TASK FORCE REVIEW OF EQUIPMENT

PERFORMANCE FOR

DRESDEN

REPORT

JULY 10, 1987

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EXECUTIVE SUMMARY

Because of the excessive number of events that occurred during the past few months, Region III formed a special task force to review equipment performance at the Dresden Station. The task force's charter was to determine if systematic equipment problems existed which had been overlooked by the NRC or the licensee. Towards this end, the task force reviewed the operating history of equipment during the 1984-1986 time period. The task force's findings were:

- The licensee had previously addressed all problems involving systems that have been repeatedly involved in events reviewed;
- The licensee is taking steps to reduce the number of scrams;
- Because of an undue number of personnel errors, the licensee must continue its activities aimed at decreasing personnel errors;
- The licensee is improving its preventive maintenance program by implementing a corporate initiative known as the "Reliability Related Program";
- The licensee has implemented a systematic "get-well" program for recovering from extended outages, i.e., Dresden's Error Free Program; and
- To preclude an undue maintenance workload during outages, the licensee should implement a "stay-well" program.

I. INTRODUCTION

This report is a compilation of the observations made and conclusions drawn by the special task force. Towards this end, the special task force performed an in-depth review of equipment performance and maintenance history for the Dresden Station. Special emphasis was placed on identifying potential problem areas and trends related to component failures. The task force consisted of a resident inspector and three regional inspectors under the supervision of Region III's Technical Support Staff's Supervisor.

The tasks performed included a review of various documents involving maintenance history and hardware problems for potential trends, and an assessment of NRC and licensee perceptions of the Dresden Station. The perceptions were garnered by NRC regional and licensee personnel to determine whether potential problems existed that could not be identified by reviewing documents. Prior to the review, it was decided that the task force need not delve into how Dresden performs maintenance, (i.e., a procedural review) because that area had already been extensively inspected by other regional specialists. The extent of this new effort involved approximately 400 man-hours in the Region III office and 200 man-hours onsite.

II. REVIEW METHODOLOGY

The task force reviewed NRC and licensee generated documents dated between January 1, 1984 and December 31, 1986, for potential trends. The documents reviewed included:

- Licensee Event Reports
- Licensee Reportable Events
- Licensee Deviation Reports
- NRC Inspection Reports
- Licensee QA Audit Reports
- Licensee Potential Significant Events
- Licensee Discrepancy Reports
- Licensee Work Requests
- NRC Daily Reports

In addition, the following NRC staff members were interviewed for their perceptions of Dresden's performance:

- L. McGreger, Senior Resident Inspector, Dresden
- P. Kaufman, Resident Inspector, Dresden (Also a member of task force)
- J. Bjorgen, Reactor Operator Licensing Examiner
- N. Choules, Reactor Inspector
- M. Ring, Chief, Reactor Projects Section 1C
- S. DuPont, Reactor Inspector
- N. Gilles, Project Inspector

Dresden personnel including management staff members of several departments, (e.g., Operations, Quality Assurance, Technical Staff, and Maintenance) were also interviewed for their perceptions of Dresden's maintenance program. Particular emphasis was placed on the impact of Dresden's maintenance program on the area of the person being interviewed. During the course of our site visits, meetings were held with upper plant management to discuss our program and findings.

III. AREAS REVIEWED FOR TREND ANALYSIS

A. Deviation Reports

Licensee generated Deviation Reports (DVR's) were reviewed to determine whether Dresden's management had failed to identify problem trends or repeated equipment failures. The premise here being that such deficiencies would be indicated by deteriorating plant equipment or other conditions that had not been appropriately identified or addressed by the licensee.

Whether they are safety-related or not, DVR's are used by the licensee to document all plant conditions that represent a significant deviation from accepted normal operation of the plant equipment. DVR's, if left uncorrected, could result in the failure of a component to perform its intended function. Some DVR's involved reportable occurrences and resulted in a 50.72 notification to the NRC and the issuance of a Licensee Event Report (LER) pursuant to 10 CFR 50.73.

For the period covered by the task force's review, 659 DVR's were generated. The yearly distribution of these DVR's is as follows:

Time Period	DVR's Issued
1984	173
1985	271
1986	215

Analysis of the data indicated that component failures were the major contributor (nearly 50 percent) to the DVR's, and that most of these failures were not reportable to the NRC. The following tabulation illustrates the quarterly distribution of said component failure DVR's, that were generated during the time period reviewed by the task force:

Time Period		Unit 2	Unit 3	Total
1984:	1st quarter	18	5	23
	2nd "	9	4	13
	3rd "	9	10	19
	4th "	9	10	19

Time Period		Unit 2	Unit 3	Total
1985:	1st quarter	10	14	24
	2nd "	18	12	30
	3rd "	12	10	22
	4th "	27	6	33
1986:	1st quarter	22	5	27
	2nd "	6	4	10
	3rd "	17	24	41
	4th "	14	15	29

An observation of the total DVR's generated at both units indicates an upward trend of equipment failure DVR's for the period studied. Based on the upward trend of equipment failure DVR's and the discussions with NRC and licensee personnel, it appears that the majority of events are due to aging of plant components. The effect of aging components is complicated by an inadequate preventive maintenance program for most balance-of-plant components. However, because of the constricted accounting system being used by the licensee to track component failures, the licensee does not perceive the increasing trend in DVR's as a recurring problem.

The increase in equipment failure DVR's for the third quarter of 1986 on Unit 3 was due to items discovered while returning the unit to power after the extended outage associated with pipe replacement. The increase of equipment failure DVR's at the end of 1985 and the beginning of 1986 for Unit 2 was due to errors that occurred during the EQ maintenance outage. The licensee is trending all equipment failure DVR's at Dresden to obtain a better understanding of the mode of component failures. The licensee will supplement the DVR information with historic equipment files and work request histories. This change should give the licensee a better perspective on recurring problems.

The 1986 DVR's were further broken down by quarters and into types of equipment failures (mechanical, electrical, and instrument) to see if any trends were evident as follows:

1986	Mechanical	Electrical	Instrument
1st quarter	4	15	13
2nd "	6	3	3
3rd "	10	14	17
4th "	7	8	8

There were no department trends discernible from the data, and no recurring component or system problems were identified.

The following tabulation lists the percentage of DVR's attributable to personnel error during the reviewed time frame:

Units	1984	1985	1986
2	25%	23%	30%
3	29%	27%	30%

The licensee is attempting to reduce the number of personnel errors at Dresden. Towards this end tool box talks are held regularly between management and staff; managers are required to make a weekly tour of an assigned portion of the plant, examine the material condition, and address any issue that could affect the ability of plant personnel to deal with off-normal situations.

B. Licensee Event Reports

Licensee Event Reports (LER's) represent a significant subset of DVR's, i.e., approximately 26%. Because they are reported to the NRC, they are written in greater detail than the original DVR's. In addition, each LER includes the root cause of the event. Consequently, they were examined in greater detail then the DVR's. Because most events, such as failures and malfunctions of balance-of-plant components, do not require NRC notification, most DVR's do not become LER's.

As in the case for DVR's analysis of the LER's reflected no definite trends that were not being addressed. The (equipment failure/personnel error/total) LER's are tabulated below:

Scrams and ESF Actuations Caused by Equipment Failures and Personnel Errors

	Scrams			ESF Actuations		
Time Period	Equip. Failure	Pers. Error	Total Scrams	Equip Failure	Pers. Error	Total ESF's
1984 1st half	1	2	4	0	0	0
1984 2nd half	7	5	13	2	1	3
1985 1st half	7	10	17	1	2	6
1985 2nd half	5	4	10	4	7	13
1986 1st half	3	2	6	3	8	11
1986 2nd half	6	3	9	3	3	7

The following observations were made after reviewing the LER's:

1. The scram peak during the latter half of 1984 and early 1985 was due to a rash of unrelated equipment failures plus personnel errors. The licensee responded with a scram reduction program in late 1985 which appears to be working.

2. The above mentioned scram peak corresponds to the peak in personnel errors (7) causing them in the first quarter of 1985. In addition to the scram reduction program, this resulted in a licensee-NRC management meeting on March 25, 1985, which increased the station's awareness of the NRC's concern with personnel errors.

3. Despite the NRC/licensee emphasis on reducing personnel errors in early 1985, the number of ESF actuations peaked during the end of 1985 and the beginning of 1986. This increase was largely due to another increase in personnel errors (seven of 13 and eight of 11 respectively). The ESF actuations have since gone down, with a corresponding decrease in those caused by personnel error (three of seven in the second half of 1986).

4. The increase in ESF actuations caused by personnel errors corresponds to a general increase in personnel errors (5) during the second quarter of 1986. The number of errors again resulted in increased attention by station management and personnel errors (1) causing ESF's were again turned around by the last quarter of 1986.

The foregoing chronology indicates that Dresden's attention toward reducing personnel errors is not always adequate. Heightened awareness of this problem generally follows very high numbers of errors. The number of errors then decreases until licensee attention again becomes lax; personnel errors subsequently increase and the cycle begins again. The licensee's new personnel error reduction program which was initiated in December, 1986 is its latest attempt to curb this problem. Because of the newness of this program, no clear evidence is present regarding its effectiveness.

C. Quality Assurance/Quality Control

The Quality Assurance (QA)/Quality Control (QC) program associated with maintenance activities performed at Dresden over the past year were reviewed.

The mandatory quality control hold points and optional quality control witness points which are to be applied to the maintenance work request packages by a QC inspector are identified in Dresden's Administrative Procedure (DAP) 15-1, "Work Requests," Revision 17, if not specifically delineated in the specific procedure.

A total of six QC inspectors assign QC hold and witness points. The qualifications of all six QC inspectors were reviewed and found to be adequate. However, report by the licensee's onsite review committee noted a declining trend in QC performance during the fourth quarter of 1986 because of bypassed QC hold points. The bypassing of QC hold points could be due to the relatively small size of the QC staff in relation to the increased maintenance activities encountered during outages, or it may be due to the traveler package/procedures not being required to be at the work station. Nevertheless, tailgate meetings were held with first line supervisors to emphasize the missed QC holdpoints. In addition to followup on the tailgate meetings, letters were sent to the maintenance department foremen. Also, plastic tabs have since been added to work packages to flag holdpoints.

The following QA audit reports were reviewed:

Audit No. 12-86-42, dated 9/23/86, Instrument Maintenance work activities.

Audit No. 12-86-43, dated 9/29/86, Mechanical Maintenance work activities.

Audit No. 12-86-44, dated 9/30/86, Electrical Maintenance work activities.

Audit No. 12-86-31, dated 2/10/86, Mechanical Maintenance work activities.

Audit No. 12-87-35, dated 2/17/86, Instrument Maintenance work activities.

No significant adverse trends were found in the above audits. However, the quantity of work requests sampled during the QA audits appears to be insufficient, since only a single work request was examined in three of the five audits.

D. Personnel

The maintenance department appears to be adequately staffed with qualified people. However, several major maintenance staff personnel changes were made during the past six months. For example, a new Plant Manager who is directly involved with the reduction of personnel errors, including maintenance errors, was appointed in September of 1986. The new plant manager has implemented a team concept which should help turn Dresden around. Attitudes appear to be improving.

In addition, the Assistant Superintendent of Maintenance was replaced by the former Quad Cities Station Assistant Superintendent of Maintenance in April 1987. Having a new person in this position should be beneficial.

In September of 1986, the Master Mechanic was replaced with the former Dresden Station SNED representative. Having a person familiar with Dresden's engineering problems in that position should have a positive effect on site maintenance.

A full-time Preventive Maintenance Coordinator was assigned in September 1986, to provide a more effective program. The program now includes a more rigorous predictive approach to maintenance than was previously in place. It is being designed to provide early warnings of the need for increased periodic maintenance.

E. Total Job Management System

The licensee's equipment history and trending program is called the Total Job Management (TJM) System. The TJM system, which was implemented approximately three years ago, includes a computer based program where all pending and completed work requests are entered into a computer file. The data base includes all mechanical work requests dating from April 1984, and all electrical and instrument work requests dating from April 1985.

The pending work requests are documented in a report every two weeks. Currently there are 1800 outstanding work requests. The station goal is to achieve and maintain a backlog of less than 1100 work

requests for non-outage corrective maintenance. Improved planning for multiple work requests written on a given plant component should help the site achieve this goal. Additionally, the maintenance department has implemented a pending work request program that segregates the requests by various fields (i.e., control room, outage related, or preventive maintenance). The ability to separate the work requests should allow the licensee to better control the work.

Maximum Occurrence Reports (MOR's) are automatically generated from the completed work request file whenever a component's failure rate reaches a predetermined limit. However, as it now stands, the trending program is based only on individual component failures, and not identical component failures. The licensee is attempting to expand the program to identify failures of equipment types that are common to all the Edison Plants. The program should also be adjusted to identify and group frequent failures of equipment types that encompass many individual components at Dresden. This degree of program sophistication should enhance the predictive portion of the maintenance program.

Since the licensee has not formalized its review process, the task force could not determine whether reviews of the MOR's by the maintenance department heads have improved maintenance performance. Interviews with the Master Mechanic, Master Electrician, and Master Instrument Mechanic revealed that each was reviewing the MOR's; however, the results of and subsequent recommendations arising from these reviews were not well documented. To date, the procedure governing MOR reviews has been drafted but not issued.

F. Licensee Programs

Management awareness of the maintenance problems at Dresden is accomplished by numerous reports and meetings. The data are used by managers and plant personnel to help focus attention on areas that most enhance plant operations and to help eliminate the more frequently recurring problems. In addition, an annual review of Discrepancy Reports was initiated in 1985 which generates a trending report to station management.

Since mid-1984, an Onsite Review Committee meets quarterly to evaluate trends in such document as LER's, DVR's, QA Audits and personnel errors. Station management is active in these meetings.

Due to the increased frequency of scrams at the Dresden station, a scram reduction program was initiated in 1985. In late 1985, a formal procedure was issued outlining the program's organization, delineating responsibility and providing for investigations of the causes of automatic scrams. These investigations are conducted by the Scram Reduction Committee, which meets monthly. This program should reduce the recurrence of similar scrams. Actions being taken by the licensee to reduce scrams include:

1. To address the problems of inadvertently bumping sensitive equipment, the licensee is identifying all racks where protective action may result from bumping sensitive equipment, erecting a fence around the MSL flow switch rack, investigating the feasibility of placing protective covers on the MSL sensing lines, and replacing certain vibration sensitive instruments with instruments that are not as sensitive to vibration.

2. To reduce scrams resulting from feedwater regulating valve problems, the licensee is examining all valve stem welds; monitoring valve travel to determine whether the new three-element control system eliminates valve swing problems; and investigating changes to the hydraulic feedwater actuators.

3. Investigating half-scrams.

In February 1987, a Monthly Plant Status Report was started to improve communications and provide information to management through a set of "Performance Indicators" that can be used for assessing key aspects of the plant's performance.

Beginning in January 1987, afternoon maintenance coordination planning meetings have been held daily; prior to January, these meetings were held weekly. At each meeting, a rolling three day schedule of maintenance work is established. This meeting coordinates all the maintenance activities performed by the three maintenance groups (mechanical, electrical, and instrumentation) with operations as well as radiation protection personnel.

From the TJM program, MOR's are generated automatically whenever a specific component fails three times in six months. These reports are reviewed by management to determine what course of action to take, i.e., what preventive maintenance can be performed, to preclude repetition of similar failures. See Section III.E of this report for additional details.

A weekly staff meeting was initiated in early 1987 to discuss the Station Weekly Report. This report trends and summarizes the week's LER's, scrams, personnel errors, and equipment failures. This meeting provides management with an up-to-date tool for management oversight of problems.

IV. EVALUATION OF MAINTENANCE PRACTICES

Evaluation of Dresden's maintenance performance was based on reviews of its preventive maintenance and corrective maintenance programs. The evaluation also accounted for Dresden's recent corrective program for the restart of Units 2 and 3, and the unavailability of the three shutdown cooling pumps at Unit 3 on March 3, 1987.

A. Preventive Maintenance Practices

Preventive maintenance (PM) at Dresden is divided into three phases (planned, periodic, and predictive).

1. Planned maintenance activities are those activities generated from such items as GE SIL's, GE TIL's, INPO Good Practices, INPO Significant Operating Experience Reports, NRC IEB's, NRC IN's, and NRC GL's.

2. Periodic maintenance activities are generally associated with scheduled surveillance activities such as lubrication of components, electrical work, and instrument calibrations.

   Lubrication at Dresden is part of its periodic maintenance program performed by three different groups according to a monthly computer printout of required lubrication changes obtained from the Technical Staff. The operations group is responsible for all oil changes. The mechanical maintenance group greases the mechanical geared couplings and the electrical maintenance group greases electric motors. The monthly printout lists the required due date of lubrication. At the present time, the printout lists no critical date by which the lubrication must be performed to ensure component operability. Changing the due date is arbitrary, therefore, an administrative procedure is needed to limit the liberties that can be taken in this regard. If the lubrication is for an individual component, and the lubrication has not been accomplished by the due date, the missed action appears on a Past Due List which is printed every month. However, if the listed action is for more than one component such as the lubrication of the three shutdown cooling pumps, and two of the pumps have been lubricated, the action is entered into the computer tracking system, but the program does not account for the missed pump. As a result, there is no printout of a past due date for the remaining pump. Rather, the program assumes that all three pumps have been lubricated. In such instances, the missed action relies on personnel notes to accomplish the missed maintenance action. The lubrication surveillance list should be expanded to account for each component rather than a group of components.

   Electrical periodic surveillances are associated mainly with Technical Specification requirements such as those for scram pilot valves, MSIV limit switches and scram breakers.

The instrument mechanics (IM's) regularly calibrate instruments in the plant that are used routinely by the operators in their day-to-day operation of the plant. Critical measured quantities associated with Technical Specification instruments are graphed and trended. The remaining instruments are merely logged into the computer system as they are recalibrated, and new due dates are assigned. If an instrument, as found, is out of the accepted calibration range, the IM's write a DVR for a Technical Specification related instrument. The Balance of Plant (BOP) instruments which are out of range are adjusted without issuing DVR's. Thus, no meaningful PM information is obtained from the majority of recalibrations. If a class of instruments is routinely going out of range, the site is relying on the memory of individuals to highlight this. When instruments are found broken, work requests are generated to repair them. These are entered into the TJM system for trending. However, it would be beneficial if all instruments that are out of range generate a DVR so that adverse trends can be caught to predict instrument failure. This measure would permit the IM's to perform required PM actions before instruments break.

A better periodic surveillance program would permit the maintenance department to perform the required PM actions on a timely basis. Other predictive measurements that warrant consideration for components include vibration analysis, oil analysis, acoustical analysis, and ultrasonic testing, depending on the relative importance of the component.

3. Predictive maintenance activities at Dresden consist of In-Service Inspection (ISI) of safety-related equipment required by Section 11 of the ASMI Code and limited tests of electric motors.

   Limited tests of electric motors are only performed when members of the maintenance department suspect that a motor is defective and are limited to phase voltage balance and insulation resistance measurements. These tests only reveal extreme deterioration of a motor rather than degradation, per se. A more meaningful PM program would include periodic tests which measure dielectric absorption or dielectric strength of large motors (e.g., 500 HP and above). Such tests can detect the actual degradation of a motor's insulation and can be used to predict equipment failure, thereby permitting the maintenance department to perform the required PM actions on a timely basis.

   Dresden's remaining predictive maintenance activities are tracked by a monthly computer printout. This printout is generated onsite to keep track of all the required tests. The Technical Staff keeps records of the tests and compares the results to ranges of acceptability which can change the frequency of tests. The staff trends such parameters as pressures and flow rates. At the urging of INPO and the

NRC, the licensee has begun looking at additional existing operational data in order to get a PM program started on the remaining portion of the plant not covered by Section 11. However, the analysis work that could be performed has been hampered by the limited data that exists. To correct this, the licensee assigned a PM coordinator about two years ago who began to upgrade the program. For example, vibration monitoring of certain equipment was begun to predict operability. Better oil wear analyses have been performed. These predictive trending indicators are the beginning of a learning curve, with more to be added.

This Dresden in-service testing program should be improved by a corporate initiative known as the "Reliability Related Program," which has been implemented within the last year at all Commonwealth Edison nuclear stations. The program provides for selected use of technical and management controls to improve the operational performance of equipment that is not safety-related. It is essentially a BOP equipment performance monitoring trending program. The program includes implementation of a variety of engineering, operating, and maintenance practices.

For this program, the plant equipment will be broken down into three groups: safety-related, regulatory-related, and reliability-related. Safety-related equipment is already covered by a variety of surveillances. Regulatory-related equipment includes fire protection and security systems which are covered by their own existing programs. Reliability-related equipment includes BOP equipment that, if defective, can cause or has a potential for causing a loss of generating capacity.

To accomplish these goals, the licensee has embarked on a PM program which will analyze and predict equipment performance. It will attempt to address all PM items recommended by manufacturers and vendors. Previous site experience and existing maintenance histories will be included. Deferring a scheduled PM item will need to be approved. Work performed on a component will be required to be documented. Measuring and test equipment will be controlled and calibrated.

In addition to the above, equipment performance will be regularly evaluated by performance tests and analyses. Tests will be performed with the intent to detect and correct degraded equipment performance before failures can occur. Performance tests will also be used to evaluate equipment performance after maintenance work. The tests will be performed by knowledgeable and trained personnel in accordance with approved procedures.

B. Corrective Maintenance Practices

Corrective maintenance (CM) activities at Dresden are performed in accordance with Dresden Administrative Procedure (DAP) 15-1 and are initiated by the logging and routing of a Work Request (WR). Any Dresden staff member can initiate a WR upon discovering the need for repairs, maintenance or modification. Station personnel involved in the routing and completing of a WR are clearly defined in DAP 15-1. The initiator of the WR is responsible for a clear and concise description of the problem and work requested; the Operating Shift Supervisor is responsible for the assignment of a WR number and entering the requested work in the official station operating work request log; the Operating Engineer is responsible for several determinations, including tests to be conducted prior to returning the component to service, the department responsible for the required work, the priority of the request, and whether the request is safety-related; the Working Department is responsible for the performance of the work; the Quality Assurance department is responsible for establishing hold points; and Quality Control is responsible for inspecting and ensuring that the work conforms to the applicable standards. During the processing of the WR, the required work is entered and tracked in Dresden's computerized work request reporting system.

Upon completing the routing of the WR, and based on the priority assignment, the assigned Working Department will request that the equipment be placed out of service. This request is submitted to the Operating Department for logging the master out-of-service card in the "Equipment Outage Checklist" and allowing the equipment to be taken out of service for the required work.

Dresden's CM program for non-safety related components is static rather than dynamic regarding the assignment of priorities. In other words, once a component needing maintenance is assigned a priority, its priority usually remains unchanged, irrespective of the time the component is out of service or of the number of similar or related components that are out of service. In brief, there is no systematic or periodic review process at Dresden for upgrading the priority of a component that needs maintenance. Consequently, because BOP components and non safety-related components that do not impact plant operation are usually assigned a low maintenance priority, a large backlog of such components can result. Such backlogs during plant outages have created undue stresses on personnel and could adversely impact Dresden's "Plan to Achieve Error Free Operation."

C. Dresden's Recent Corrective Action Program for the Restart of Units 2 and 3

This corrective action program was initiated as a result of events that occurred during the first three months of 1987 at Dresden 2 and 3. Although all three of the Unit 3 shutdown cooling pumps were out of service on March 3 and 4, 1987, these outages did not directly

influence Dresden's corrective action program; however, because of the high visibility of this event, including concerns regarding common mode failures, this event is described in greater detail later.

The essential ingredients of Dresden's corrective program for restarting Units 2 and 3 were included in a letter from Cordell Reed to Bert Davis dated March 6, 1987. This letter and its two attachments (Attachment A and Attachment B) describe a comprehensive plan for resolving a broad array of problems recently discovered by the NRC and Commonwealth Edison. Attachment A is a listing of out-of-service equipment at Dresden Unit 3. The listing identifies the components that must be returned to service prior to the restart of Unit 3 or the bases for their not being required for restart. Attachment B, "Dresden 2 and 3 Plan to Achieve Error-Free Operation," describes a systematic "get-well" plan. As such, it defines the responsibilities of relevant levels of management during the March 1987 startups of Units 2 and 3, including several check points where specific analyses and verification must be conducted prior to escalating the power level. In brief, this "get-well" program methodology if successful should be used in a "stay-well" program. Such a program should be aimed at reducing the magnitude of work to be performed under the stresses imposed by the "get-well" program following an outage.

D. Unavailability of the Three Shutdown Cooling Pumps at Dresden Unit 3 on March 3, 1987

On March 3, 1987, all three shutdown cooling pumps for Unit 3 were out of service. A description of the sequence of events leading to these outages follows.

Approximately one year ago, the upper bearings of the motor for the "3C" shutdown cooling pump failed. In addition, the motor's windings were damaged to such an extent that the motor required replacement; however, because of the unique design of the motor, it had not been replaced on March 3, 1987. Unfortunately, a DVR was not prepared for this failure because the affected pump is not a safety-related component and the estimated repair cost was less than the specified threshold for preparing a DVR. Consequently, the root cause for this failure was not determined.

On March 1, 1987, two days after the "3B" shutdown cooling pump had been placed in service, the motor's upper bearing failed. A DVR for this failure has been initiated; however, as of May 7, 1987, the DVR had not been completed. Consequently, the licensee has not yet determined the root cause of this failure, which might also have been the root cause of the year old failure of pump "3C".

On March 1, 1987, subsequent to the failure of the "3B" shutdown cooling pump, the "3A" shutdown cooling pump was placed in service. On March 3, 1987, the shift operators noticed that the oil for the

motor's upper bearing was discolored. Although pump "3A" was the only operable shutdown cooling pump, it was secured and the oil was changed as a PM measure. Thus, the simultaneous outage of all three shutdown cooling pumps, which lasted less than 24 hours, was the result of a conscious and deliberate decision to perform PM actions and was not due to equipment failure, per se. (NOTE: Although these pumps are called shutdown cooling pumps, they are not safety-related. Dresden has several other means for decay heat removal which are safety-related.)

Dresden has not yet, and may not ever, determine the root cause(s) of the above bearing failures. However, during the course of the review, it was speculated that the cause might have been defective lubricant. In support of this view, it was conjectured that the lubricant was not being changed on the prescribed schedule, (i.e., biannually, with the previous change having been scheduled for March of 1985). A review of Dresden's computer printout for this PM function indicated that the lubricant was last changed on schedule, thereby disarming the foregoing conjecture. Our review did not lead us to a reasoned conclusion regarding the root cause(s) for these bearing failures. Nevertheless, it is recommended that the following questions concerning PM and operational practices be reviewed for their potential contribution to the failures: (1) Is the two-year schedule for changing oil adequate, or should it be modified based on periodic (say quarterly) testing of the oil? (2) Should the practice of only using one pump for fuel pool cooling be revised such that each pump is used periodically (we were informed that pump "3C" had been used almost exclusively for this function for several years)? (3) Should these pumps be periodically run or at least rotated, to reduce the likelihood of brinnelling at the bearing surfaces?

V. PERCEPTION OF DRESDEN

The team interviewed Region III personnel (listed in Section II) who have had dealings with the plant concerning perceived problems and licensee personnel. The consensus of people interviewed was that Dresden has a dedicated staff and that most of the equipment problems were attributed to a lack of an extensive and systematic preventive maintenance program. Increased management attention is needed to reduce the number of unnecessary reactor scrams, the time spent operataing under LCO's, and the long list of degraded equipment. The licensee is attempting to correct these problems.

VI. CONCLUSIONS

There are several conclusions that can be drawn from the data reviewed and interviews conducted during the review process. They are as follows:

A. Analysis of NRC and licensee documents indicated that no system has been repeatedly involved in events that has not been previously addressed by the licensee.

B. The licensee has or is taking steps to reduce the number of scrams and personnel errors. Some of these actions are:

- The Plan to achieve Error-Free Operation.
- Recent personnel changes.
- The Scram Reduction Program.

These programs are not as effective as they could be as evidenced by the continuing high rate of scrams during the first three months of 1987. To avoid further decline in operation performance, increased management awareness is warranted.

C. The preventive maintenance program has been improved by the addition of a Preventive Maintenance Coordinator and is being improved by a BOP Reliability Related Preventive Maintenance Program. The program is being designed to anticipate and prevent balance of plant equipment failure and degradation. This improved performance will be accomplished through routinely scheduled maintenance tests, equipment monitoring, inspections, and surveillances.

D. The licensee has implemented a systematic "get-well" program entitled "Dresden 2 and 3 Plan to Achieve Error-Free Operation" which clearly defines management responsibilities and actions to be taken including various checkpoints when recovering from an outage.

E. The major concern identified by the task force was a need to make existing maintenance practices more systematic. To a significant degree, the station relies on capable individuals to recognize and keep track of equipment problems and failures. Hence, consideration should be given to the following recommendations:

- Evaluate the effectiveness of the maximum occurrence reports and take those actions necessary to make them more preventive, e.g., by expanding their trending ability.
- Expedite the issuance of a procedure governing the lubrication program and expand the lubrication list.
- Evaluate the scope of DVR's to provide better information relative to trending of instruments out of calibration range.