U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No:	50-286/94-11
Licensee:	New York Power Authority
Facility:	Indian Point 3 Nuclear Power Plant
Location:	Buchanan, New York
Dates:	May 15, 1994 to June 27, 1994
Inspectors:	G. Tracy, Senior Resident Inspector, IP-3 T. Frye, Resident Inspector, IP-3 R. Rasmussen, Resident Inspector, IP-3

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Reactor Projects Section 1B

Areas Inspected: This inspection report discusses resident inspector safety inspections of plant activities in the following areas: plant operations; maintenance; engineering; plant support; and safety assessment and quality verification.

Results: Inspection results are summarized in the attached executive summary.

EXECUTIVE SUMMARY

Indian Point 3 Nuclear Power Plant

NRC Inspection Report No. 50-286/94-11

Plant Operations: The plant remained in the cold shutdown condition in a performance improvement outage throughout the period. On June 8, 1994, NYPA's new work control process became effective. Integral to this new work control process was the establishment of the work center.

Review of NYPA assessments and inspector observations of work activities have demonstrated improvements in the conduct of maintenance at Indian Point 3. Questioning attitudes and the willingness to stop and correct problems are apparent in all departments and all phases of the work process. However, some problems still exist in the planning and preparation of work packages that lead to eventual challenges during the processing and performance of the work in the field. Further, a comprehensive procedure upgrade program is still being developed to review and improve station procedures.

On June 11, 1994, a full load test was being performed on the 32 emergency diesel generator (EDG) as a retest following preventive maintenance. Load increased continuously with no operator action. Troubleshooting identified that the field exciter voltage (selenium) rectifier had failed. NYPA's response was prompt and thorough and the inspectors considered their immediate corrective actions and operability determination acceptable. However, the inspectors noted several weaknesses with a 1988 Material Substitution Evaluation that replaced the original selenium rectifier with a different model. This issue remains unresolved. **(URI 94-11-01)**

Maintenance: The inspectors observed several maintenance activities during the RHR system window. Overall, work activities observed were well performed with workers knowledgeable of the scope of their work. Good contingency planning was developed to address the restoration of RHR cooling in the event that the operable loop was lost. Safety evaluations for the different phases of the window were reviewed by the inspectors and found to be well written. During these observations, the inspector noted a vent valve removed from the system and laying on the ground with a stop tag still attached. NYPA quickly and thoroughly confirmed system configuration and revised the plant tagging procedure.

NYPA noted reduced flow-rates through the auxiliary boiler feed pump recirculation valves during performance of the monthly surveillance test. NYPA subsequently determined that the reduced flow was caused by plugging of the recirculation valve internals by grit from blast cleaning the condensate storage tank. NYPA is investigating the process that allowed sufficient grit to enter the auxiliary feed system such that it plugged the recirculation flow control valves. This item is unresolved. **(URI 94-11-02)** The inspectors also reviewed NYPA's procedures, flush preparation, execution and retest of the auxiliary boiler feedwater

system. Maintenance procedures required identification and correction of leakage during an operational pressure test. Although the evolution was generally well-coordinated and controlled, operations personnel missed small leaks in the system. The inspectors considered the planning process and post maintenance retest package to be weak, but most importantly, the licensee's critique of this event was narrowly focused.

Engineering: NYPA discovered a pin hole leak on the component cooling water discharge piping from the spent fuel pool heat exchanger. The leak rate was approximately 45 drops per minute. NYPA's long and short term solutions were well thought out and received an appropriate level of review. The UT examination and technical evaluation of the pipe for potential catastrophic failure was conducted promptly and the operations department response of monitoring the leak and reviewing the contingency actions showed a good safety perspective.

In response to weld and radiograph concerns at FitzPatrick, an extent of condition review is being performed at Indian Point 3 of their radiographic film and weld records. As suspect weld records have been identified, NYPA has searched for additional documentation, has verified the condition of the welds through additional radiography, and has promptly evaluated the effects of the confirmed defective welds. Four deficient welds have been identified so far. The engineering calculations and operability determinations for the defective welds have been reviewed by the resident and region based specialist inspectors and were found to be acceptable. Further details are documented in specialist inspection report 50-286/94-15. This area remains unresolved. **(URI 94-11-03)**

Plant Support: The primary water storage tank overflowed due to level instrument errors apparently caused by over heating of the transmitters due to heat trace. The inspector reviewed NYPA's action plan to address this area and found it acceptable.

Safety Assessment/Quality Verification: In early May 1994, an effort was undertaken by NYPA management to perform a comprehensive root cause analysis to address the continuing procedure adherence problems at the station. This effort was termed the Procedure Adherence Root Cause Analysis (PARCA) and has been undertaken by a diagonal cross section of Indian Point 3 employees. The efforts of the PARCA team have been very effective and thorough in evaluating previous station procedure adherence events for common root causes.

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1.0 SUMMARY OF PLANT ACTIVITIES

1.1 Plant Activities

NYPA continued the performance improvement outage throughout the reporting period. The reactor remained in the cold shutdown condition. Work in the scheduled residual heat removal system window progressed throughout the period.

On May 26, 1994, NYPA held a public meeting to present the Restart and Continuous Improvement Plan (RCIP) to the NRC. The meeting was attended by local elected officials, representatives of local environmental organizations, NYPA employees and local citizens. Details of the meeting are discussed in section 1.4 of this report. NYPA's handouts distributed during the meeting are attached.

1.2 NRC Activities

From May 16 to 20, 1994, an inspection of emergency diesel generator issues associated with Restart Action Plan Item 2.II.2 was conducted by an NRC specialist inspector. (NRC Inspection 50-286/94-13)

From May 22 to 26, 1994, a routine inspection of site security was conducted by an NRC specialist inspector. (NRC Inspection 50-286/94-14)

From May 23 to 27, 1994, an inspection of NYPA's drawing control program was conducted by an NRC regional inspector. (NRC Inspection 50-286/94-12)

From June 20 to 24, 1994, an inspection to follow up issues associated with welding and weld records was conducted by an NRC regional inspector. (NRC Inspection 50-286/94-15)

1.3 Management Changes

On June 16, 1994, NYPA announced the appointment of Mr. T. Dougherty as Vice President Nuclear Engineering. Mr. Dougherty previously held the position of Director of Project Engineering in the White Plains Office.

On June 16, 1994, NYPA announced the appointment of Mr. B. Deasy as Vice President of Appraisal and Compliance Services. Mr. Deasy was formerly the head of the Power Contracts Group in New York.

1.4 Restart and Continuous Improvement Plan Presentation

On May 26, 1994, NYPA presented the Restart and Continuous Improvement Plan (RCIP) to the NRC during a public meeting at the training center. On December 17, 1993, the NRC had held a public meeting with NYPA management in order to discuss concerns with the

Performance Improvement Plan (PIP) and its apparent ineffectiveness in addressing performance issues. A Situational Assessment Team (SAT) had been chartered by the NYPA Restart Management Team (RMT) in January 1994 in order to determine the root cause for the continuing decline in performance at Indian Point 3 and the White Plains Office (WPO), and to develop comprehensive and integrated corrective actions under the RCIP.

The RCIP project was completed in May 1994. The RCIP outlines the elements NYPA believes are necessary to restart and improve performance at Indian Point 3. The plan is divided into two sections: the Restart Plan (actions required to restart Indian Point 3) and the Continuous Improvement Plan (actions to improve long-term performance). The RCIP describes NYPA's restart criteria, restart action plans, restart readiness and assessment, and startup plan.

Questions regarding the development and validation of the RCIP were asked by NRC as well as NYPA's methods for verifying the actual results during plan implementation. At the end of the meeting, NRC management voiced their concern with the fact that NYPA had presented a number of plans to address the declining performance at Indian Point 3 prior to the RCIP, which had appeared adequate, but were ultimately unsuccessful.

The RCIP is currently under review by the NRC NYPA Assessment Panel (NAP). Formal comments regarding the RCIP from NRC will be transmitted under separate correspondence upon completion of that review.

2.0 PLANT OPERATIONS (71707, 93702)

2.1 Routine Operations Reviews

Using the probabilistic risk assessment (PRA) inspection guidance and applicable drawings and checkoff lists, the inspectors independently verified safety system operability by performing control panel and field walkdowns on the following systems:

- Low Pressure Injection System (RHR)
- Service Water System
- Component Cooling Water System (CCW)
- Emergency Diesel Generators

All systems were properly aligned for the existing plant conditions.

The inspectors routinely observed plant operations including operator shift turnovers, shift briefings, operator logs, system tagouts, alarm response, control manipulations and system operation. The inspectors verified that the plant was being maintained safely and in accordance with procedural and regulatory requirements.

The inspectors also observed the radiological controls in place throughout the plant and considered them effective in meeting the objectives of the radiological controls program. The inspectors observed site and vital area access controls. The security department effectively implemented the security plan during the activities observed.

2.2 Work Control

Background

In late 1993, several events occurred involving improper configuration control of the plant and poor procedural adherence practices. An enforcement conference was held on December 10, 1993, to discuss these events, their causes, and corrective actions. By letter to the NRC dated December 22, 1993, NYPA described actions taken to ensure control of plant configuration. These actions included reducing the amount of work being performed, slowing down the work control process, and tightening the controls on work clearances and operating orders.

NRC inspection report 94-01 documented a January 1994 review of these revised work control practices and NYPA's ability to maintain control of plant configuration. This inspection concluded that corrective actions to date have been effective, although in part due to the decrease in work activity. The inspection also stated that NYPA's proposed methods for monitoring work as activity increased would address their ability in accurately scheduling and processing work, but would not address the quality of work performed.

Work Control Center

On June 8, 1994, NYPA issued administrative procedure (AP)-9, revision 24, "Work Control." Integral to this new work control process was the establishment of the work center. The functions of the work center were placed under the cognizance of the operations department organization. The work center provides the new focal point for performing station work by issuing all work packages, operating orders, and clearances. All work packages for station equipment are issued and returned to the work center. System retests are also controlled through the work center.

The work center is staffed 24 hours a day by operations personnel, and is supplemented on day shift by work control personnel. The shift supervisor controls daily work activities through the work center, and can designate another licensed senior reactor operator to perform these duties. Currently the assistant shift supervisor performs these work control duties. The inspectors observed work control activities in the new work center and discussed responsibilities with personnel. Personnel were knowledgeable of their duties and good interaction was observed between operations and maintenance personnel while processing work packages.

Scheduling

A contributing cause to the previous plant configuration control problems had been the adequacy of the schedule used for controlling station work. Previously the work schedule was no more than a listing of work activities with no logic ties between activities. In addition, many work activities would be added to the schedule without an adequate risk assessment by operations department.

Improvements in scheduling work activities have been realized by NYPA using their "Finest Hour" scheduling program. The inspectors reviewed the scheduling of the residual heat removal (RHR) windows and concluded that the scheduling for this work was clear and well laid out. As of the end of this inspection period, NYPA was finalizing their restart (RS)-94 outage schedule.

The RS-94 schedule encompasses all remaining work required for startup and places these activities in distinct system windows. To develop this schedule, all remaining work was reviewed against outage scope criteria to evaluate the need for completion prior to startup. The inspectors reviewed the outage scope criteria used and considered the criteria to be comprehensive.

Outage Management

In May 1994, AP-9.5, "Outage Management" was revised to clarify the methods and responsibilities for the management and control of outages. Included in this revision was the establishment of the Outage Manager as the focal point for departments to report all outage related issues. The Outage Manager reports directly to the Resident Manager and is responsible for ensuring that the outage schedule is properly implemented. The Outage Manager conducts daily outage meetings and chairs the outage scope control meeting, which considers additions and deletions to the approved schedule. The Outage Manager is also responsible for maintaining cognizance of emergent work that could alter the schedule. The inspectors have observed several outage meetings, during which good discussion and interaction was apparent between the Outage Manager, outage coordinators and the various departments.

Ramp-Up of Work Activities

Currently, the pace of work activities is still being restrained by the new work control process, with work at 30-40% of capacity. In addition, the outage schedule is currently only 50% resource loaded. NYPA management has decided that there will be no clearly defined date when work activity will be increased. Instead, NYPA management believes that as the work control processes are better understood, and the communications and interactions between involved departments improve, the amount of work that is able to be performed will increase.

In early June 1994, NYPA management decided to work limited second shift and weekend shifts in an effort to increase the amount of work accomplished. These extra shifts were assigned to work critical path and emergent work activities, starting with the auxiliary feed water system flushes and the subsequent residual heat removal system window. Therefore, while the level of work per shift had not increased, the addition of the extra shifts increased the total amount of work accomplished.

Work Process Assessments

To assess the effectiveness of work activities, a ramp up assessment team was established in May 1994. The purpose of the assessment team was to establish parameters and criteria for monitoring work and to assess work during the RHR window to benchmark current work activities. The criteria developed by the team included both quantitative assessments of the effectiveness of the work control process and qualitative assessments of work being performed.

Due to the fact that work activities did not ramp up commencing June 6 as previously planned, the assessment team has scaled back their assessment activities. As the work level starts to pick up, the assessment team will continue with their monitoring functions. In addition to this team's activities, the quality assurance (QA) department is performing surveillance of the work control process.

Conclusions

Reviews of NYPA assessments and inspector observations of work activities have demonstrated improvements in the conduct of maintenance at Indian Point 3. Questioning attitudes and the willingness to stop and correct problems are apparent in all departments and all phases of the work process. In spite of these improvements however, areas for improvement still remain. Problems still exist in the planning and preparation of work packages that lead to eventual challenges during the processing and performance of the work in the field. Examples of these challenges are described in sections 3.1.1.2 and 3.1.3 of this report. Further, a comprehensive procedure upgrade program is still being developed to review and improve station procedures. In the interim, NYPA is relying on procedure user review prior to use to identify and correct procedure deficiencies. This presents unnecessary challenges to the plant and contributes to overall restrictions on the work process.

2.3 Emergency Diesel Generator (EDG) Overload

On June 11, 1994, a full load test was being performed on the 32 EDG as a retest following preventive maintenance (PM). During the test, the 32 EDG was started and loaded successfully to 1400 KW. As load was raised above 1400 KW, load increased continuously with no operator action. The operators responded by decreasing the load manually. The

load on the 32 EDG reached approximately 2000 KW before the operators were able to reverse the load manually. As load was decreasing, the EDG tripped on over-current at approximately 1750 KW.

On June 12, troubleshooting by I&C and technical services identified that the field exciter voltage (selenium) rectifier had failed. This caused a loss of field excitation voltage and resulted in the low voltage/high current trip. After replacement of the selenium rectifier, several test runs were made on the EDG to verify the operability of the unit. On June 17, the formal retest was completed and the 32 EDG was declared operable.

In 1988, the selenium rectifier for the 32 EDG failed. Since the original Westinghouse model was no longer available, NYPA installed a CKE Inc. selenium rectifier. A PORC approved material substitution evaluation (MSE) was performed. Subsequent to the model change in 1988, NYPA has had three failures of this selenium rectifier on the 32 EDG.

The selenium rectifier vendor was brought on site to help understand the cause of the rectifier failures. As a result of this investigation, NYPA identified several factors that could be contributing to the failures of the rectifiers.

1. The voltage ratings of the replacement CKE Inc. rectifier are below the ratings for the original Westinghouse rectifier.

Westinghouse rectifier ratings:	189 VDC Steady State @ 530V Clamping
CKE Inc. rectifier ratings:	180 VDC Steady State @ 480V Clamping

   The lower voltage rating causes the rectifier to try to maintain the field voltage at a lower value and therefore degrades the selenium more rapidly.

2. Temperatures in the EDG control circuit cabinet may be degrading the voltage rating of the selenium rectifier.

3. The vendor literature from CKE Inc. states a service life of 5 years is expected under optimum conditions.

4. NYPA did not have a periodic check or replacement of the selenium rectifiers as part of their PM program.

5. There may be voltage spikes on the 32 EDG that are different from the spikes on the other EDGs. NYPA plans to obtain and compare voltage data from all of the EDGs to evaluate this concern.

NYPA is evaluating another model change for the field exciter voltage rectifiers to alleviate the apparent design flaw created with the current configuration. In the interim, NYPA has taken several actions to ensure operability of the EDGs. A quarterly inspection and annual

replacement of the rectifier will be added to the 32 EDG PM program. Additionally, visual inspections will be performed on the rectifiers installed on the 31 and 33 EDGs. Long term actions include an evaluation of EDG control cabinet temperatures and the possible effects on the selenium rectifiers and other EDG control components.

Conclusion

NYPA's response to the most recent 32 EDG failure was prompt and thorough. The inspectors considered NYPA's immediate corrective actions adequate and consider NYPA's operability determination acceptable.

However, the inspectors noted several weaknesses with the 1988 MSE. The MSE did not address all of the differences between the two rectifiers. Specifically, the lower steady state voltage of the CKE Inc. rectifier was not mentioned. Additionally, the basis for accepting the lower clamping voltage did not consider the aging affect on the rectifier. The 5-year life expectancy of the unit was also not addressed in the MSE and was not factored into the PM program. This issue remains open pending the completion of NYPA's evaluation of this event and subsequent NRC review. **(URI 94-11-01)**

3.0 MAINTENANCE (62703/61726)

3.1 Routine Maintenance Review

The inspectors' review of maintenance activities included the following:

93-09733	Waste Gas Analyzer Modifications
94-03079	32 Central Control Room Air Conditioner Troubleshooting
94-01767	33 Emergency Diesel Generator Maintenance
94-02846	Clean/Inspect ABFP Flow Control Valves
94-02395	Modify CCW Flow Indicators
94-03756	31 Central Control Room Air Conditioner Repair and Modification
94-01851	Calibrate 32 Emergency Diesel Generator Service Water Pressure Switch
94-00850	Replace 32 RHR Pump and Motor
92-2029	Repair Tubing to Flow Indicator FI-985

During the observation of maintenance activities and review of records, the inspectors verified that required administrative controls and tagouts were obtained, procedures were adequate, certified parts and materials were used, test equipment was calibrated, radiological requirements were implemented and quality control hold points were established as required. Findings noted during the performance of these activities are discussed in further detail in this report.

3.1.1 RHR System Window

The inspectors observed several different maintenance activities during the RHR system window. The RHR system window consisted of taking all RHR outage work and scheduling it as appropriate during the separate 31 and 32 RHR pump and heat exchanger portions of the window. Overall, work activities observed were well performed with workers knowledgeable of the scope of their work. Good contingency planning was developed to address the restoration of RHR cooling in the event that the operable loop was lost.

Safety evaluations for the different phases of the window were reviewed by the inspectors and found to be well written. Temporary operating procedures were prepared to address draining and isolating portions of the system and to ensure that RHR cooling requirements were always met. Portions of the 32 RHR heat exchanger work involved intrusive maintenance on the system, and was controlled as a special evolution.

3.1.1.1 Vent Valve Removed With Stop Tag Attached

On June 9, 1994, while observing the replacement of the 32 RHR pump motor, the inspector noted a section of the pump seal heat exchanger piping removed from the system and laying on the ground. The inspector further noted that this section of piping included a vent valve, AC-728B, which still had a stop tag hung on it. This valve had been tagged open to support system isolation and draining. The inspector informed the shift supervisor of this situation, and expressed concern as to how the plant configuration could be controlled when tagged components were removed from systems.

NYPA determined that the maintenance supervisor had made the decision to remove the piping with the tagged valve while disconnecting the 32 RHR pump service lines. The supervisor's justification for this decision was that since the valve was tagged open to vent the piping, removing the piping would keep the system vented and the purpose of the tag would be unchanged. AP-10.1, Revision 8, "Control of Stop Tags", stated that stop tags are used to prohibit personnel from making changes in the status of equipment. However, the definition of a change in equipment status was not clearly defined. NYPA management emphasized to the inspectors that the removal of tagged equipment did not meet their expectations for adequate plant configuration control.

Work was stopped on the 32 RHR pump and the two outstanding work packages were placed in hold status and returned to the operations department. The stop tag on AC-728B was removed, and the remaining isolation was reverified to confirm system configuration. The maintenance manager briefed his supervisors on management's expectations concerning stop tags on equipment and their importance towards maintaining control of the plant configuration. Revision 9 to AP 10.1 was PORC approved on June 10, 1994, to clarify the prohibitions on changing the status of tagged equipment.

Conclusions

Maintenance displayed weak work practices and judgement in removing valve AC-728B with a danger tag attached. The potential affect of these types of actions on the ability to control system configuration was not clearly understood by maintenance personnel. NYPA response to confirm system configuration was timely and thorough. The revision to AP 10.1 was promptly prepared and reviewed, with the revision and it's significance well communicated to the plant staff.

3.1.1.2 Inadequate Isolation Proposed For CCW Piping

In order to remove the installed 32 RHR pump motor, NYPA generated work request 94-850-02 to remove an interfering section of CCW piping. When maintenance brought the work request to the work center for approval, maintenance and operations review prior to work authorization identified that the scope of the work was outside the established isolation. The significance of this event was that the potential existed for the release of intrusive work on the CCW system without adequate protection established for personnel safety and system integrity.

A critique was held by the work center staff to review the event. It was determined at the critique that the description of the scope of work in 94-850-02 did not provide adequate information to allow for the development of a proper isolation. The central planning department is reviewing work request 94-850-02 to determine the adequacy of the information in the work request and any corrective actions to prevent recurrence.

The work control processes recently established, such as maintenance and operations review of the scope of work and protection established, proved effective in identifying this deficiency prior to work authorization. However, the failure of the work request to provide adequate information to identify the scope of the intended work presented an unnecessary challenge to the work control system. The inspectors remain concerned about the adequacy of work packages and the effect this has on the quality of work performed.

3.1.2 Plugged Auxiliary Boiler Feed Pump Recirculation Valves

Overview

On May 25, 1994, NYPA noted reduced flow-rates through the auxiliary boiler feed pump (ABFP) recirculation valves during the performance of the monthly surveillance test. NYPA subsequently determined that the reduced flow was caused by plugging of the recirculation valve internals by foreign material.

Details

During the performance of 3PT-M20B, the monthly auxiliary boiler feed pump functional test, low recirculation flow rates were noted for both the 31 and 33 ABFPs. The acceptance criteria for the test was greater than 100 gallons per minute (GPM) recirculation flow for each pump. The 31 ABFP had 33 GPM flow and the 33 ABFP had 50 GPM flow. Following the test failure NYPA initiated actions to investigate the problem.

The investigation indicated that the recirculation valves were restricting flow. Upon inspecting the valve internals, NYPA determined that the valve trim was plugged with foreign material. NYPA evaluated the material and determined it was sand-blasting grit that was most likely introduced into the system during condensate storage tank (CST) cleaning performed in October, 1993. NYPA concluded that the grit had been in the lines since October, 1993 but did not progress down the piping to the pumps until the system was used in April, 1994 to feed the steam generators for the RCS fill and vent evolution.

The auxiliary boiler feed pump recirculation flow paths are required to ensure a minimum flow through the pumps exists to protect the pumps from possible damage while running at shutoff head. The flow-paths are also used to determine pump performance during periodic tests. Because the plugging of the lines was discovered by the failure of a performance test, NYPA declared the auxiliary boiler feed pumps inoperable. NYPA delayed the planned maintenance on the residual heat removal (RHR) system pending restoration of the ABF system because the ABF system was a backup method of core cooling.

NYPA developed a plan for evaluating the extent of foreign material entry and restoring system cleanliness. To establish the extent of the spread of the grit, valves considered susceptible to fouling were disassembled and inspected. No plugging was noted in the additional valves inspected. NYPA flushed the piping from the CST to the suction of the ABFP's and to the main condenser. The flush procedures were designed such that sufficient flow-rates would be achieved to flush out any particles of the size and type found in the recirculation valves. The flush effluent was filtered to determine the cleanliness of the system. After several flushes, the piping was declared acceptable and the system was reassembled.

For the final check of the system's cleanliness, NYPA ran the ABFPs in recirculation mode for eight hours and then reinspected the internals of the recirculation control valves. The final inspection did not indicate any further grit in the valves. At the completion of the reassembly of the piping and valves, NYPA performed leak tests of the various mechanical joints. On June 8, 1994, NYPA considered the problem corrected and the system was declared available for use.

NYPA evaluated the effect of the foreign material that was injected into the steam generators during filling operations from October 1993 to May 1994. NYPA determined that the material in the amounts postulated to have been injected would not have any detrimental effects on the ABF system, the steam generators or other systems.

NRC Review

The inspectors reviewed NYPA's flush preparation, execution and retest of the ABF system. The temporary operating procedure developed to perform the flushes was logical and well written. The decision to perform the flushes prior to proceeding with the scheduled residual heat removal system work demonstrated a conservative safety perspective. Personnel performing the flushing evolution conducted the evolution formally and in accordance with the procedure. The inspectors noted one area of concern while observing a portion of the system retest. This is discussed in the following section.

The inspectors were also concerned with the events regarding the grit blasting of the condensate storage tank that introduced the foreign material into the system. NYPA is investigating the process that allowed sufficient grit to enter the auxiliary feed system such that it plugged the recirculation flow control valves. This item is unresolved pending NYPA's investigation and subsequent NRC review. **(URI 94-11-02)**

3.1.3 Retest of Auxiliary Boiler Feed Pump Spool-Pieces

The inspector reviewed post maintenance retest packages and observed several retests for the work involved with the cleanliness restoration of the ABF system described in section 3.1.2. While the 33 ABFP was being operated for a performance test, the inspector noted several drops per minute leaking from a two-inch union on a recirculation line connecting the pump casing to the suction spool-piece. Drops of water were hanging from a similar union on the 31 ABFP line, indicating it was leaking as well. The inspector noted that the system was pressure tested and signed-off satisfactory in maintenance work requests the previous day. The joints were required to be disassembled and reassembled as part of the work package for removing the spool-pieces.

NYPA corrective actions consisted of initiating a maintenance work request to tighten and retest the joints. A subsequent pressure retest was satisfactory. NYPA conducted an investigation of the retest of the ABFP suction spool-pieces. Operations personnel conducting the test did not find any leakage at the time of the test. NYPA's critique determined that the operations personnel conducting the retests were not aware that the joints were within the test boundary and attributed the event to inattention to detail.

The inspector reviewed the initial post maintenance retest package and noted the following weaknesses. The individual joints in question were not specified, the actual test results were not required to be recorded, and leakage criteria was not specified. Additionally, the procedure step noting no system leakage found was signed by the maintenance supervisor

rather than the operations personnel performing the retest. As a result of these findings, the inspector considered the planning process and post maintenance retest package to be weak. Most importantly, the inspector found the licensee's critique of this event to be narrowly focused. It did not examine the interface between the operations and maintenance departments nor did it examine weaknesses with the planning aspects of the job. The inspector expressed his concerns to licensee management and they agreed to review their critique for further corrective actions if warranted.

3.2 Routine Surveillance Review

The inspectors' review of surveillance activities included the following:

3PT-R32H	Vapor Containment Vent Exhaust Filtration
3PT-M20B	ABFP Functional Test
3PT-CS15	ABF System Valve Stroke Test
3PT-Q20	ABF System Valve Stroke Test
3PT-CS21	Charging System Valve Stroke Test
3PT-M79B	32 EDG Functional Test
3PT-R16A	EDG 2hr Capacity Test

The inspectors reviewed these surveillance tests and verified that they were performed in accordance with approved procedures, technical specifications and vendor recommendations. During the observation of surveillance activities and the review of test records, the inspectors reviewed surveillance performance, required administrative controls, adequacy of test procedures, calibration of test equipment, utilization of required radiological controls, detail of the test review process, and documentation of deficiencies and corrective action implementation.

4.0 ENGINEERING (71707)

4.1 Through Wall Leak on Spent Fuel Pool CCW Return Line

On June 5, 1994, NYPA discovered a pin hole leak on the component cooling water (CCW) discharge piping from the spent fuel pool heat exchanger. The leak rate was approximately 45 drops per minute.

As a result of this discovery, NYPA conducted an ultrasonic test (UT) of the piping in the area of the leak to characterize the condition of the pipe. NYPA concluded that the leak was a result of erosion corrosion and only affected a small localized area. Based on the UT results, NYPA concluded that a safety margin of at least 10 existed and the piping would not experience a catastrophic failure. Additionally, NYPA is evaluating several locations in the CCW system for inclusion in their erosion corrosion program.

Based on the recommendations of the technical services engineers, the operations department continued to operate the spent fuel pool heat exchanger while collecting the leakage and monitoring the leak rate. The technical services department developed plans to patch the leak using a temporary rubber patch while the details of a permanent replacement of the affected piping were being developed.

NYPA is planning to make a permanent repair of the piping prior to startup. Due to the lack of a backup spent fuel pool cooling system, NYPA is developing a comprehensive work package to be done when the system is down. The procurement, shop fabrication of the required replacement piping, and development of the work packages are being performed as priority jobs so that the pipe replacement can be performed ahead of schedule if required.

NRC Review

The inspector considered NYPA's response to this problem exemplary. The plans for the long and short term solutions were well thought out and received an appropriate level of review. The UT examination and technical evaluation of the pipe for potential catastrophic failure was conducted promptly and the operations department response of monitoring the leak and reviewing the contingency actions showed a good safety perspective. The inspector had no further immediate concerns in this area and will monitor the performance of the repairs as they are conducted.

4.2 NYPA Audit Of Post Construction Weld Records

Background

In response to weld and radiograph concerns at FitzPatrick, an extent of condition review is being performed at Indian Point 3 of their radiographic film and weld records. This audit being performed by Quality Assurance (QA) is reviewing post construction category I radiographs on a system by system basis. The RHR system was selected first to support the scheduled RHR system window. On May 26, 1994, three suspect radiographs were found for welds performed during a 1978 modification to the RHR system.

Details

On May 26, 1994, new radiographs were performed on the three welds in question. These new radiographs indicated unacceptable root passes due to lack of penetration for two of the three welds in question, RHR-BFW-35 and 36. The third weld in question was verified to be acceptable. The two confirmed defective welds are on the refueling water storage tank (RWST) supply piping to the RHR and safety injection (SI) pumps.

Operations prepared operability determination 94-21 to address the effect of these degraded welds on the RHR cooling loops and boration paths available to the core. It was determined that these degraded welds did not affect the RHR cooling loops since the welds were isolated

by two closed valves. In addition, while these welds do affect a core boration path from the RWST via SI pumps, other boration paths were available via blended makeup from the chemical and volume control system.

Engineering calculations were performed by corporate engineering to determine whether the affected line containing the two welds was still operable for cold shutdown conditions. These calculations concluded that for the present shutdown conditions, this line was operable provided the pipe wall thickness was greater than 0.092 inches. Assuming a complete lack of penetration of the root pass, the remaining nominal pipe wall thickness was 0.143 inches. Therefore the affected line is operable for shutdown conditions.

Startup and long term operability of the line was analyzed by a separate calculation completed on June 10, 1994. Review and comparison of the radiographs from 1978 and 1994 confirmed that the flaws in the two welds were from lack of penetration during the original weld process and no flaw growth was present. However, for conservatism flaw growth by intergranular stress corrosion cracking was hypothesized in the long term operability calculation. This analysis concluded that the two weld flaws were acceptable without repair for at least 2 1/2 years of continued operation in accordance with ASME section XI, IWB-3461.

With the confirmation of these two RHR weld defects, QA completed a detailed review of the 1978 RHR modification to identify further deficiencies. QA and technical services review concluded that there were an additional 8 welds associated with the modification that did not have radiographic records. Radiography was performed on these 8 welds on June 21 and 22, 1994, and it was determined that 2 of these welds were defective. The welds in question are RHR-BFW-33 and 34 and are on the safety injection recirculation line to the RWST. Weld BFW-33 was rejected due to lack of penetration and BFW-34 was rejected due to lack of fusion. Operability determination 94-22 was completed on June 23, 1994 and concluded that the line containing these 2 additional defective welds was operable for current cold shutdown conditions.

NYPA Review

As of the end of this inspection period, NYPA was still evaluating welds BFW-33 and 34 for past operability, code compliance and if these two welds will be repaired prior to startup. Repair of welds BFW-35 and 36 will be deferred until the next refueling outage due to the need to drain the RWST to perform the weld repair.

At the completion of the inspection period, QA has completed the review of approximately 300 of the 516 field welds identified for review. In addition to the 4 RHR welds that were rejected, additional welds are still under evaluation for code acceptance. At the completion of the QA audit, NYPA is considering an engineering review of all modifications to identify whether all appropriate nondestructive examination (NDE) records are available.

Conclusions

The efforts undertaken by QA to inventory and sample IP-3 radiographic weld records have been a good initiative. As suspect weld records have been identified, NYPA has verified the condition of the welds through additional radiography, and has promptly evaluated the effects of the confirmed defective welds. The engineering calculations and operability determinations for the defective welds have been reviewed by the resident and region based specialist inspectors and were found to be acceptable. Further details are documented in specialist inspection report 50-286/94-15. This area will remain unresolved pending completion of NYPA's investigation and subsequent NRC review. **(URI 94-11-03)**

5.0 PLANT SUPPORT (71707, 82701)

5.1 Primary Water Storage Tank (PWST) Overflow

While making his shiftly tour of the waste holdup tank (WHUT) cells on May 23, 1994, the nuclear plant operator (NPO) noted water and black sludge on the floor. It appeared to the operator that the WHUT cell sump had overflowed. The refueling water storage tank (RWST), 31 and 32 Monitor Tanks, and the PWST all have overflow lines that are directed to this sump. The water on the floor was sampled and boron concentration was too low to be from the RWST. In addition, both monitor tank levels were too low to have overflowed. Operations concluded that the source of the water was the PWST.

On May 22, 1994 at 12:00 noon, the PWST had been filled to 29.5 feet by control room (CCR) indication. There were no signs of water on the floor or indications of PWST overflow during the subsequent NPO tour of the WHUT cells at 5:00 p.m. on May 22. When the overflow was discovered by the NPO at 1:45 a.m. on May 23rd, the level in the PWST was 29.2 feet by CCR indication, but 31.5 feet by local indication. PWST overflow is set at 32.5 feet by design.

To confirm the source of the overflow, the PWST was lined up for fill while the overflow line was observed. As PWST level was raised to approximately 29.4 feet by CCR indication, water was observed overflowing into the WHUT sump. In addition, while filling the tank, a leak was noted on the overflow line, outside the tank. This resulted in a spill to the ground of a couple of gallons of PWST water. Chemistry sampled the PWST water and spill area and confirmed that activity was less than minimum detectable.

While checking the local tank indication, operators noted that the heat trace was energized in the CCR level transmitter box and the temperature of the box seemed abnormally high. When the heat trace was deenergized, and the box allowed to cool, the CCR level indication rose and matched the local tank level indication of approximately 31.5 feet.

NYPA is investigating whether possible blockage in the overflow line caused the delay in overflow from noon on May 22 until it was discovered on 1:45 a.m. on May 23. Further, the effects of heat trace on the PWST and other tank level transmitters will be reviewed. The inspector reviewed NYPA's action plan to address this area and found it acceptable.

6.0 SAFETY ASSESSMENT/QUALITY VERIFICATION (40500)

6.1 Procedure Adherence Root Cause Analysis

In early May 1994, an effort was undertaken by NYPA management to perform a comprehensive root cause analysis to address the continuing procedure adherence problems at the station. This effort was termed the Procedure Adherence Root Cause Analysis (PARCA) and has been undertaken by a diagonal cross section of Indian Point 3 employees. The PARCA effort was conceived to be different from previous event root cause analyses, which focused on correcting the individual events, with no feedback on corrective action effectiveness.

PARCA has taken a comprehensive approach to identify the underlying common root causes by revisiting the previous procedure adherence events at IP-3, and by reviewing industry and NRC information on procedure adherence problems. The PARCA team has taken this effort down to the worker level through the use of employee surveys and interviews to solicit problems that impact procedure adherence, possible root causes, and corrective actions.

As of the end of this inspection period, the data collection, interview, and root cause determination phases have been completed. The next step for the PARCA team is a root cause validation that will involve presentations of the identified root causes to NYPA supervisors and NYPA worker focus groups. After that, the PARCA team will develop and validate corrective actions, review and incorporate these corrective actions into action plans under the Restart and Continuous Improvement Plan. The PARCA team will remain intact after the development of the corrective action plans to monitor their effectiveness and to provide feedback to modify the action plans if necessary.

Conclusions

The efforts of the PARCA team have been very effective and thorough in evaluating previous station procedure adherence events for common root causes. By taking this effort down to the worker level and utilizing innovative promotion techniques involving worker family members, NYPA has achieved greater acceptance by the plant staff on the causes of the events and anticipates this acceptance will continue through the development of appropriate corrective actions. While a few personnel errors have still occurred as documented in this report, their frequency and significance have been appreciably reduced.

7.0 MANAGEMENT MEETINGS (71707)

At periodic intervals during the inspection, meetings were held with senior facility management to discuss the inspection scope and findings. The issues in this inspection were discussed with site management throughout this inspection and an exit meeting was held on July 11, 1994 to discuss the findings and conclusions of this report period. During the discussion, the licensee did not identify any 10 CFR 2.790 material and did not take exception to any of the findings of this inspection.

ATTACHMENT

MAY 26, 1994

MEETING TO DISCUSS

THE INDIAN POINT 3 RESTART PLAN

MAY 26, 1994 MEETING TO DISCUSS THE INDIAN POINT 3 RESTART PLAN

AGENDA

I. Welcome - NYPA

II. Opening Remarks - NRC

III. Opening Remarks - NYPA

IV. Situation Assessment Team - A. Bellis (NYPA)

V. Root Cause Analysis - K. Chapple (NYPA)

VI. Restart and Continuous Improvement Plan - L. Hill (NYPA)

VII. Closing

IP3 PLANT STATUS

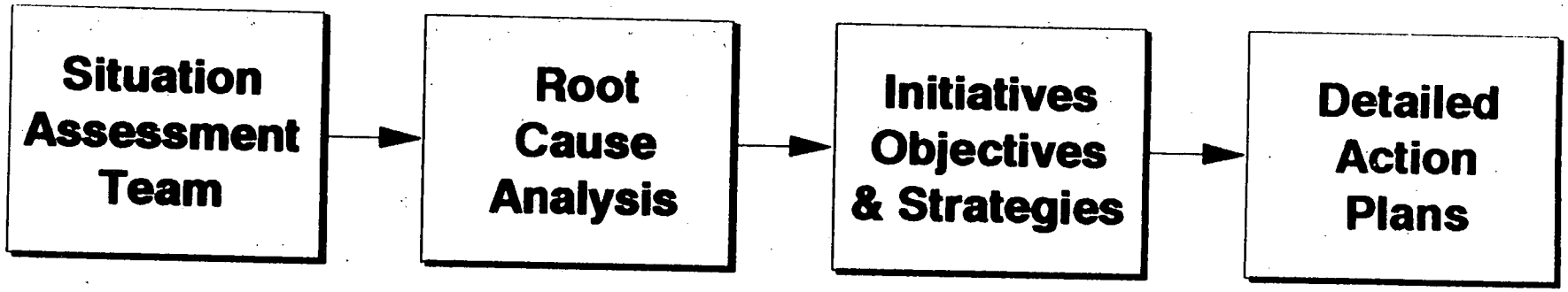
- Reactor is in cold shutdown.

- Filling and Venting of the Reactor Coolant System was completed May 19.

- Corrective and Preventive Maintenance in progress on 31 RHR System and Diesel Generator scheduled for completion this week;
  32 RHR System work next week.

- Detailed Outage schedule development is in progress.
  - Criteria for work this Outage developed
  - Work scope has been identified
  - Draft schedule available early June

RESTART AND CONTINUOUS IMPROVEMENT PLAN DEVELOPMENT



ROOT CAUSE ANALYSIS

- Data Collection
- Data Analysis
- Identification of Root Causes
- Validation Process

DATA COLLECTION

- Interviews
- Observations
- Document Reviews

DATA ANALYSIS

- Performance Issues
- Categories
- Families
- Labeling of Families

IDENTIFICATION OF ROOT CAUSES

- Six Root Causes
- Six Contributing Causes

VALIDATION OF ROOT CAUSES

- Table Top Review
- Root Cause Comparison
- Validation Workshops
- Restart Management Team Review

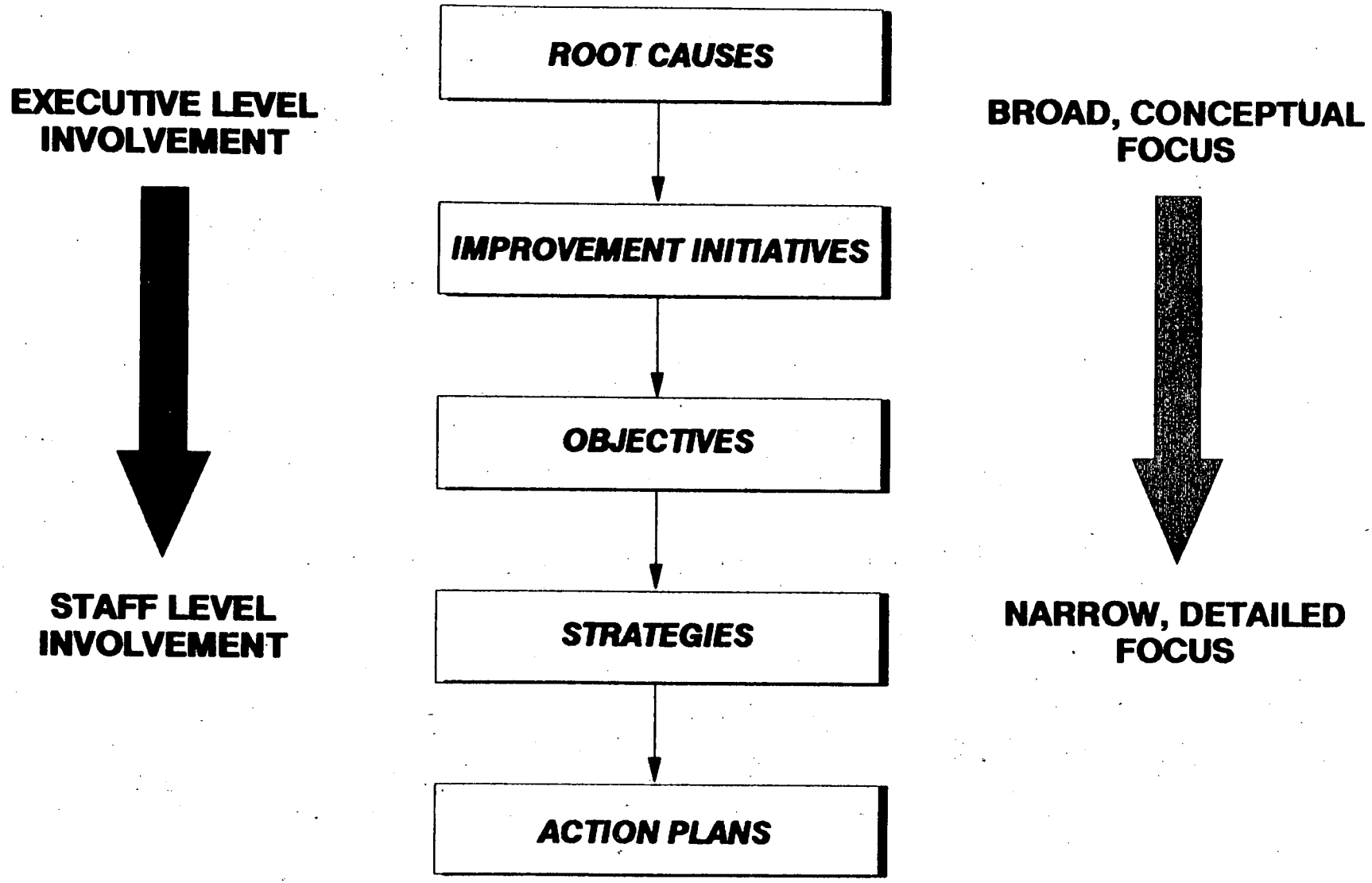
SUMMARY OF ROOT CAUSES

- **Interpersonal and Leadership Skills**
- **Vision and Direction**
- **Issue Identification and Problem Resolution**
- **Clear Performance Expectations**
- **Management of Change**
- **Definition of Roles and Responsibilities**

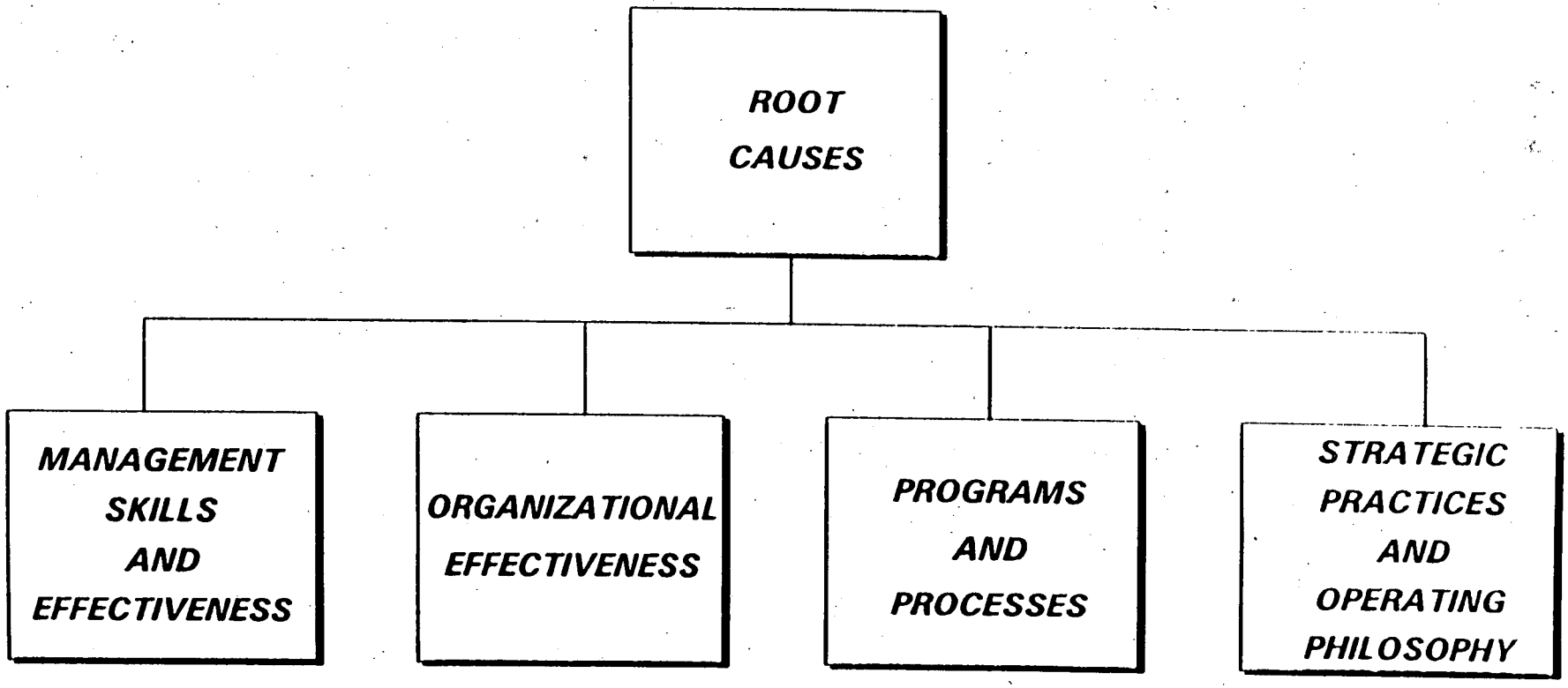
SUMMARY OF CONTRIBUTING CAUSES

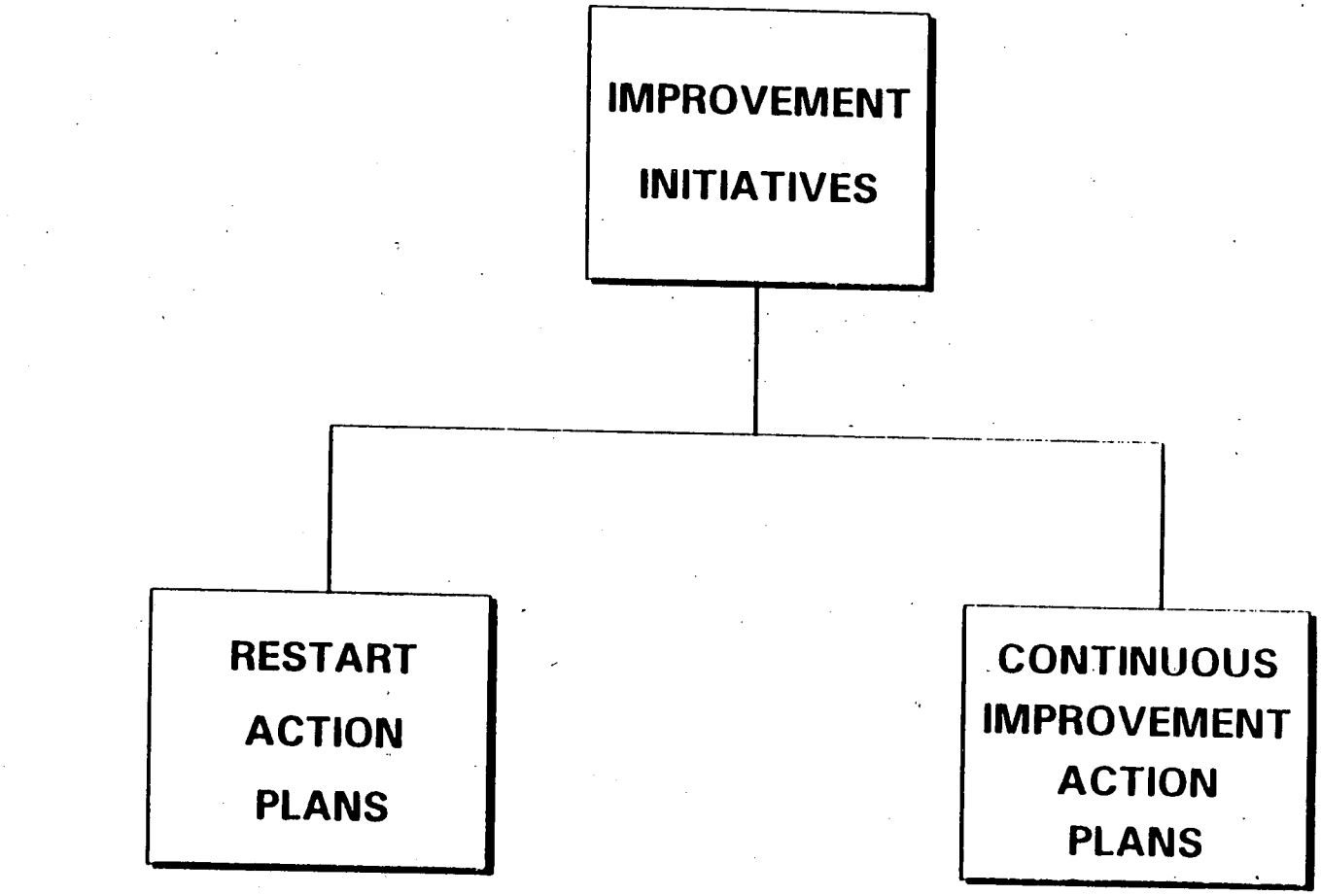
- Use of Industry Experience to Establish Performance Standards
- Communication of Information and Direction
- Policies and Procedures
- Maintenance
- Information Systems
- Engineering

PLAN DEVELOPMENT

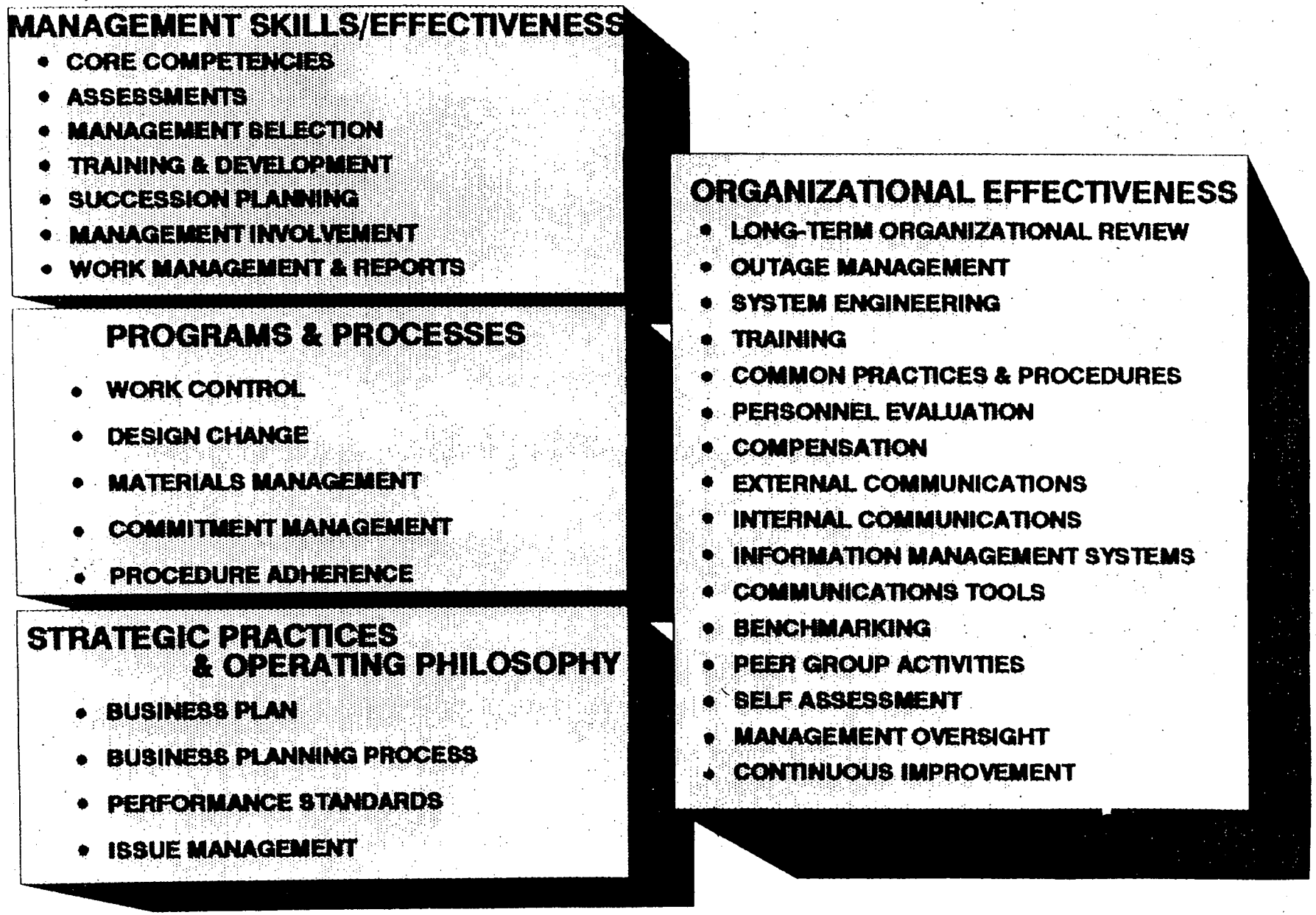


IMPROVEMENT INITIATIVES




IMPROVEMENT INITIATIVES
RESTART ACTION PLANS
CONTINUOUS IMPROVEMENT ACTION PLANS
ACTIVITIES TO BE SCHEDULED, COMPLETED AND ASSESSED AS A PREREQUISITE TO IP3 STARTUP.
ACTIVITIES TO BE SCHEDULED, COMPLETED AND ASSESSED THAT WILL ENSURE COMPREHENSIVE AND SUSTAINED PERFORMANCE IMPROVEMENT.

WORK BREAKDOWN STRUCTURE
CONTINUOUS IMPROVEMENT ACTION PLANS



WORK BREAKDOWN STRUCTURE
RESTART ACTION PLANS

MANAGEMENT SKILLS & EFFECTIVENESS

- Management Team for Startup
- Operations Management
- Management Review Meeting

ORGANIZATIONAL EFFECTIVENESS

- Organizational Structure for Restart
- Roles, Responsibilities and Interfaces for Restart
- Outage Management
- System Engineering
- Training
- Internal Communications
- External Communications
- Oversight Effectiveness

PROGRAMS & PROCESSES

- Work Control
- Design Change Process
- Materials Management Process
- Corrective Action
- Surveillance Test Program
- Preventive Maintenance Program
- Procedure Adherence
- Upgrade Targeted Policies & Procedures

RESTART PLAN EFFECTIVENESS VALIDATION

- Action Plan implementation against performance indicators.

- Review and approval by Project Team.

- Oversight of action plan closure provided by Restart Management Team.

- Overall plan effectiveness and restart readiness to be validated through:
  - System Certification
  - Startup Evaluation for Readiness Team Certification
  - Operational Readiness Review

- Plan implementation and effectiveness independently reviewed and assessed by Quality Assurance.

KEY SUCCESS FACTORS

- Industry Experience
- Plan Management
- Development Process
- Strategic Based Plan
- Comprehensive Plan
- Management Commitment