5 20[illegible]

DETROIT EDISON - FERMI 2
WORK REQUEST

DATE: 05/05/92
PAGE: 5

PIS:N3011C001

Work Req# :D739920312

---------- PART 10: PMT INSTRUCTIONS ----------

Step: 1 MECHANICS
UNUSUAL OR UNSATISFACTORY INSPECTION RESULTS SHALL BE REPORTED TO THE NSS AND MAINTAINANCE FOREMAN, AND DISCREPANCIES CORRECTED PRIOR TO WORK REQUEST SIG-OFF.
INSPECTION RESULTS SAT/OR DISCREPANCIES CORRECTED _____/_____

Comments: Inspection information given to Paul Hudson Init: CMC

Date: 10-4-92

All Blades exhibited no tip rock - the lacing spools are worn on their small diameter and the blades are worn where the spools pass through them. This wear is of the same magnitude as that noticed in RO2 and it is not felt necessary to record this wear, since all blades will be changed in RO4.

Paul Hudson 10/4/92

---------- PART 11: WORK CLOSURE ----------

A) DPR Complete :NOT REQUIRED Date:05/05/92

---------- PART 12: RETURN TO SERVICE ----------

A) CRIS Dot Removed CRNSO: NA Date: —

B) Work area was left in acceptable house keeping condition (-Yes

Work/PMT Complete NSS/SSS: [signature] RTS Date: 10/22/92

---------- PART 13: POST WORK REVIEW ----------

A) ISI Review :NOT REQUIRED Date:05/05/92

B) Welding Review:NOT REQUIRED Date:05/05/92

00208

Work Req# :D739920312

PIS:N3011C001

PART 14: TOOLS/M&TE

	Number	Description	Calibration Due Date
A		SPECIAL SCAFFOLDING	
B		STARRET ADJUSTABLE T-SQUARE	

PT.5.20 DETROI :I'2 DATE PAG

D7

:N3011C001

---- PART I] : PE

D Number	Descript		e
002910111	E TEMP / URBINE BEARI	MAI FLE	1
002911058	LEAN MAIN TU REDUCE AIR	IGHT	—
002911059	IN-LEAKAG OX. 35-5	ELLO	—
002911084	STALL OPTIC TS FOR TU	LS SUI	1
002911507	PAIR TURBIN EALS AND	PO	1
002912176	TURB. B E BELOW	BET PS	—
002912516	NE VIBRA MUST BE	CAT PO	1
002920552	BEARI T & RE	CAN Y.	—
01B881117	R EROSI E EXTRA	R EX	9
01C890425	E CONC TURBINE	SI VER	
01C890815	STAGE NIZIN	S OF	89
01D901225	TURBINE TM 90		
02C890306	E TURBI		89
02C890425	TURBINE BLADES	T SE E	—
02C890613	TURBINE SET UP O	ANSI	—
02C89122	OIL OIL ON	LAC	90
02D901101	E LP#3 GNALS FO	NG E TO	91
02E910223	ER ORDE E 4TH	EPA APH	91
03C 90425	SIGNAL CANNO	CH LN	—
03C890617	UP OFFIC E DES	E/ PIP	—
04C 9042	E GLA ER ME	EA EN	
04C 9061	ALL SHE ATOR/WA	WA T	
04D 00314	FOR E ARM 4	EPS RN	
05C 9042	M INT S VIA	OF	
05C 9061	DIAPH DECK. T	ON YD.	—
05C 9122	TURBINE (C) RE	KS DEN	

** E CET

RPT:5:20 DETROIT EDISON - FERMI 2 DATE: 05/05/92
WORK REQUEST PAGE: 9

IS:N3011C001 Work Req# :D739920312

PART 18: PARTS REQUIREMENTS

tock Code	Noun	Required Quantity	Unit Issue		Quantity Used
2-9638	GASKET	18.0	SQFT		2
~~1-0116~~	~~GASKET~~	~~1.0~~	~~EH~~	DA 5/5/92	
5-0135	COMPOUND	1.0	CAN		
80-6305	SEALANT				1
82-6944	GASKET				6

ilsition	PO Number	Description	LTA	ROS C017407	Status Notes TO WHSE 5-5
	2214550 2	GASKET - SHEET		C017407	
	2505172 1	GASKET - FLAT		4826944	
	256126-01	SEALANT - TITESEAL		C023422	

5/5/92

PIS:N3011C001 Work Req# :D739920312

CLEAN AREA ACCESS/CLEANLINESS CHECKLIST

PART 1: INITIATION

A) Housekeeping Zone: 3 | B) Cleanliness Class: C

C) Job Description:
INSPECT EROSION SHIELDS, CHECK TIP ROCK,CHK LACING SPOOL WEAR ON LP-8TH STG B LDS

D) Location of Clean Area: TURBINE FLOOR

E) HST/Supervisor Name (print): DAVID A ANDER /(Sign): [signature]

PART 2: IMPLEMENTATION

TABLE 1 - SUMMARY OF ZONE RESTRICTIONS

Restriction	I	II	III	IV	V
Clothing Change	YES	NO	NO	NO	NO
Clean Gloves, Shoe Covers, Head Covers	YES	YES	NO	NO	NO
Filtered Air	YES	NO	NO	NO	NO
Material Precleaning	YES	NO	NO	NO	NO
Material Accountability*	YES	YES	YES	NO	NO
Personnel Accountability*	YES	YES	YES	NO	NO
No use of Tobacco, Drinking or Eating*	YES	YES	YES	YES	NO

*FOR ZONE III OR ABOVE, THESE RESTRICTIONS SHALL BE POSTED IN THE IMMEDIATE AREA.

A) Work Area is Properly Cleaned Prior to Work [ ] See Remarks
Work Group Personnel: _____ Date: CMK 9469Z

B) Access Control Area Established [ ] See Remarks
Work Group Personnel: _____ Date: _____ N/A

C) System Inspection [ ] See Remarks
Work Group Personnel: F W Stolaki FRW See Procedure Date: 10-14-92 [ ] N/A

D) Deterrents in Place (as required) [ ] See Remarks
Work Group Personnel: _____ Date: _____ N/A

E) Closures or Plugs Installed: [ ] Yes
Work Group Personnel: _____ Date: _____ N/A

PART 3: CLOSE-OUT

A) Closures or Plugs Removed (as required): [ ] Yes
Work Group Personnel: _____ Date: _____ N/A

B) System Closeout Inspection
Work Group Personnel: FRW Date: 10-14-92 [ ] N/A

PART 4: REMARKS

B) Access Controlled by R.W.P. Tool control WAIVED by Turbine Supervision. Close out to be performed by Turb bldg prior to removal. Also operations to inspect all openings prior to closure

If material accountability is waived, a close out inspection shall be performed per Area Minimum Closeout section of the Tool Control Log (Form NPP-HK1-01) Part 4.

PIS:N3011C001 Work Req# :D739920312

ACCESS CONTROL LOG

PART 4: AREA MINIMUM CLOSE-OUT

WR/Surveillance Number:	Enclosure Number:	Date:
D739920312	N/A	~~AW~~ 10-14-92
Housekeeping Zone: 3	Cleanliness Class: C	

Verify tools and loose equipment are removed or firmly secured.

EMC 10-13-92
Initials/Date

Verify debris is removed (paper, plastic sheeting, tapes, rags, cable ties, wire, ropes, hoses, etc.)

EMC 10-13-92
Initials/Date

Area cleanliness and equipment deterioration inspected.

~~Operations~~ Crew- 10/16/92

NLT 10/16/92
Initials/Date

ACCESS CONTROL LOG

PART 1: INITIATION

WR/Surveillance Number D739920312 COV 2621625

Date 10-5-92

PART 2: IMPLEMENTATION

Material/Personnel	In Time/ Date	Out Time/ Date	In Time/ Date	Out Time/ Date	Comments
Frank Wszelak	1400 10/5/92	1430 10/5/92	10/5/92		
Phil McCommish	1400 10/5/92	1430			
Paul Hudson	1400 10/5/92	10/5/92 10-5-92			
1 Trouble light	1400 10/5/92	1437			
2 Safetybelts	1400 10/5/92	misc 10/5/92	10/8/92	Ret. Ad @ Glove Box FH	
1 Flash Light	1400	1430			
[illegible]	[illegible]	[illegible]	10-8-92	10-8-92	
[illegible]	[illegible]	[illegible]	1010	1021	
[illegible]	[illegible]	[illegible]	10/8/92 1010	10-8-92 1021	
Alex [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
08-4130 02 Air sampler	10/8/92 1010	10/8/92 1121	10/8/92 1243	10/8/92 1430	
	10/8/92	10-8-92 1021	10-8-92 1230	10-8-92 1530	
ED PRODAN	10/8/92 12:45	10/8/92 1430			
ALEX ROSI	10/8/92 12:45	10/8/92 1430			
KENT LAY	12:45	1430			

PART 3: CLOSE-OUT

Access Control Log Reviewer Signature FH Date/Time 10/21/92 1212

Log NPP-HK1-01 AH2 PT 2 052892

File 0805

96-1319

CONFINED SPACE ENTRY PERMIT

THIS FORM MUST BE COMPLETED BY NSS AND SUPERVISOR BEFORE ENTERING ANY CONFINED SPACE OR EQUIPMENT FOR CLEANING, INSPECTION, OR MAINTENANCE AND POSTED IN THE IMMEDIATE AREA OF THE CONFINED SPACE LISTED IN THE CONFINED SPACE ENTRY PERMIT.

START of Outage until 10-30-92
Date(s) (Inclusive)

PJ N3011 CU01
M/R 0739920312
Work Request No.
WR000B921625

Name of Confined Space to be Entered: Low Pressure #3
Location: 3RD FL TB Generator Area LP-3

APPLICABLE REQUIREMENTS (Initials under Yes or No)

	Required? Yes	No
Safety Harness, Lanyard (when required)	✓	
RTC Retractaloc Lifeline, Continued Entry Rescue and Climbing Protection Device; Rescue Winch; and Removable Ladder Extension (when required)		✓
Hoist, Hand, attaches to Manhole Guard to lift person		✓
Self-contained Breathing Equipment On and Ready		✓
Continuous Purge		✓
Necessary Protective Clothing		✓
Two Outside Safety Persons — ONE Person Required FTW 10-8-92	✓	
Lighting (Explosion Proof) or Flashlights	✓	
Continuous Monitoring	✓	
Communications	✓	
Fire Fighting Equipment	✓	

The precautions and limitations of working under this Confined Space Permit have been explained to those individuals working under my supervision.

	Print Name	Signature	Date/Time
Entry Approved by Job Supervisor	CHARLES McDOWELL	C McDowell	9-24-92 0600
Entry Approved by Job Supervisor	JAMES MASON	James Mason	10-5-92 1800
Entry Approved by Job Supervisor	[illegible]	[illegible]	10-7-92 2300
Entry Approved by Job Supervisor			
Entry Approved by Job Supervisor			

The Confined Space atmosphere has been checked and is safe for personnel entry.

Based on the activity and air quality of this space, air samples shall be taken and recorded on this PERMIT (check one) hourly ___, at the start of each shift ___, daily ✓, weekly ___, monthly ___, or once per outage ___.

Enclosure 15

:C Turbine Generators Limited ATTACHMENT #1

L.P. STAGE 8 LACING HOLE WEAR CYLINDER 3

Unit No. Serial No.

n by John Hoffman Date 4-14-91 Approved by B. Ingle Date 31 MAY 91

PKB 5/31/91

Abbreviations:— 'H' = Wear in hole. 'R' = Wear or wastage on rod diameter.

Blade position at time of reading:

Accepted on basis that blades will be changed at RFO3 B9.

Turbine End

Blade No.	Wear	Blade No.	Wear	Blade No.	Wear	Blade No.	Wear	Blade No.	Wear
1	.250	19	.263	37	.190	55	.136	73	
2	.220	20	.145	38	.225	56	.181	74	
3	.212	21	.145	39	.143	57	.153	75	
4	.285	22	.200	40	.236	58	.116	76	
5	.182	23	.222	41	.125	59	~~.OK~~	77	
6	.233	24	.194	42	.105	60	~~OK~~	78	
7	.160	25	.133	43	.187	61	~~OK~~	79	
8	.140	26	.222	44	.127	62	.238	80	
9	.110	27	(.410)	45	.243	63	.136	81	
10	.235	28	.168	46	.146	64	.120	82	
11	.197	29	.191	47	.180	65		83	
12	.230	30	.115	48	.209	66		84	
13	.215	31	.165	49	.209	67		85	
14	.172	32	.196	50	.246	68		86	
15	.275	33	.164	51	.131	69		87	
16	.178	34	.105	52	.243	70		88	
17	.345	35	.135	53	.125	71		89	
18	.182	36	.155	54	.203	72		90	
								91	
								92	

Blades numbered clockwise looking on outlet side.

LP3 STAGE 8 BLADE CHECKS.

(1) DATA TAKEN IN MAY OF 91 INDICATES NO TIP ROCK BUT THAT CAUSING SPOOLS HAD AXIAL MOVEMENT - WE ARE INVESTIGATING THE READINGS TAKEN AND METHOD USED.

(2) IN RF03 WE USED A NEW PROCEDURE 35.10.91.005 FOR THE FIRST TIME TO TRY AND DUPLICATE THE DATA TAKEN IN RF02 - THIS PROVED TO BE VERY DIFFICULT MACHINE ON STANDS VERSUS MACHINE IN BOXED CONDITION - RESULTS SHOWN IN D739920312 WE ARE CONTINUING OUR INVESTIGATION AND WILL PRESENT A REPORT COVERING RF01 - RF03 EARLY NEXT WEEK.

Paul Hudson 1/15/92.

...ne Generators Limited ATTACHMENT #11

STAGE 8 LACING HOLE WEAR CYLINDER 3

Unit No. _____ Serial No. _____

by John Hoffman Date 4-14-91 Approved by B. Mufe Date 31 MAY 91
PKH 5/21/91

Abbreviations:— 'H' = Wear in hole. 'R' = Wear or wastage on rod diameter. NOTE LP3 STG8 BLADES TO CHANGE RF03

Blade position at time of reading:

GEN. END

Blade No.	Wear	Blade No.	Wear	Blade No.	Wear	Blade No.	Wear	Blade No.	Wear
1	.225	19	.145	37	—	55	.140	73	
2	—	20	.175	38	—	56	—	74	
3	.155	21	.160	39	—	57	.115	75	
4	.120	22	—	40	—	58	.230	76	
5	.200	23	—	41	—	59	.105	77	
6	.105	24	.150	42	—	60	.225	78	
7	.260	25	—	43	.155	61	—	79	
8	.150	26	—	44	.115	62	—	80	
9	.155	27	—	45	—	63	.150	81	
10	—	28	—	46	.100	64	—	82	
11	.215	29	.175	47	.105	65		83	
12	.120	30	—	48	—	66		84	
13	.225	31	—	49	—	67		85	
14	—	32	—	50	—	68		86	
15	.115	33	—	51	—	69		87	
16	.145	34	—	52	.165	70		88	
17	—	35	—	53	.110	71		89	
18	.195	36	—	54	—	72		90	
								91	
								92	

Blades numbered clockwise looking on outlet side.

Turbine Generators Limited

3 L.P. STAGE 8 BLADE TIP ROCK CYLINDER

Contract _____ Unit No. _____ Serial No. _____

Taken by Steve Parnell Date 5-20-91 Approved by B. Wright Date 31 MAY 91
Acted 5/21/91

ATTACHMENT Z

Abbreviation:— T = Tight Blade with no tip rock

Blade position at time of reading: No Recordable Movement in Turb or GEN END

Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock	Blade No.	Tip Rock
1		19		37		55		73	
2		20		38		56		74	
3		21		39		57		75	
4		22		40		58		76	
5		23		41		59		77	
6		24		42		60		78	
7		25		43		61		79	
8		26		44		62		80	
9		27		45		63		81	
10		28		46		64		82	
11		29		47		65		83	
12		30		48		66		84	
13		31		49		67		85	
14		32		50		68		86	
15		33		51		69		87	
16		34		52		70		88	
17		35		53		71		89	
18		36		54		72		90	
								91	
								92	

Blades numbered clockwise looking on outlet side

Detroit Edison

2B

Copy D. PRICE

DATE: MARCH 27 '93

REFERENCE NO. _____

TO: ALAN HOLMES
PHONE: 0785-531-4946.
FAX: 0782 531-949

COMPANY: GEC ALSTHOM.
POST CONTRACT DESIGN
RUGBY.

FROM: JOE CAFFREY.
LOCATION: FERMI 145 AEB
PHONE: (313) 586-5106.
FAX: (313) 586-1615

COMPANY: DETROIT EDISON COMPANY
6400 N. DIXIE HWY.
NEWPORT, MI 48166

NO. OF PAGES
(INCLUDING COVER SHEET: 1

SUBJECT: RESONANT TORSIONAL VIBRATION OF TURBINE L.P. BLADING.

AS A CONSEQUENCE OF THE GE TURBINE EXPERIENCE AT MAANSHAN, WE ARE BEING ASKED BY NPD TO REVIEW APPLICABILITY OF THE SUBJECT MATTER AT ENRICO FERMI.

IN ADDITION TO STANDARD I2 ALARM LEVEL DETECTION, WE HAVE BEEN MONITORING NEGATIVE PHASE SEQUENCE QUIESCENT LEVELS FOR SOME TIME.

CAN YOU FURNISH DATA TO SUPPORT, OR OTHERWISE, THE LACK OF RESONANT MODES WITHIN CLOSE PROXIMITY TO DOUBLE GRID SYNCHRONOUS FREQUENCY ~120HZ

THANK YOU FOR YOUR CO-OPERATION.

REGARDS.

A.

Enclosure 17

NRR

F

P

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

FEB 24 1994

Docket No. 50-341
License No. NPF-43

The Detroit Edison Company
ATTN: D. R. Gipson
Senior Vice President
Nuclear Generation
6400 North Dixie Highway
Newport, MI 48166

Dear Mr. Gipson:

This refers to the routine safety inspection conducted by Messrs. W. J. Kropp, K. Riemer, S. Stasek, and R. Twigg of this office from December 13, 1993, through February 8, 1994. The inspection included a review of activities at your Fermi 2 facility. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

Although no violations of NRC requirements were identified during the course of this inspection, there were instances where contractor oversight should be improved. In the first case, material supplied by the contractor was found defective during post-installation testing. Further examination determined that the material had not been subject to your receipt inspection process. In the second case, the NRC inspectors found contractor personnel had hung personal clothing on station air system valve handwheels and noted a contract individual sitting on a run of station air system piping. In light of the large number of contractor personnel anticipated necessary to support Fermi's recovery efforts, you are encouraged to ensure appropriate Fermi oversight is provided to preclude contractor related problems during this extended outage.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

M. P. Phillips, Chief
Reactor Projects Section 2B

Enclosures:
Inspection Report
No. 50-341/93028(DRP)

cc w/enclosure:
John A. Tibai, Principal
Compliance Engineer
P. A. Marquardt, Corporate
Legal Department
OC/LFDCB
Resident Inspector, RIII
James R. Padgett, Michigan Public
Service Commission
Michigan Department of
Public Health
Monroe County Office of
Civil Preparedness
Fermi, LPM, NRR
E. G. Greenman, RIII

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/93028 (DRP)

Docket No. 50-341 License Nos. NPF-43

Licensee: Detroit Edison Company
2000 Second Avenue
Detroit, MI 48226

Facility Name: Fermi 2

Inspection At: Fermi Site, Newport, Michigan

Inspection Conducted: December 13, 1993, through February 8, 1994

Inspectors: W. J. Kropp
K. Riemer
S. Stasek
R. Twigg

Approved By: _____ 2/22/94
M. P. Phillips, Chief Date
Reactor Projects Section 2B

Inspection Summary

Inspection from December 13, 1993, through February 8, 1994
(Report No. 50-341/93028 (DRP))
Areas Inspected: Routine, unannounced safety inspection by the resident inspectors of operational safety verification, cold weather preparations, engineered safety feature systems, onsite event follow-up, current material condition, housekeeping and plant cleanliness, radiological controls, security, corrective action improvement program, maintenance and surveillance activities, engineering and technical support, and review of licensee reports.

Results: Within the twelve areas inspected, no violations, deviations, or unresolved items were identified. Five inspection followup items were identified that pertained to a loss of off-site power (paragraph 2.d), an Unusual Event declared as a result of a fire in the turbine building (paragraph 2.d), oil intrusion into the turbine building HVAC system (paragraph 2.e), an EDG failure (paragraph 5.a), and a contractor control issue associated with cleanup evolutions (paragraph 5.b).

The following is a summary of the licensee's performance during this inspection period:

Operations:

The operators' response to the December 25 turbine-generator failure event is documented in Inspection Report 50-341/93029. Operators responded appropriately to the January 27 loss of Division 1 offsite power. The operators' response to the January 29 Unusual Event was also timely and correct. There were instances where contractor oversight should be improved. In the first case, material supplied by the contractor was found defective during post-installation testing. In the second case, the NRC inspectors found contractor personnel had hung personal clothing on station air system valve handwheels and noted a contract individual sitting on a run of station air system piping.

Maintenance and Surveillance:

The December 25 event resulted in severe damage to the Fermi 2 turbine-generator system and caused a discharge of large quantities of oil and water to the turbine and radwaste buildings. Maintenance personnel satisfactorily supported the initial clean-up and recovery efforts associated with the turbine-generator failure event.

Engineering and Technical Support:

Engineering personnel satisfactorily supported the scram investigation and turbine-generator assessment activities initiated as a result of the December 25 event and recovery and investigative efforts associated with plant restoration. Engineering's initial response and troubleshooting efforts associated with the December 16 EDG-13 test failure were timely.

DETAILS

1. Persons Contacted

Detroit Edison Company

*S. Bartman, Supervisor, Chemistry
J. Bragg, Group Leader, QA Audits
*R. Delong, Superintendent, Radiation Protection
R. Eberhardt, Assistant to Plant Manager
*P. Fessler, Director, Technical Manager
*L. Fron, Supervisor, Turbine
*D. Gipson, Senior Vice President, Nuclear Generation
L. Goodman, Director, Nuclear Quality Assurance
*E. Hare, Senior Compliance Engineer
*H. Higgins, Supervisor, Operations Support
*J. Korte, Director, Nuclear Security
J. Malaric, Supervisor, Modifications
*R. Matthews, Supervisor, Shift Testing
*R. McKeon, Plant Manager, Nuclear Production
*W. Miller, Technical Support
*R. Newkirk, Acting Director, Licensing
E. Nickolite, GS ICMA, Maintenance
*J. Nolloth, Superintendent, Maintenance
*J. Nyquist, Supervisor, Safety Engineering
*D. Ockerman, Director, Nuclear Training
J. Pendergast, Compliance Engineer
G. Pierce, Work Control
*J. Plona, Superintendent, Operations
*D. Powell, Nuclear Shift Supervisor, Operations
*T. Schehr, Supervisor, Work Planning
*G. Smith, Director, Nuclear Fuel
*R. Szkotnicki, Supervisor, Inspection & Surveillance
J. Tibai, Compliance, Licensing
*J. Walker, Director, Plant Engineering

*Denotes those attending the exit interview conducted on February 8, 1994.

The inspectors also had discussions with other licensee employees, including members of the technical and engineering staffs, reactor and auxiliary operators, shift supervisors, and electrical, mechanical and instrument maintenance personnel, and security personnel.

2. Plant Operations

Fermi 2 operated at power levels up to 93.5 percent until December 25, 1993, when a reactor trip occurred due to catastrophic failure of the turbine. The event is discussed in paragraph 2.d of this report with details documented in Inspection Report 50-341/93029. The plant was placed in a cold shutdown condition after the event and remained that way throughout the rest of the inspection period.

a. Operational Safety Verification (71707)

The inspectors verified that the facility was being operated in conformance with the license and regulatory requirements, and that the licensee's management control system was effective in ensuring safe operation of the plant. On a sampling basis, the inspectors verified proper control room staffing and coordination of plant activities; verified operator adherence with procedures and technical specifications; monitored control room indications for abnormalities; verified that electrical power was available; and observed the frequency of plant and control room visits by station management.

The inspectors reviewed applicable logs and conducted discussions with control room operators throughout the inspection period. The inspectors observed a number of control room shift turnovers. The turnovers were conducted in a professional manner and included log reviews, panel walkdowns, discussions of maintenance and surveillance activities in progress or planned, and associated LCO time restraints, as applicable.

During observations of work activities on the turbine deck, the inspector noted instances where contractors had hung personal clothing on station air system valve handwheels. The inspector also noted a contract individual sitting on a run of station air system piping. Although these examples were not, in themselves, safety significant, the inspector was concerned with the lack of sufficient control over contractor work activities that this demonstrated. The inspector immediately informed the Plant Manger, who issued a directive to all superintendents at the next morning meeting to ensure that contractor control was maintained.

b. Cold Weather Preparation (71714)

The inspectors completed a review of the licensee's process to ready the unit for cold weather operations. The inspector's review included direct observation of components or systems potentially affected by cold weather, log reviews to check for cold weather related problems, interviews with licensee personnel, and documentation review of the licensee's cold weather preparation procedure, NPP-27.000.04, "Freeze Protection Lineup Verification".

No substantive concerns were identified as a result of the review. Safety-related as well as balance-of-plant (BOP) equipment and systems that would be sensitive to cold weather conditions were adequately addressed by the licensee's procedures and preparations.

c. Engineered Safety Feature (ESF) Systems (71710)

During the inspection, the inspectors selected accessible portions of several ESF systems to verify status. Consideration was given to the plant mode, applicable Technical Specifications, Limiting Conditions for Operation requirements, and other applicable requirements.

Through observation, the inspectors verified that the following items were acceptable: installation of hangers and supports; housekeeping; freeze protection, if required, was installed and operational; valve position and conditions; potential ignition sources; and major component labeling, lubrication, cooling, etc. The inspectors also verified that instrumentation was properly installed, calibrated, and functioning and that significant process parameter values were consistent with expected values; that necessary support systems were operational; and that locally and remotely indicated breaker and valve positions were in agreement.

During the inspection, the accessible portions of the following ESF systems were walked down with no concerns identified:

- Division I Emergency Diesel Generators
- Divisions I and II Core Spray System
- Divisions I and II RHR/LPCI
- High Pressure Coolant Injection

d. Onsite Event Follow-up (93702)

During the inspection period, the licensee experienced several events, some of which required prompt notification of the NRC pursuant to 10 CFR 50.72. The inspectors pursued the events onsite with licensee and/or other NRC officials. In each case, the inspectors verified that any required notification was correct and timely. The inspectors also verified that the licensee initiated prompt and appropriate actions. The specific events were as follows:

December 25, 1993: While the plant was operating at 93 percent power, a turbine trip with subsequent reactor trip occurred at 1:15 p.m. The trip was caused by a catastrophic failure of the turbine, and resulted in the licensee declaring an Alert. The details of this event are documented in the NRC's Augmented Inspection Team report No. 50-341/93029.

January 27, 1994: At 1:05 p.m. (EST) offsite power was lost to the Division I switchyard, causing a loss of the Div. I reactor protection system (RPS) MG set and resulting Group IV isolation signal. The southern Michigan area had been experiencing an ice storm with freezing rain at the time of the failure. Division I Emergency Diesel Generators (EDG) also autostarted upon bus

undervoltage, and loaded vital equipment to the bus. By design, the inboard suction valve for shutdown cooling closed as part of the Group IV isolation. Shutdown cooling was lost for about 57 minutes, during which time the reactor coolant system temperature rose from 101°F to 116°F. Cooling was restored after repowering the RPS motor-generator set, clearing the isolations, and completing fill and vent procedures for the RHR pump. Division I offsite non-vital power was restored initially by starting the combustion gas turbines (CTG) that are connected to the Fermi 1 site, and backfeeding from there. Upon restoration of supply from the Luzon and Custer lines, Division I was powered from those sources and the CTG was turned off. When power was transferred from the diesel generators, a small frequency oscillation was observed (59.5 To 60 hertz) on EDG #12. The licensee conservatively declared the EDG inoperable while the frequency was adjusted. When the incoming 120 kV Swan Creek line experienced a fault, the isolation breaker failed to open. In addition a breaker failure relay also failed to operate correctly to trip the breaker. Preliminary analysis by the licensee indicated that the contacts for the timer on the relay had foreign material present which prevented the relay from opening. A subsequent, unrelated fault on another incoming line to the Division I switchyard then precipitated the loss of all offsite electrical power to Division I. The utility's System Maintenance division (non-Fermi specific) initiated an investigation of the breaker failure. The inspectors were concerned that component failures in conjunction with two line faults caused a loss of Division I Offsite Power. Pending licensee and NRC review of the results of the breaker inspection, this item is an Inspection Followup Item (341/93028-01(DRP)).

January 29, 1994: At 6:54 a.m. (EST) a fire occurred in the turbine building passenger elevator shaft. At 7:04 a.m., operators declared an Unusual Event based upon a fire in the plant not being brought under control within ten minutes. The fire was associated with power supply cables for the elevator and was extinguished at 7:14 a.m. with the Unusual Event terminated at 7:53 a.m. Initial licensee investigation into the root cause of the fire identified two possible causes for the cable fire: 1) a cable mounting bracket located on the underside of the elevator failed and allowed the cable to rub against metal braces on the guide rail for the elevator; or 2) a water/oil mixture that collected in the elevator shaft as a result of the December 25 event wet the cloth insulation on the cable resulting in degradation of the cable insulation. Licensee personnel had inspected the elevator subsequent to the December event and declared the elevator operable for unrestricted use. Subsequent to the January 29 fire, the licensee replaced the cable with new cable that did not utilize cloth for insulation and sent the old cable offsite for laboratory analysis to aid in root cause identification. Pending determination of the root cause of the cable failure and NRC review of corrective actions, this item is an Inspection Followup Item (341/93028-02(DRP)).

e. Current Material Condition (71707)

The inspectors performed general plant as well as selected system and component walkdowns to assess the general and specific material condition of the plant, to verify that work requests had been initiated for identified equipment problems, and to evaluate housekeeping. Walkdowns included an assessment of the buildings, components, and systems for proper identification and tagging, accessibility, fire and security door integrity, scaffolding, radiological controls, and any unusual conditions. Unusual conditions included but were not limited to water, oil, or other liquids on the floor or equipment; indications of leakage through ceiling, walls or floors; loose insulation; corrosion; excessive noise; unusual temperatures; and abnormal ventilation and lighting.

Subsequent to the December 25 event, oil was observed dripping from several locations in the turbine building HVAC (TBHVAC) exhaust ductwork. Chemical analysis of the oil showed that the oil was related to the turbine generator. An oil/water mixture was drawn into the suction of the ductwork when flooding of the turbine building basement occurred as a result of the December 25, 1993 event and deposited an oil/water residue throughout the entire run of exhaust ductwork. The licensee dammed off the suction to TBHVAC to prevent further oil intrusion into the system. At the end of the inspection period the licensee was working with several vendors to develop a method to clean the system of oil. The licensee also initiated an investigation to determine what affect the oil would have on the caulking and gasket materials located in the system. This item is an Inspection Followup Item pending review of the long term effects to the system and results of licensee cleanup efforts (341/93028-03(DRP)).

f. Housekeeping and Plant Cleanliness

The inspectors monitored the status of housekeeping and plant cleanliness for fire protection and protection of safety-related equipment from intrusion of foreign matter. The licensee responded expeditiously to the oil and water from the December 25 event and is continuing to clean the remaining portions of the Turbine building. No significant concerns were identified.

g. Radiological Controls (71707)

The inspectors verified that personnel were following health physics procedures for dosimetry, protective clothing, frisking, posting, etc., and when examined, determined that radiation protection instruments were properly used, operable, and calibrated. The inspectors identified no significant concerns and observed that the Radiation Protection Technicians responded well to the December 25 event and subsequent cleanup evolutions.

h. Security (71707)

Each week during routine activities or tours, the inspectors monitored the licensee's security program to ensure that observed actions were being implemented according to the approved security plan. The inspectors noted that persons within the protected area displayed proper photo-identification badges, and those individuals requiring escorts were properly escorted. Additionally, the inspectors also observed that personnel and packages entering the protected area were searched by appropriate equipment or by hand.

No violations or deviations were identified.

3. Safety Assessment/Quality Verification (40500)

The inspectors reviewed the licensee's Deviation Event Reports (DER) generated during the inspection period. This was done in an effort to monitor the conditions related to plant or personnel performance, potential trends, etc. DERs were also reviewed to ensure that they were generated appropriately and dispositioned in a manner consistent with the applicable procedures. The inspectors had no substantive concerns as a result of their reviews.

Corrective Action Improvement Program: The licensee provided the inspectors with an update of the status of the Corrective Action Improvement Program initiated in response to the Enforcement Conference on December 14, 1993. The inspectors did not identify any new concerns as a result of the update of the program status. The licensee stated that they intend to provide updates to the resident office on a regular basis until all program items are completed.

No violations or deviations were identified.

4. Maintenance/Surveillance

a. Maintenance Activities (62703)

Routinely, station maintenance activities were observed and reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with technical specifications. The following items were also considered during this review: limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; functional testing or calibrations were performed prior to returning components or systems to service; quality control records were maintained; and activities were accomplished by qualified personnel.

Portions of the following maintenance activities were observed or reviewed:

- 000Z934314 Replace # 3 Low Pressure Stop Valve Unitized Actuator
- 000Z934737 Repair/refurbish HCU 22-15
- 000Z934738 Repair/refurbish HCU 6-39
- 000Z935879 EDG-13 Does Not Respond to Load Changes

No violations, deviations, or significant concerns were identified.

b. Surveillance Activities (61726)

During the inspection period, the inspectors observed technical specification required surveillance testing and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that results conformed with technical specifications and procedure requirements and were reviewed, and that any deficiencies identified during the testing were properly resolved.

The inspectors also witnessed or reviewed portions of the following surveillances:

- 54.000.03 Scram Time Testing
- 24.307.16 EDG-13 Start and Load Test - Slow Start
- 43.000.08 Pressure Test on Temporary Hose, Fittings, and Valves Used for CST Cleanup

No violations or deviations were identified.

5. Engineering & Technical Support (37700)

a. On December 16, 1993, the licensee started EDG-13 for performance of the monthly surveillance test (24.307.16, "Emergency Diesel Generator 13 Start and Load Test"). The engine was successfully started, synchronized, and loaded to 1800 kw. The operators observed load oscillations while increasing load to 2500-2600 kw. The engine settled out at 1800 kw and would not accept more load. While troubleshooting, the licensee found that the fuel rack linkage was disconnected from the governor actuator output terminal shaft. The clamp bolt that provides the force to hold the fuel rack linkage on the governor actuator output terminal shaft had come loose, apparently due to engine running vibration. The engine fuel racks failed to the as-is position. Operators shut down the engine and reconnected the fuel rack linkage to the governor actuator output terminal shaft. The licensee checked the three remaining EDGs to ensure that the fuel rack linkage connection was tight. No movement was noted on EDGs-11,12 and one flat movement of the clamp bolt was noted on EDG-14. The licensee formally notified the NRC of the test failure by letter dated

January 14, 1994, and planned to implement long term corrective action when each engine is taken out of service for its eighteen month surveillance inspection (scheduled for the spring of 1994). This is an Inspection Followup Item pending NRC review of the licensee's completion of long term corrective action (341/93028-04(DRP)).

b. During the fill and vent of the contractor supplied temporary equipment installed for the Condensate Storage Tank (CST) cleanup, a hose separated from a coupling device when the metal bands used to connect the hose to the device failed. Clean demineralized water was utilized for the system fill. However, the temporary hoses contained some internal contamination. Approximately 25 gallons of water spilled into the CST dike area and one individual was wetted as a result. A survey and whole body count of the individual showed no detectable activity and verified no uptake or ingestion. Radiation protection personnel performed smear surveys of the area which showed no detectable beta, gamma, or alpha activity. The licensee terminated all CST testing activities except for those actions necessary to isolate and drain the equipment.

Prior to the hose failure on the CST equipment, the inspectors had questioned the licensee's receipt inspection of contractor supplied materials due to a leak that developed in a hose utilized for a different temporary modification. The licensee initiated a DER to address the issue and conducted a visual inspection of the hoses and equipment utilized for the CST cleanup evolution. After the hose/coupling connection failure, the licensee discovered defects on other metal bands within the same system. The licensee remade all hose connections prior to successfully completing the system pressure test at a later date. Pending NRC review of licensee receipt inspection activities for contractor supplied material, this is an Inspection Followup Item (341/93028-05 (DRP)).

c. Throughout most of the inspection period the licensee conducted a turbine generator investigation and disassembly activities as a result of the December 25th event. NRC regional and headquarters management relaxed some of the quarantine restrictions specified in Confirmatory Action Letter CAL No. 3-93-018 to enable the licensee to commence investigation and root cause activities associated with the event. The memoranda lifting portions of the quarantine are provided as attachments to this report. Followup and review of licensee actions and other items relating to the turbine generator failure will be documented in future inspections.

No violations or deviations were identified.

6. Report Review

During the inspection period, the inspector reviewed the licensee's Monthly Operating Status Reports for November and December, 1993. The inspector confirmed that the information provided met the requirements of Technical Specification 6.9.1.6 and Regulatory Guide 1.16.

No violations or deviations were identified.

7. Inspection Followup Items

Inspection Followup items are matters which have been discussed with the licensee, which will be reviewed by the inspector and which involve some action on the part of the NRC or licensee or both. Inspection Followup Items disclosed during the inspection are discussed in Paragraphs 2.d, 4.a, 5.a, and 5.b.

8. Exit Interview (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 during the inspection period and at the conclusion of the inspection on February 8, 1994. The inspectors summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.

Attachments: As stated

Date: January 28, 1994

To: Bob Mckeon
Fermi 2 Plant Manager

From: Ken Riemer
Resident Inspector

Subject: Changes to Confirmatory Action Letter Quarantine Requirements.

With regard to the main turbine. Detroit Edison may open the access ports on all three LP hoods, may perform visual inspections of the accessible areas under the hoods. may pick up pieces of debris and remove them from the under hood area, may secure the large components as necessary to support removal of the hoods. In addition, Detroit Edison may identify and perform work necessary to prepare for the removal of the hoods. However, the actual lifting of any of the hoods may not be done until NRC authorization is granted and NRC inspectors are present.

The NRC desires to have a minimum of two days notice prior to lifting any of the hoods.

With regard to the generator. Detroit Edison may remove the hydrogen coolers for the purpose of inspecting these areas of the generator. Detroit Edison may perform inspections in the generator termination box areas. Debris may be bagged, tagged and removed. The NRC would like to be notified 12 hours in advance of the removal of the hydrogen coolers. This notification can be made through the resident's office (beeper 457-1208).

The exciter remains under quarantine.

Ken Riemer

DT WA #184

Date: February 2, 1994

To: Bob McKeon
Plant Manager

From: Ken Riemer
NRC Resident Inspector

Subject: Relaxation of Quarantine Requirements

With respect to the exciter, Detroit Edison may begin disassembly and removal of the exciter. The NRC desires to view, when possible, the following items:

- The condition of stator windings, especially if there is any evidence of melting or overheating.
- The condition of brush holders (also provide information on the type of brushes).
- The condition of the rotor.
- The condition of the permanent magnets at the end of the shaft.
- The condition of the bearings after the shaft is lifted.

The NRC (Ken Riemer) would like to have 8 hours advance notice prior to examining the above items. Detroit Edison is required to provide photographs to the NRC of each of the above items.

With respect to the generator, Detroit Edison may begin disassembly and inspection. As discussed in the January 28, 1994 letter to you, the hydrogen coolers may be removed to facilitate inspection of the generator. The NRC desires to view, when possible, the following items:

- The condition of the brush holders.
- Evidence of burns on the rotor or stator winding.
- The condition of plastic tubing for hydrogen cooling.
- The straightness of the rotor.
- Evidence of burns on laminations between bars on the rotor.
- The condition of insulation on stator windings.

- The condition of rotor shaft at bearings; check if shaft is scored.

- Evidence of glaze on the insulators.

- The condition of isolated phase bus duct.

The NRC (Ken Riemer) would like to have 8 hours advance notice prior to examining the above items. Detroit Edison is required to provide photographs to the NRC of each of the above items.

Ken Riemer 2/2/94

MAR 18 1994

Docket No. 50 341
Docket No. 50-016

The Detroit Edison Company
ATTN: Mr. D. R. Gipson
Senior Vice President
Nuclear Generation
6400 North Dixie Highway
Newport, MI 48166

Dear Mr. Gipson:

SUBJECT: ROUTINE EMERGENCY PREPAREDNESS INSPECTION AT FERMI 2 AND OPERATIONAL SAFETY VERIFICATION AT FERMI 1 (INSPECTION REPORTS NO. 50-341/94004 (DRSS); 50-016/94001 (DRSS))

This refers to the routine safety inspection conducted by Mr. R. Jickling of this office on February 28 - March 4, 1994. The inspection included a review of authorized activities at your Fermi 1 and 2 facilities. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, interviews, observation of activities in progress, and follow-up to concerns identified by the NRC Augmented Inspection Team (Inspection Report No. 50-341/93029(DRS)).

Based on the results of this inspection, certain of your activities concerned with the December 25, 1993, turbine event appeared to be in violation of NRC requirements, as specified in the enclosed Notice of Violation (Notice). The violation involved the failure to adequately implement Radiological Emergency Response Preparedness Procedures which required immediate assembly and accountability of site personnel at the Alert declaration. This violation is of concern because these actions ensure the safety of site personnel during an emergency.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC Public Document Room.

The response directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PI 96-511.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

Original signed by J. McCormick-Barger for

John A. Grobe, Acting Chief
Reactor Support Programs Branch

Enclosures:
1. Notice of Violation
2. Inspection Reports
   No. 50-341/94004(DRSS);
   No. 50-016/94001(DRSS)

cc w/enclosure:
John A. Tibai, Principal
  Compliance Engineer
P. A. Marquardt, Corporate
  Legal Department
OC/LFDCB
Resident Inspector, RIII
James R. Padgett, Michigan Public
  Service Commission
Michigan Department of
  Public Health
Monroe County Office of
  Civil Preparedness
Fermi, LPN, NRR
E. G. Greenman, RIII

bcc w/enclosures:
Public IE06

RIII
Jickling/dp
03/14/94

RIII
McCormick-Barger
3/15/94

RIII
Phillips

RIII
Pederson

RIII
Axelson

NOTICE OF VIOLATION

The Detroit Edison Company
Fermi 2 Nuclear Power Plant

Docket No. 50-341
License No. NPF-43

During an NRC inspection conducted on February 28 through March 4, 1994, one violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C, the violation is listed below:

10 CFR Part 50.54(q) requires, in part, that a licensee follow and maintain, in effect, emergency plans which meet the standards in 10 CFR Part 50.47(b) and the requirements of Appendix E to 10 CFR Part 50.

Section D.2.3. of the Radiological Emergency Response Preparedness (RERP) Plan, which meets the standards and requirements of 10 CFR 50.54(q), contains the required licensee actions following an Alert declaration.

RERP Procedure EP-103, "Alert," implements the required emergency response actions contained in Section D.2.3 of the RERP Plan and, as an immediate action, requires an order be issued to assemble all personnel in the Fermi protected area and perform accountability.

Contrary to the above, on December 25, 1993, an order was not immediately issued to assemble all personnel in the Protected Area and perform accountability when the emergency classification was upgraded to an Alert.

This is a Severity Level IV violation (Supplement VIII).

Pursuant to the provisions of 10 CFR 2.201, the Detroit Edison Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, Illinois, 60532, and a copy to the NRC Resident Inspector at the Fermi 2 Plant within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved.

If an adequate reply is not received within the time specified in this Notice, an order or a demand for information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

Dated at Lisle, Illinois
this 18 day of March 1994

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-341/94004(DRSS); 50-016/94001(DRSS)

Docket Nos. 50-341; 50-016 Licenses No. NPF-43; DPR-9

Licensee: The Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166

Facility Name: Fermi 2 Nuclear Power Station; Enrico Fermi Atomic Power Plant, Unit 1

Inspection At: Newport, Michigan

Inspection Conducted: February 28 - March 4, 1994

Inspector: J. W. McCormick-Barger for R. Jickling — Date: 3/18/94

Approved By: J. W. McCormick-Barger — Date: 3/18/94
J. W. McCormick-Barger, Chief
Radiological Programs Section 1

Inspection Summary

Inspection on February 28 - March 4, 1994 (Reports No. 50-341/94004(DRSS); 50-016/94001(DRSS))

Areas Inspected: Routine, announced inspection of the operational status of the emergency preparedness (EP) program (Inspection Procedure (IP) 82701), review of NRC Augmented Inspection Team (AIT) issues related to the December 25, 1993, turbine failure (IP 82701), follow-up of licensee actions on previously identified items (IP 82301), and the operational safety verification of the Fermi 1 facility (IP 71707).

Results: One violations was identified from the AIT issues concerning the assembly and accountability of onsite personnel (Section 2.b). However, the EP program continues to be well maintained. Management involvement in the program was strong. One concern remains open from the 1993 annual emergency preparedness exercise (Section 2.a). No concerns were identified with Fermi 1.

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DETAILS

1. Persons Contacted

Facility

*D. Gipson, Senior Vice President Nuclear Operations
*R. McKeon, Assistant Vice President and Manager
*W. Romberg, Assistant Vice President, Technical
*R. Newkirk, Acting Director, Licensing
*J. Korte, Director, Nuclear Security
*C. Baker, Director, Safety Engineer
*J. Walker, Director
*W. Miller, Superintendent, Technical Engineer
*P. Fessler, Manager
*W. Tucker, Assistant to Technical Manager
*D. Powel, Nuclear Shift Supervisor
*S. Hsreh, Supervisor, Nuclear Fuel
*L. From, Supervisor, Technical
*H. Higgins, Operations Supervisor
*E. Kokosky, General Supervisor, Radiation Protection
*J. Tibai, Principle Compliance Engineer
*J. Pendergast, Compliance Engineer
*K. Morris, Supervisor, Radiological Emergency Response Preparedness
*R. Webster, Emergency Response Specialist
*J. Kauffman, Emergency Response Specialist
*J. Baum, Emergency Response Specialist
*B. Szkotnicki, Supervisor, Quality Assurance
*R. Baum, Supervisor, Radiological Engineer
*R. Russell, Supervisor, Training
*D. Ockerman, Training
*J. Sweeney, Quality Assurance Specialist
G. Heitzenrater, Nuclear Shift Supervisor

U. S. Nuclear Regulatory Commission (NRC)

*K. Riemer, Resident Inspector, Fermi

*Denotes those present at the NRC exit meeting on March 4, 1994.

The inspectors also contacted other licensee personnel during the inspection.

2. Augmented Inspection Team (AIT) Report No. 50-341/93029(DRS)) Issues

During this inspection, the inspector reviewed two issues identified in Inspection Report No. 50-341/93029(DRS).

a. The first issue concerned the timeliness of the Unusual Event (UE) declaration. At 1:15 p.m., the control room (CR) crew received indications of a seismic event, turbine vibration, and numerous other alarms, including fire alarms, coincident with an automatic

reactor shutdown (scram). While Tab 8 of the Radiological Emergency Response Preparedness (RERP) Procedure EP-101 contained conditions requiring a UE classification based on control instrumentation indicated turbine rotating component failure resulting in a reactor scram, a UE was not declared until 1:52 p.m., based on a fire in the plant requiring offsite support.

In reviewing documentation and interviewing licensee personnel, including the Nuclear Shift Supervisor (NSS) who was onshift during the emergency, it was apparent that a large number of alarms and reactor off-normal indications were concurrently received in the CR. Within minutes, the NSS initiated a methodical review of the indications and the classification procedures. The CR staff acted appropriately in ensuring the safe shutdown of the reactor and overall condition of the plant. Based on the numerous plant indications, the conditions for an UF based on a fire in the plant requiring offsite support were recognized prior to the assessment of the nature of the turbine failure. Although the indications appeared to be immediately present for the UE based on turbine failure and subsequent reactor scram, the NSS's evaluation of the conditions appeared timely, and, the subsequent classification appeared to be adequate.

b. The second issue concerned the failure to follow procedures which required the immediate assembly and accountability of site personnel at the Alert declaration.

At approximately 1:57 p.m., the emergency director (ED) in the control room upgraded the emergency classification to an Alert. However, the order to assemble all personnel in the protected area and perform accountability in accordance with RERP Procedure EP-103, "Alert," was not performed until approximately 2:27 p.m.

In review of documentation and licensee interviews it was apparent that the nuclear assistant shift supervisor contacted some plant departments to account for plant personnel, prior to the NSS ordering assembly and accountability. The NSS was generally aware of who was onsite and what their functions were due to the reduced holiday staffing. However, a formal assembly and accountability, which would have ensured the complete accountability of plant personnel, was not performed until approximately 30 minutes after the Alert declaration.

Assembly and accountability of all personnel in the protected area was not ordered at the Alert declaration in accordance with RERP Procedure EP-103, "Alert," and with RERP Plan. According to 10 CFR 50.54(q), the licensee is required to maintain and follow their emergency plan. The failure to conduct an assembly and accountability of site personnel in accordance with EP-103 is a violation (Violation No. 50-341/94004-01).

One violation was identified.

3. License Action on Previously Identified Items (IP 82301)

a. (Open) Inspection Follow-up Item (IFI) No. 50-341/93002-01: The NSS failed to properly declare a Site Area Emergency during the 1993 annual emergency preparedness exercise.

The licensee has initiated development of an emergency action level (EAL) chart to improve emergency classification. Discussions regarding training improvements have taken place and lessons learned were being used in the development of future emergency response training. This item will remain open pending the completion of the licensee's training and EAL development and the successful demonstration of the licensee's corrective actions.

b. (Closed) IFI No. 50-341/93009-02: During the 1993 annual emergency preparedness exercise, the notification of the NRC was not adequately simulated for the General Emergency classification.

The following corrective actions were taken:

- Lessons learned from the July 14, 1993, annual exercise were incorporated into emergency response training; and
- NRC notification during the October 27, 1993, drill was successfully demonstrated.

Based on the above training and the adequate offsite notifications during the October 1993 drill and December 25, 1993, event, this item is closed.

4. Operational Status of the Emergency Preparedness (EP) Program (IP 82701)

a. Emergency Plan and Implementing Procedures

On January 10, 1994, the licensee implemented Revision 10 of the RERP Plan. This revision included changes regarding implementation of EPA-400 guidance, some terminology changes, and a number of EAL enhancements. The RERP Plan was received by the NRC for review within regulatory requirements.

The inspector reviewed the changes in RERP Procedure EP-101, which did not appear to decrease the effectiveness of the emergency plan. Current copies of the emergency plan and implementing procedures were available in the emergency response facilities.

The inspector and the licensee's RERP and licensing staffs discussed the licensee's plans for the development of an EAL chart system to improve its ability to promptly and correctly classify emergencies. This was to be an interim improvement until the licensee's Nuclear Management And Resources Council (NUMARC) EALs were approved and implemented.

The emergency call out system was changed to augment specific Emergency Operations Facility (EOF) positions at the Alert classification to improve the dispatch of offsite monitoring teams.

b. Emergency Response Facilities, Equipment and Supplies

An inspection tour was conducted of the Technical Support Center (TSC), Operational Support Center (OSC), and Alternate OSC. The TSC was found to be in an excellent state of operational readiness. An inspection of facility equipment and supplies located in emergency cabinets did not reveal any problems. Radiological monitoring instruments were properly calibrated.

Plans were reviewed for remodeling the OSC to decrease congestion and improve information availability. The OSC remodeling was projected to be completed by the next annual exercise.

The addition of an emergency management communications loop between the emergency response facilities managers was established to improve communications between management centers.

c. Organization and Management Control

The Fermi 2 site organization completed a restructuring, including changes in the management oversight of the emergency preparedness group. The RERP supervisor reported to the nuclear licensing director, where previously, the RERP supervisor reported to the general director of regulatory affairs. With the exception of this change, the level of management interface and oversight from the RERP department to the senior vice president has not changed.

In September 1993, the RERP staff also underwent organizational changes, including the transfer of the former RERP supervisor to another plant organization. Subsequently, an experienced member of the RERP staff was named as the RERP supervisor. This individual had over six years of EP experience and was knowledgeable of the licensee's program. With this re-assignment, a radiation protection technician was added to the RERP staff. This gave the RERP group a diverse experience background and provided a strong team of three specialists and one supervisor.

d. Emergency Preparedness Training

The inspector reviewed the training of emergency response personnel and RERP staff. Lessons-learned from drills, exercises, and events have been incorporated into requalification training courses. Courses for facility orientation and management overview have been added to provide an overview and assist decision makers regarding offsite dose projections. Additionally, qualification requirements were created for the RERP staff positions.

A training course in emergency classification, notifications, and event reporting assessment was observed. The lessons-learned handout and the significant event handout were excellent. However, actual in-class event classification from the latter handout would have been more useful than directing the class to take the handout and classify events on their own time, especially in light of past performance in the 1993 exercise and the December 1993 turbine event. Also, actually walking through some more difficult EALs may have been appropriate.

During an interview with a licensed operator requalification instructor, improvements in simulator training were discussed. During licensed operator requalification training in the simulator, emergency response activities have been added. Appropriate time delays as well as in-plant operator availability were simulated.

An interview with an NSS was conducted. Overall knowledge of responsibilities, tasks to be performed, and procedures to be used was excellent. Knowledge and ability to use the emergency classification procedure for specific questions and conditions was very good.

No violations or deviations were identified.

5. Fermi 1 Operational Safety Verification (IP 71707)

Specific aspects of the Fermi 1 facility were inspected after a recent problem at the Dresden 1 facility with cold weather preparations (Inspection Report No. 50-010/94001(DRSS)).

Systems condition, design, and status were evaluated. Radiological information was reviewed related to contamination levels and to quantities of radioactive materials. Alarms and annunciators for moisture intrusion and carbon dioxide and instrument surveillance were identified.

In the Fermi 1 facility, there continued to be no water stored in the reactor containment and no fuel onsite. The curie content of the facility was sufficiently low as not to pose a significant threat to the environment or public, even during a significant accident. Annunciators alarm in the Fermi 1 and 2 control rooms for water intrusion and the carbon dioxide high/low pressure. Surveillances were conducted every six months on the instruments and weekly checks were also completed.

No violations or deviations were identified.

4. Exit Interview

The inspector held an exit interview on March 4, 1994, with licensee representatives identified in Section 1, to present and discuss the preliminary inspection findings. The licensee was informed that one violation of NRC requirements pertaining to inadequate assembly and accountability of all site personnel was identified as a result of the inspection. The licensee indicated that none of the matters discussed were proprietary in nature.