South Texas Project, Unit 1

Readiness to Begin Ascent to Full Power:

A Self-Assessment Report

prepared by

Houston Lighting & Power Company

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I

INTRODUCTION AND SUMMARY

This self-assessment by Houston Lighting & Power Company (HL&P) is intended to outline the bases upon which the Company has concluded that operations beyond five percent of rated power can be safely conducted at Unit 1 of the South Texas Project (STP).

In Summary:

1. The facility meets licensing requirements affecting design, construction and testing. Where problems have been identified during pre-critical testing, they have been corrected and steps taken to reduce the likelihood of their recurrence. There are no significant outstanding testing deficiencies. (See Section II.)

2. Requirements affecting the staffing and training of personnel have been met, and an effective fitness for duty program is in place. Operational experience during pre-critical testing identified opportunities for improvement in procedures, organization and aspects of team training. Training programs have been expanded and certain organizational and procedural changes have been accomplished, all as part of the lessons learned from this experience. (See Section III.)

3. Other indicators also consistently point to readiness, including:

   (a) Improvements in security measures;

   (b) Results of other objective assessments including that of the NRC's Operational Readiness Inspection;

   (c) Appropriate maintenance programs are in place and the maintenance backlog is acceptable; and,

   (d) Emergency preparedness plans are in place and a successful full participation emergency drill has been performed.

   These and other readiness indicators are discussed in Section IV.

Conclusions drawn from the foregoing regarding the general readiness to proceed with operations at STP at power levels above five percent are summarized in Section V.

II

DEMONSTRATING THE ADEQUACY OF ENGINEERING AND CONSTRUCTION

A. PRIOR TO RECEIPT OF OPERATING LICENSE

As the Commission is aware, most safety-related construction at STP was held in abeyance in the period 1980-81. A Commission Order to Show Cause was issued in 1980. The engineer/constructor was replaced in 1981. During this transitional period, there was a thorough examination of all completed and in-process engineering, and construction work. HL&P personnel were a part of these reviews which verified the status and quality of engineering and construction and determined its acceptability.

In addition, HL&P employed an Engineering Assurance Program (EAP) in which a special, off-project group of engineers performed real-time, independent, third-party substantive reviews of the architect-engineer's work. The EAP function is continuing into the operations phase.

Additional assurance regarding design and construction is derived from the SAFETEAM program which provides a means for STP employees to identify any concerns that they may have in regard to nuclear safety or quality. The NRC Staff is thoroughly familiar with the program. The SAFETEAM program has, in effect, provided thousands of "additional pairs of eyes" to help assure that work was done properly.

B. POST RECEIPT OF OPERATING LICENSE

PRINCIPAL PROBLEMS ENCOUNTERED DURING LOW POWER TESTING

Since receipt of its license in August, 1987, the South Texas Project has carried out pre-critical and low power testing in accordance with FSAR and OL requirements. As in the case of the pre-operational program, post-OL testing has confirmed the adequacy of systems, structures and components. The Startup Program was delayed by two design related events encountered during the pre-critical testing period, both of which offered opportunities to learn important lessons in managing the resolution of technical problems:

- In September 1987, tube failures in one of the safety related Component Cooling Water (CCW) heat exchangers were detected.

  The investigation revealed that the design requirements placed on heat exchangers at the time of procurement did not adequately account for flow instabilities which led to excessive vibration and failure of tubes. The heat exchangers were repaired, modified to prevent recurrence and returned to service in October 1987.

- On November 3, 1987, a failure of a 1" vent line in the Auxiliary Feed Water (AFW) system was discovered. An investigation identified hydraulic transients in the auxiliary feed water system.

  Hydraulic transients of two types were found. The first type of hydraulic transient was a classic water hammer event caused by air trapped in the lines. Corrective action was the addition of vents to more easily remove air from the system. In addition, changes were made to operating procedures. The second type of hydraulic transient resulted from the fact that the piping and support systems were resonant at 24 hertz under certain valve lineup combinations. This vibration occurred when the flow control valves were regulating at low (less than 50 gallons per minute) flow rates. Modifications were made to the feedwater regulating valves to prevent operation in the unstable low flow regimes and the system was stiffened by adding a number of pipe supports. Tests confirmed the adequacy of the repairs, and the system was returned to unrestricted operation in January 1988.

LESSONS LEARNED

The handling of the CCW Heat Exchanger problem identified the need for earlier and more direct management involvement in investigating and taking corrective action in connection with repair activities which are unusual, complex, and require interdepartmental cooperation. In a memorandum analyzing the event and surrounding circumstances, prepared by the Group Vice President-Nuclear, organizational guidelines were established to assure timely coordination between departments and the immediate designation of a specific knowledgeable engineer to take charge of the investigation and repair activities, including timely preparation of reports and procedures.

In the case of the AFW hydraulic transients, the lessons of the CCW heat exchanger were properly applied in terms of designating responsible personnel, identifying necessary outside assistance and providing direct management involvement. The effort, however, highlighted the need for a more systematic and patient approach to root cause analyses.

The lessons learned from the response to these events have led to improved coordination in resolving such complex technical problems among operations, maintenance, engineering and quality assurance. Both events have thus been converted to assets available to resolve similar problems should they occur.

They have been excellent illustrations of the importance of teamwork in such situations.

III

OPERATIONAL EXPERIENCE

As in the case of requirements applicable to engineering and construction, STP also meets regulatory requirements associated with staffing, procedures and training.

A. STAFFING & ORGANIZATION

1. NUMBERS OF PERSONNEL & TRAINING

The Operations Department includes four departments reporting through the Plant Superintendent to the Plant Manager as shown in Figure 1. The Operations Department is responsible for the operation of the Nuclear Steam Supply System and the turbine generator and its auxiliaries. STP has a total of 49 SROs and 4 ROs. The Operations staff is on five shift rotation with 6 licensed operators on each shift, of which at least three are SROs. Thirteen (13) of the SROs and one (1) of the ROs have been previously licensed. Each shift also has an SRO-licensed Shift Technical Advisor. As discussed further in Section III., previously licensed, experienced Shift Advisors and support engineers have been added to each shift through the power ascension test program.

Personnel have had training on a plant-specific simulator at STP. The training program achieved a success rate of 86 percent on the NRC license examination. The numbers suggest that the program has been successful in meeting objective training requirements. In reviewing the STP simulator training program, the NRC Readiness Inspection Report noted:

> "After each scenario, the training staff conducted a detailed critique of operator performance. Good as well as deficient actions and practices were pointed out and discussed. Techniques of team interactions, communications, and coordination were continually emphasized. There was a free exchange of information between operators and instructors during the critiques.
>
> The simulator training session observed was considered to be excellent in all respects."

Some employees were assigned to other utilities to gain experience in plant startups, operations and outages. Hiring practices have stressed the importance of experience in all parts of the organization. At least one licensed SRO on each shift has experience at another large operating PWR. All shifts have at least two licensed operators and some have three, who have held licenses and gained experience at other facilities.

The Maintenance Department is responsible for preventive and corrective maintenance programs. The Department consists of Electrical, Mechanical, I&C, Support and Metrology groups. Maintenance personnel are trained in a dedicated facility on site. As in the case of operations, hiring practices have emphasized the importance of experience. Each of the maintenance groups has several journeymen who have worked at operating nuclear stations. The current Maintenance Department staffing is 265 and is currently planned to be 339 for two unit operation. The NRC operational readiness inspection team reviewed a sample of training records for personnel conducting maintenance and surveillance testing and concluded that the "experience and training of these individuals was more than adequate for the tasks performed."

The Plant Engineering Department is responsible for system performance engineering. The Department has responsibility for the performance of programs such as Appendix R compliance, ASME Section XI Pump and Valve Testing, Appendix J testing and system leakage testing. Predictive maintenance in the form of equipment diagnostics also is performed by this Department. Shift Technical Advisors are also drawn from this Department.

The Technical Services Department is responsible for the station chemistry program, for operation of the radwaste systems and radiological controls and services. This Department currently numbers 160 and 209 are currently planned for two unit operation.

The Integrated Planning & Scheduling Department, which reports directly to the Plant Manager, has 19 personnel and 30 are currently planned for two unit operation. The Department is responsible for scheduling and coordinating work activities during operations and outages. Work activities are assigned daily through a work control center where representatives of the Operating staff, Maintenance and Scheduling Departments ensure that work activities are prioritized and coordinated, taking into account plant conditions.

2. FITNESS FOR DUTY

Plant personnel, including all HL&P Nuclear Group employees and employees of contractors and subcontractors, are subject to a stringent fitness for duty program which meets the NUMARC guidelines. One important element in the program is aggressive alcohol and drug testing. Prospective employees are subject to baseline testing for alcohol and drugs. Random testing is also utilized. If an employee comes forward voluntarily to acknowledge a drug problem, he is eligible for rehabilitation and may return to work at STP under certain conditions. However, if testing identifies a user of illegal substances, the employee is discharged. HL&P believes that this is an important step in ensuring a drug and alcohol free environment on the job, as well as a significant deterrent to off-site use of illegal substances.

3. REORGANIZATION

A recent reorganization was made to strengthen the office of the Plant Manager. In view of the heavy load on the Plant Manager, in a new plant with new procedures and a second unit coming on line in the near future, HL&P determined that the addition of two plant superintendents was necessary. (Fig. 1) This change allows the Plant Manager to take a "step back" and evaluate the performance of departments on Unit 1, while also allowing him to devote attention to the process of accepting, testing, and operating Unit 2. The individuals chosen as plant superintendents are persons with solid nuclear experience. These changes give HL&P confidence that both units will benefit from a broader degree of oversight and guidance from the Plant Manager.

Concurrently, changes were made to strengthen the overall Operations Support Organization. A seasoned individual was placed in charge of an expanded Operations Support Organization which now includes Engineering, Construction and Facility Support Services, Licensing and Nuclear Engineering. (Fig. 2) This change will improve management control of the operations support organization and enhance participation across the engineering/operations interface. Most of the organization is located on site with the remainder of the personnel to be relocated from Houston later this year.

B. PROCEDURES

Workable procedures for the trained operator are essential for proper operations. Procedures have been written for the operating staff in the operations, maintenance and surveillance areas.

Since STP has unique features and is the first nuclear unit for HL&P, it was recognized that in addition to the development and initial implementation of procedures, it would be necessary to incorporate feedback from operator experience. Accordingly, HL&P undertook the following actions.

- Procedures were written by personnel with experience gained at other nuclear units. Personnel who participated in the pre-operational test program also took part in the drafting of procedures.

- Operating procedures were used during pre-operational checkout to assess their useability and technical adequacy.

- Emergency Operating Procedures and other operating procedures were validated on the simulator to test their adequacy.

Generally, HL&P is satisfied with the development of operating procedures. Some difficulties were encountered during the initial implementation of the procedures which are attributable to limitations on "hands on" experience and less than full cognizance of plant conditions by the Operators. These events are discussed further in Sections C and D which follow.

Preventive maintenance procedures have been written covering both safety and nonsafety components in the plant. These procedures are based on manufacturers recommendations and experience in the field. In general, the NRC operational readiness inspection team found that the preventive maintenance procedures "appear to be well identified and scheduled" and that the overall preventive maintenance program " appeared to be very comprehensive for a plant as new as STP-1."

Surveillance procedures, required by Technical Specifications for the first year of operation, are written and are in place. A few problems have been uncovered in this area. HL&P has acted both to correct the problems and strengthen the program. The problems are listed below.

- Procedures for surveillance of the class 1E batteries were not updated to reflect the most recent calculated loads at the time the surveillance test was performed.
- Procedures for surveillance of the Pressurizer Low Pressure Setpoint were written with the wrong value.
- Procedures for surveillance of slave relays failed to include all of the required relays.

The discovery of these problems initiated a series of activities to prevent recurrence, including but not limited to:

- A review to reverify that Technical Specifications are reflected in procedures correctly;
- A review to ensure that the surveillance procedures are functionally correct;
- A review to ensure that design documents have been properly reflected in the surveillance procedures; and,
- A review to ensure the surveillance procedures adequately test the plant control systems.

In general, the surveillance procedure development has been successful with the exception of the specific instances noted above.

The NRC Operational Readiness Inspection Report noted that, subject to a few problems which have since been resolved:

"...the surveillance procedures reviewed were well written; they contained sufficient detail so that verbatim compliance could easily be achieved. The documents were written in compliance with [test procedures] and had many user aids that helped the performer comply with all the administrative requirements involved. During the performance, it was evident that the performers were well trained to execute the surveillance tests, and there was an obvious sensitivity and discipline to comply verbatim with procedures."

C. PRINCIPAL OPERATIONS PROBLEMS DURING PRE-CRITICAL TESTING

HHSI VALVE MISPOSITIONING

On November 2, 1987 with the unit in Mode 4, operating personnel recognized that the three High Head Safety Injection (HHSI) Cold Leg Injection Valves were closed. Upon discovery, the valves were immediately opened. The valves had been closed for a number of shifts without recognition by operating personnel. The Technical Specifications require that two of the three train valves be open in Mode 4. This event was the subject of escalated enforcement action. HL&P was assessed a civil penalty.

This event, and a related event during the NRC operational readiness inspection, indicated that additional measures were necessary to ensure the operators remain cognizant of plant conditions.

As a result, the following corrective actions have been or will be implemented:

- The Plant Heatup and Cooldown procedures have been revised to better control mode changes. A review of General Plant Operating Procedures will be performed and procedures revised as necessary to reduce, better control and document out of sequence steps;

- Operators have received classroom and simulator training on the revised procedures. The simulator training included special attention on mode changes during heatup and cooldown evolutions; and,

- Operations Department personnel have been counseled on the importance of following procedures, attention to detail, and cognizance of plant status.

LIFTING OF THE PRESSURIZER PORV

On January 2, 1988 with the Unit in Mode 5 and prior to initial criticality, a Reactor Coolant Pump (RCP) was started with the Reactor Coolant System (RCS) in the "Cold Shutdown Loops Filled" condition, while the secondary side water temperature of each

Steam Generator (SG) was more than 50 degrees F above each RCS cold leg temperature. Starting a RCP with the secondary side SG temperatures higher than 50 degrees above RCS cold leg temperatures, is not allowed by Technical Specifications. The operators recognized the need to comply with this requirement prior to starting up an RCP but failed to properly determine the bulk water temperature of the steam generators. The result was to cause RCS pressures to exceed the Cold Overpressure Mitigation System pressure setpoint and open a pressurizer Power Operated Relief Valve (PORV). Pressure control was established and no pressure limitations were exceeded during the transient.

To prevent recurrence of this event, the following corrective actions were taken.

- Procedures were modified to provide Operators with detailed instructions on how to obtain reliable temperature indication of steam generator secondary water conditions.

- Operators will be given more training on bulk water thermodynamics and solid plant pressure control during requalification training.

Plant equipment was not adversely affected as a result of the event. This was confirmed through Engineering and vendor review of the maximum RCS pressure recorded during the event.

MAIN FEEDWATER HYDRAULIC TRANSIENTS

On January 11, 1988 with Unit 1 in Mode 5 and prior to initial criticality, several hydraulic transients occurred while filling the steam generators using main feedwater. The hydraulic transients were attributed to flashing flow conditions caused by introduction of feedwater into portions of the feedwater piping at a temperature greater than the saturation temperature corresponding to the pressure in the steam generator and feedwater piping. Condensation-induced waterhammer occurred at the interface of cold water and steam in feedwater piping to the steam generators. The piping systems were inspected and evaluated to assure system integrity. No damage was found.

To prevent recurrence of these events, the following corrective actions were taken.

- The applicable procedures for filling the steam generators were revised to include detailed thermal requirements for selection of the proper source of feedwater for filling steam generators during plant shutdown conditions.

- The Operators were trained on the revised procedures.

- Testing was successfully performed to ensure that filling the steam generators using the revised procedures would not result in hydraulic transients.

REMOTE SHUTDOWN OPERATOR ACTION

During the NRC operational readiness inspection an evacuation of the control room drill (i.e. assumed fire in the control room) was performed in which control of the plant is transferred to the auxiliary shutdown panel. During the drill, several concerns were identified which are noted below.

- Some of the operators required further training in the required procedure for shutdown outside the control room.

- Some of the operators did not know/have the tools and keys which were required to support the control room evacuation actions.

The needed tools/keys were positioned, the subject procedures were revised and additional classroom training was provided. Team training was a major feature of the program. In-plant drills were conducted to assure that each member of the team understood his/her function in such emergencies and the need for coordination of their respective activities.

D. LESSONS LEARNED/ENHANCEMENT OF OPERATORS' PERFORMANCE

Sufficient numbers of trained plant personnel are in place to meet regulatory requirements, including personnel with prior experience at a number of nuclear power plants. However, performance during pre-critical testing suggested a need for additional practical experience and to place additional emphasis on the development of teamwork and compliance with procedures. HL&P recognizes that as a "first time utility" extra effort must be expended to assure the degree of professionalism desired in the control room and in other areas of plant operations.

Accordingly, increased emphasis was placed on the involvement of the Shift Technical Advisors in the review and approval of technical activities, thereby helping to assure compliance with Technical Specifications and procedures (including changes in procedures). Also, an experienced Shift Advisor has been placed on each shift to advise the Shift Supervisor in allocating his personal time and attention to those activities most important to attaining quality performance in operations. Simulator training was also expanded, and support engineers were added to each shift.

Operators were given 12 additional hours of simulator training, reflecting "actual" operating conditions; e.g., operational exercises with certain components out of service and in various

operating modes including startups and shutdowns. Emphasis was placed on developing teamwork and a more complete understanding of the relationship between plant systems, components, procedures and technical specifications. An exercise was added to the operator requalification program which includes operator identification of misaligned equipment when the operators assume responsibility for the simulator. As these various corrective and supplementary measures indicate, HL&P has attempted to learn from its mistakes to improve operations, working toward the goal of attaining excellence in day-to-day activities. HL&P was particularly pleased with the conclusion expressed by the NRC team in the Operational Readiness Inspection Report that:

> "It was immediately obvious that personnel at STP-1 have been indoctrinated in the philosophy of verbatim compliance. This was demonstrated by their discipline to follow procedures in deliberate, step by step manner...."

HL&P does emphasize verbatim compliance. However, HL&P also stresses that employees are not to blindly follow procedures, but, to stop and request clarification whenever they have any doubt about the evolution they are performing.

IV

OTHER INDICATORS OF READINESS

A. SECURITY

Problems in certain areas of the security program delayed initial issuance of the OL for STP. In the period immediately following issuance of the OL, there was an unacceptable number of problems involving access control, mostly relating to the control of badges. As a result of further management attention and training, problems have declined sharply. Hardware problems requiring resolution with the NRC Staff prior to initial criticality have been resolved. HL&P has confidence that the physical security program is functioning effectively.

B. NUCLEAR ASSURANCE

The following Nuclear Assurance (NA) activities have been conducted during the period since issuance of the Operating License (OL):

- Twenty-nine (29) surveillances of the Technical Specifications;

- Sixteen (16) surveillances of the post-fuel load preoperations;
- Nine (9) surveillances of the initial startup tests;
- Four (4) surveillances of plant testing;
- Sixteen (16) surveillances related to maintenance activities;
- Five (5) surveillances of security;
- Two (2) surveillances of emergency preparedness;
- Six (6) surveillances of plant operations;
- Two (2) surveillances concerning fire protection;
- Five (5) surveillances of the chemistry program/operations;
- One (1) surveillance concerning a radwaste container storage inspection;
- Five (5) surveillances of health physics;
- Two (2) surveillances concerning material management;
- One (1) surveillance concerning special nuclear material accountability;
- Four (4) surveillances concerning housekeeping;
- Four (4) surveillances concerning modifications/contractor activities;
- One (1) surveillance of NPOD procurement activities;
- One (1) surveillance of environmental qualifications; and,
- One (1) surveillance concerning environmental protection.

The NRC operational readiness inspection team concluded that: "the licensee was controlling the surveillance backlog adequately and that the backlog was manageable and not excessive." In addition, it was noted that QA reports on surveillance activities checked for key attributes "with objective and constructive results" and that "QA inspectors did not hesitate to identify deficiencies and suggestions for improvement." The team concluded that "QA activities appeared to be adequate in this area."

The NA audit program for STPEGS operational activities (excluding monthly security audits) during the time period of August 21, 1987 to January 15, 1988 included:

- Three (3) audits of Technical Specifications surveillance activities;
- One (1) audit of Document/Record control;
- One (1) audit of Emergency Planning activities;
- One (1) audit of Radiological Effluent Monitoring Program; and,
- One (1) audit of Fire Protection Program Controls.

None of the audit or surveillance findings identified matters of significant safety concern. The NRC Operational Readiness Inspection Report noted that:

> "The QA audit and surveillance groups appeared to complement each other with transfer of information and coordinated follow-up of finding. The status of open QA audit findings indicates effective management involvement with the responding to and closing of audit findings. An escalation process is also available to QA when needed."

An audit of the initial start-up test program will be conducted at the 30% power plateau. This audit will provide an independent review of the effectiveness of the test program at a point where sufficient testing has been accomplished to provide a valid determination. The results of this audit will be considered by station management in determining the readiness of STP to escalate power above 50%.

NSRB

The South Texas Project has established a Nuclear Safety Review Board (NSRB) whose function is to provide an independent oversight and review of designated activities in various plant areas (e.g., operations, engineering, training, etc.).

The NSRB consists of experienced senior managers, including outside industry representatives. The Board's role includes oversight and review of safety evaluations, reportable events and significant operating abnormalities.

The NSRB reviews in these areas have been thorough and complete. When follow up action is indicated, open items are assigned and tracked to closure.

ISEG

An Independent Safety Engineering Group (ISEG) has been established to examine plant operating events and industry operating experience as it applies to the STP. The ISEG independently reviews reports of plant activities including observation of day-to-day operations and investigations of specific technical problems. A summary of the tasks/evaluations performed by the ISEG appears in Appendix A. The results of the ISEG evaluations are distributed to the appropriate departments/divisions for their action and implementation. The NRC operational readiness inspection report stated that "(it) appears that ISEG has been effectively used during the early operations stage of this project."

NRC OPERATIONAL READINESS INSPECTION

The NRC conducted an in-depth operational readiness inspection of the STP Unit 1 during the week of January 4, 1988. The investigation was conducted by a team of highly qualified and experienced NRC personnel. The team performed in-depth inspections of various operational areas. Their inspection report identified five (5) concerns which require resolution prior to operations in excess of five percent:

1. Operator sensitivity to plant status mode change requirements (See Section III. C, page 9.);

2. Timeliness of Station Problem Report (SPR) investigations (See Section IV. F, page 19.);

3. Problems during the control room evacuation drill (See Section III. C, page 11.);

4. Technical specification/surveillance procedure inaccuracies (See Section III. B, page 8.); and,

5. Commercial grade Agastat relays. Those Agastat relays with a safety-related function have been replaced. The remaining relays are being replaced in a sequence acceptable to the NRC Staff.

HL&P believes that all five items are resolved or will be resolved as described above.

The NRC operational readiness inspection identified eight (8) items of violation, all level IV. A response has been submitted to Region IV, and a copy is attached as Appendix B for the convenience of the Commission. The Inspection Report noted, however, that the cited violations did not indicate a pattern of serious weakness and that, in view of the intensity of the inspection team review, the violations were within a range which would be normally expected.

The team also found substantial strengths in HL&P's performance including:

- A well conducted simulator training program, with good follow-up critiques and use of procedures, including observation of a session "considered to be excellent in all respects";
- A fire brigade drill which was evaluated as "excellent";
- A comprehensive and aggressive spare parts provisioning program;
- A thorough and comprehensive preventive maintenance program, "well identified and scheduled";
- Well written maintenance instructions;
- Excellent engineering support of field maintenance activities;
- Well written surveillance test procedures which were considered as "excellent" for a new plant and which facilitated verbatim compliance, as noted by the inspectors;
- Excellent coordination between the surveillance and audit groups of quality assurance;
- A very professional shift turnover process in which the information exchange was observed to be "quite complete"; and,
- Demonstration by the operators of sound training, as reflected in "a mature, professional attitude toward plant operations and operational safety."

The Inspection Report noted that, subject to the resolution of the five areas of concern identified above, "the inspection did not reveal any areas which would lead the Staff to conclude that you were not ready to operate at full power" and further, that "the licensee performance was within the expected range for a licensee" of comparable experience.

50% ASSESSMENT

As stated in HL&P's June 23, 1987 letter to the NRC, HL&P has committed to perform an evaluation of the adequacy of plant hardware and operating staff performance at the 50% plateau of the power ascension testing program. This evaluation will include a review of the startup and testing record from issuance of the full power license to the 50% plateau to assure that root causes of problems have been properly addressed, that the work

load is under control and will not impact proper attention to further operation and that employees are demonstrating a high level of professionalism and are progressing up the experience curve. In addition, based on the STP experience through the 50% plateau and any recent industry events, HL&P will review the remainder of the power ascension program to assure that it has been appropriately planned and scheduled.

HL&P will assess its performance utilizing a combination of performance indicators (e.g., number of reactor trips, ESF actuations, etc.) management observations and objective third-party evaluations.

NRC Region IV has been invited to participate in this review.

C. EMERGENCY PLANNING

HL&P has previously submitted (with Revisions) an emergency plan for the South Texas Project. The NRC has reviewed this plan and has concluded that the emergency plan provides an adequate planning basis for onsite emergencies and that it meets the requirements of 10 CFR 50 and Appendix E thereto (See STP SSER No. 3.).

In addition, a full-participation exercise of the offsite radiological emergency preparedness plan for STP was conducted on April 8, 1987. The NRC-Region IV and Federal Emergency Management Agency (FEMA) final report stated that there were no deficiencies identified as a result of the exercise. Although several areas requiring corrective action (ARCA) were identified, the final report concluded that based on the results of the exercise and the schedule of corrective actions submitted by Texas for the ARCAs, FEMA considers that offsite radiological emergency plans and preparedness are adequate to provide reasonable assurance that appropriate measures can be taken to protect the health and safety of the public offsite in the unlikely event of an accident at the South Texas Project Electric Generating Station.

The NRC Staff performed an inspection of emergency planning activities in late January. The inspection identified one issue relative to training that had to be completed prior to exceeding 5 percent power. Corrective measures with respect to this matter have been completed.

D. PERFORMANCE INDICATORS

HL&P believes that performance indicators are a very important management tool, particularly insofar as they may provide an early warning of a potentially deteriorating situation. Thirty-eight (38) indicators, including those monitored by NRC and INPO, are included in the STP program.

A listing of the current performance indicators is attached as Appendix C.

E. LICENSEE EVENT REPORTS

Data for each Licensee Event Report (LER) categorized by root cause were placed in a matrix (Appendix D) to determine the frequency of occurrence and to perform a trend analysis. A review of the LERs shows that the most frequent causes are:

- Personnel error (operator, maintenance, construction);
- Design, manufacturing, construction/installation deficiencies;
- Defective procedures; and,
- Other (i.e. failures for which the proximate cause cannot be identified).

Human errors have been designated as the root cause for approximately nine (9) of the LERs submitted to the NRC to date. Three (3) of the nine (9) human error events involved similar circumstances, which were related to the operation of a radiation monitor "FLOW" pushbutton. This was corrected by additional training, addition of protective panel covers and application of warning labels. These and the other human error events are, in part, attributable to the practical problems of integrating a new plant, procedures and people in the early stages of plant life. At STP, this problem has been addressed through additional training and the development of more detailed procedural guidance.

The design, manufacturing construction/installation events were also reviewed for common cause. The events in this category appear to be random and not the result of a common cause.

A large number of the LERs are associated with the Toxic Gas Monitoring System. A task force was formed which has evaluated the reliability of the Toxic Gas Monitoring System, and as a result, a design modification to the ESF actuation logic has been initiated to reduce the number of ESF actuations and unnecessary challenges to the system.

An NRC inspector, as part of the operational readiness inspection reviewed the unit supervisor/shift supervisor log book for November 1987 and found no conditions which appeared reportable that were not reported to the NRC. In general, the NRC's inspection report concluded, subject to minor exceptions, since corrected, that LERs "were timely and ... effectively described the event, including determination of root causes and corrective actions."

A brief summary of the LERs is attached as Appendix D.

F. STATION PROBLEM REPORTS

HL&P has a Station Problem Report (SPR) program which establishes uniform requirements for identifying, documenting, evaluating and reviewing reports of abnormal conditions or events. SPRs are forwarded to the responsible department or division for investigation. For significant problems the investigation is intended to determine in a timely way the root cause(s), generic implication(s) and provide the recommended action(s) to correct the problem and prevent recurrence.

The NRC Operational Readiness Inspection noted a concern regarding the backlog of SPR investigations. The backlog of investigations was excessive and not evaluated in a timely manner. Additional resources, prioritization and management attention have resolved the concern.

G. MAINTENANCE

Because good maintenance is one of the principal keys to safe and reliable operation, a comprehensive maintenance program has been developed for STP. In addition to corrective and predictive maintenance, over 10,000 preventive maintenance activities or procedures have been developed for Unit 1 and common facilities.

The NRC operational readiness inspection team found that the preventive maintenance program "was comprehensive and thorough" and that maintenance work instructions were "well written" and provided an "excellent" an level of detail. Preventive maintenance procedures were found to be "well identified and scheduled" and the inspection team concluded the "overall PM program appeared to be very comprehensive for a plant as new as STP-1."

In addition, the plant engineering department includes a group of technicians devoted to predictive maintenance who are responsible for monitoring equipment vibration, pump performance, heat exchanger performance and other equipment parameters to facilitate early diagnosis of problems. In general, engineering support of maintenance (which is structured by discipline) was found to be very effective by the NRC operational readiness inspection team.

The NRC operational readiness inspection team found that the "maintenance work instructions reviewed, appeared to be well written" and that "the level of detail and quality of instructions were excellent." They further concluded that HL&P's program for coordinating maintenance activities "should provide good instructions and controls" for such activities at STP.

One of the ways STP monitors its maintenance backlog is shown in Appendix E. HL&P believes that the present backlog is well under control.

Overall, subject to the now resolved Agastat relay question, the NRC inspection team concluded that the "licensee's maintenance program and performance to-date, supported operation at power."

V

CONCLUSION

STP, Unit 1, is ready to proceed to operations in excess of five percent of rated power. The facility meets licensing requirements affecting design, construction and testing. As required by regulations, personnel with the requisite qualifications to conduct operations are in place and have demonstrated their ability to operate the plant and conduct related activities. The organizational changes described in Section III. A. 3 will also improve management oversight of Plant Operations. This does not mean that HL&P is satisfied with performance to date; training cannot fully compensate for limitations on practical experience, and HL&P is keenly aware of its status as a "first time utility". It is for this reason that additional simulator training has been required of the operations staff. In addition, the assignment of additional engineers, increased emphasis on the role of the Shift Technical Advisors and the addition of a Shift Advisor to each shift will provide greater depth of experience, especially in the early months of power operations. These measures will assist the control room staff in the near term, while contributing to the longer term attainment of excellence in day-to-day operations.

The steps which have been taken to improve surveillance and other procedures, to assure consistency between procedures and Technical Specifications and to validate procedures through simulator operations should also contribute to improved operations.

HL&P has learned a great deal about the strengths and weaknesses of its operations and personnel during low power operations. Progress has been made in identifying the root causes of problems; certain organizational and personnel changes have been made; procedures have been upgraded; and integrated team training emphasized. As a result, the Project is stronger today than it was when the OL was issued. The Company intends to proceed in a deliberate manner beyond the five percent point, learning by experience and thereby contributing to the further development of a mature and highly professional organization.

FIGURE 1

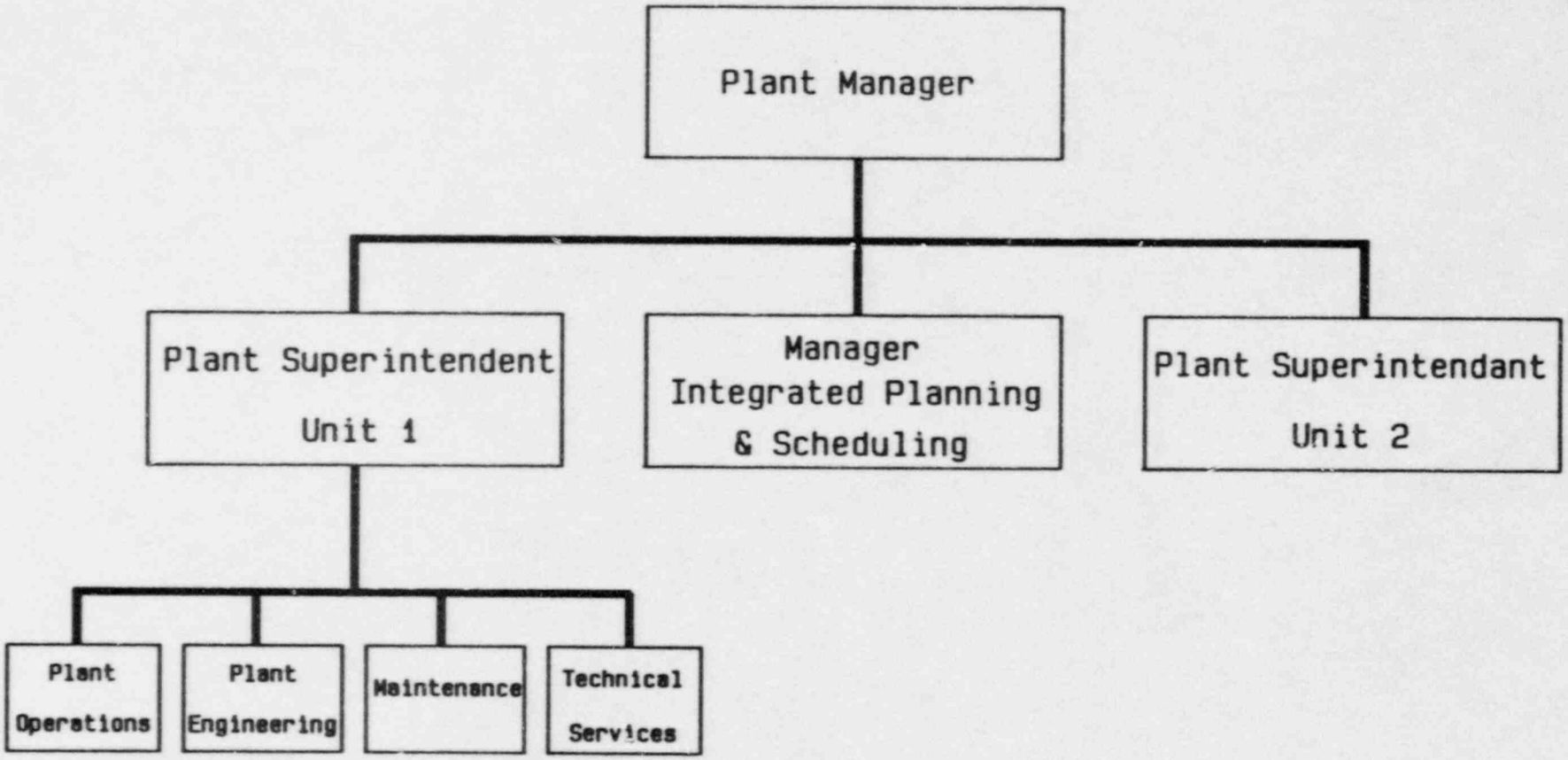
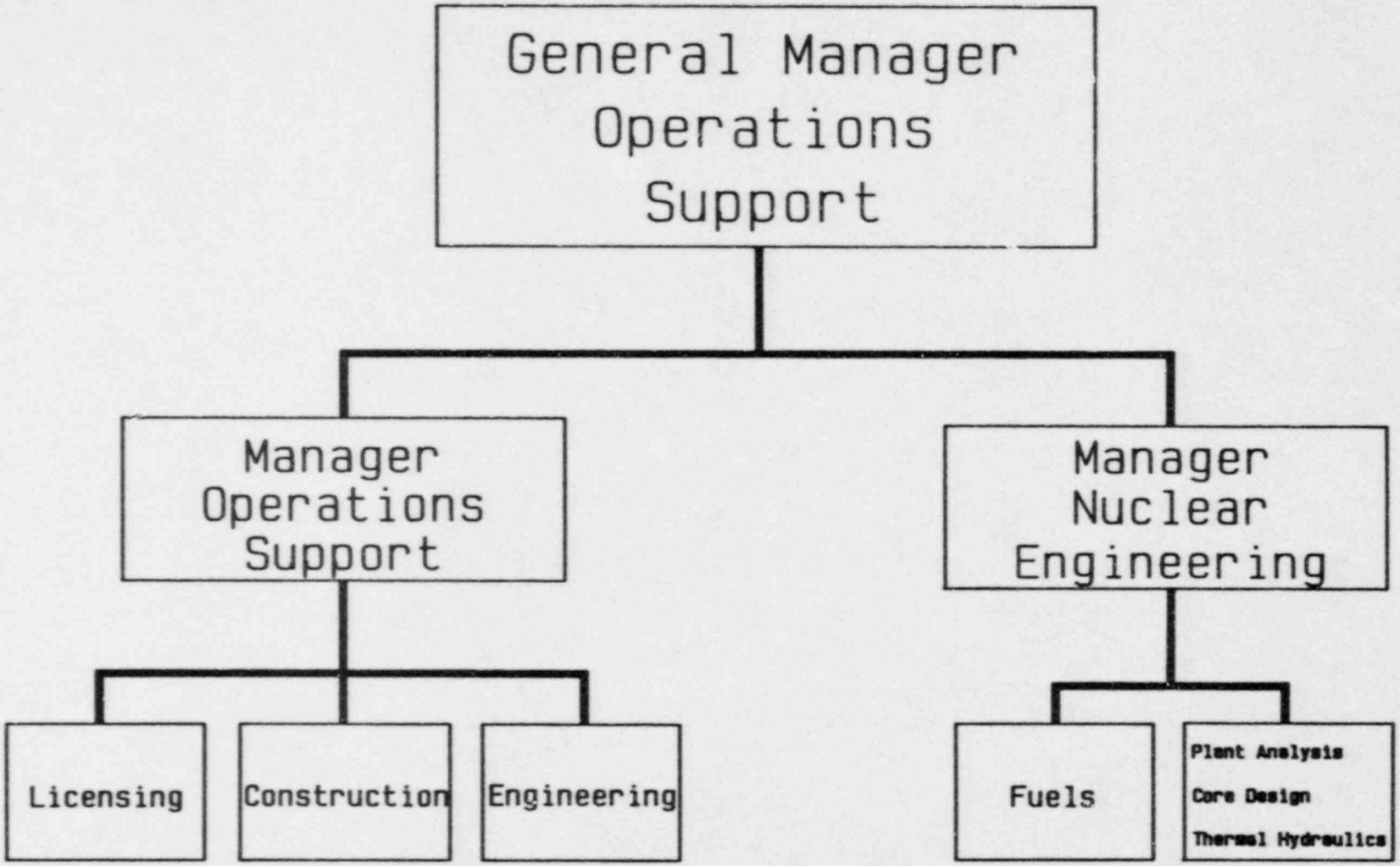

Plant Manager
Plant Superintendent Unit 1
Manager Integrated Planning & Scheduling
Plant Superintendant Unit 2
Plant Operations
Plant Engineering
Maintenance
Technical Services

FIGURE 2


General Manager
Operations
Support
Manager
Operations
Support
Manager
Nuclear
Engineering
Licensing
Construction
Engineering
Fuels
Plant Analysis
Core Design
Thermal Hydraulics

APPENDIX A

INDEPENDENT SAFETY ENGINEERING GROUP
Summary of Tasks - 1987
As of 2/15/88

Task #	Title	Subject
87-01	Plant Completion Verification Program	Assessment of the accuracy and implementation of the PCVP
87-02	PORV Block Valve Breaker Trip	Investigation of PORV block valve breaker trip during HFT
87-03	Comparison of a Manual Hoist to an Electric Hoist for the Radwaste Filter Room	Replacement of manual monorail hoist in radwaste filter room
87-04	B ECW Pump Stop Log SPR-870076	Investigation results for event where stop log mistakenly placed in Unit 1 ECW intake
87-05	RPO Pre-Shift,Shift, Turnover, Rounds and Shift Activities	Observation of RPO watch watch standing practices
87-06	Manual Remote Valve Operators	Observation of improper reach-rod installation and testing
87-07	Valve Operations	Observation of valve lineups
87-08	Agastat Relay Replacement	Observation of maintenance activity
87-09	Valve Repacking	Observation of maintenance activity
87-10	Spent Fuel Pool Cooling and Cleanup System Operation Without Pump Discharge Check Valves	Evaluation of missing pump pump discharge check valve
87-11	(Cancelled)	
87-12	Work Control Center	Observation of work scheduling and planning activities
87-13	Control Room Drawing Updates	Observation of how control room drawings are updated
87-14	Failure of Power Supply B1DGESPS02234B/PSI SPR-870017	Investigation results of event where 24VDC power supply burned up

APPENDIX A

INDEPENDENT SAFETY ENGINEERING GROUP
Summary of Tasks - 1987
As of 2/15/88

Task #	Title	Subject
87-15	Baseline Assessment of the OER/ IHE Review Program	Baseline evaluation of the external and internal event review program
87-16	Reactor Coolant System Fill & Vent	Observation of operations personnel during RCS fill and vent evolution
87-17	I&C Surve llances	Observation of maintenance I&C activities
87-18	Chemical Operations Watch Standing Practices	Observation of chemical operator normal watch activities
87-19	DG #11 Inoperable Due to Significant Loss of Lube Oil SPR-870424	Investigation results of event where I&C technician mistakenly pulled out temperature switch thermowell
87-20	RHR Pump 1B Tripped During Performance of MWR SPR-870432	Investigation results of the event where installation of jumper failed bypass valve close
87-21	HP Activities	Observation of health physics support of thimble tube eddy current testing
87-22	Control of System and Equipment	Evaluation of the control of systems and equipment in section 4.10 of OPGP-ZO-0004, Plant Conduct of Operations
87-23	Equipment Clearance	Observation of plant personnel issuing and hanging clearance orders
87-24	Injection of NaOH into the RWST SPR-870463	Investigation results of event where NaOH injected into RWST during performance of containment spray system surveillance
88-01	Annual OER/IHE Review	Follow on evaluation of program review done in 1987 (Task 87-15)

APPENDIX A

INDEPENDENT SAFETY ENGINEERING GROUP
Summary of Tasks - 1987
As of 2/15/88

Task #	Title	Subject
88-02	Mechanical Maintenance Observation	Observation of maintenance activities
88-03	Electrical Maintenance	Observation of maintenance activities
88-04	Control of Surveillance Observation	Observation of Reactor Operations' control of surveillances
88-05	Waste Evaporator Operation Observation	Observation of Chemical Operations startup of Waste Evaporator
88-06	Assessment of the PORC Effectiveness in Conducting Technical Reviews	Assessment of the PORC process
88-07	Assessment of STPEGS Actions taken to Reduce Inadvertent ESF Actuations and Unplanned Reactor Trips	Study of causes and changes available to reduce unplanned reactor trips/ESF actuations
88-08	Assessment of Computer Video Display CRT Installation in Main Control Board	Assessment of personnel and equipment safety hazards
88-09	Mechanical and Electrical Maintenance Activities Observation	Observation of maintenance activities