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Facility Name: Sequoyah Nuclear Plant Units 1 and 2

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Enclosure

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EXECUTIVE SUMMARY

This preliminary assessment of the Sequoyah Nuclear Plant, Unit 1 and 2 was conducted by the Region II Office of the U. S. Nuclear Regulatory Commission during the weeks of October 30 through November 9, 1995. The purpose of this preliminary assessment was to develop an integrated perspective of performance strengths and weaknesses based upon an in-office review of inspection reports, event reports, and other NRC and licensee generated performance information. The assessment covered a two year period from October 1993 to October 1995. A two week on-site assessment scheduled for the period of November 27 through December 8, 1995, will be conducted to validate the conclusions reached during this in-office review.

Based on the documentation review, the assessment team determined that Plant Support organizations exhibited superior to good levels of performance. Performance in the remaining areas (Safety Assessment/Corrective Action Operations, Maintenance and Engineering was good in most respects and adequate in others. An improving trend was noted in overall performance for Operations, Maintenance, and Engineering. Ratings for performance areas are identified on the Preliminary Assessment/Inspection Planning Tree (Appendix A).

In the area of Safety Assessment and Corrective Action, the team determined that line management and independent oversight groups have been effective at identifying a wide range of performance concerns. Problem analysis and evaluation was assessed as indeterminant based on the lack of information on the effectiveness of recent licensee program changes. Problem resolution was adequate. There were numerous examples of inadequate and ineffective corrective actions taken to address known problem areas.

In the area of Operations, safety focus was good with some weaknesses noted early in the assessment period. Good operator response to challenges and events, and positive management involvement was evident. Problem identification was good with improving performance; however, problem resolution was adequate with significant weaknesses. The licensee was slow and ineffective in resolving long standing problems in operator performance, clearance and configuration control errors. The quality of operations was adequate with a noted improving trend. Operators made numerous errors during routine evaluations caused by a lack of self checking. These errors resulted in unit trips safety system degradation and challenges. Operational programs and procedures were also assessed to be adequate due to recent examples of unit transients.

In the area of Engineering, safety focus and licensee programs and procedures were assessed to be good. Nuclear and systems engineering provided positive support to the plant. Problem identification and resolution was adequate, but improved late in the period. Concerns included slow problem resolution and narrowly focused evaluation. The quality of engineering was also adequate. Weak implementation of design controls was identified.

In the area of Maintenance, safety focus and problem identification/resolution was good. Good safety related equipment performance and backlog reduction efforts were noted. Equipment performance and material condition and the quality of work were assessed as adequate and good respectively with recent noted significant improvements. Although safety equipment performance was good, balance of plant problems impacted unit performance. Maintenance programs and procedures were assessed as adequate with an improving trend observed.

In the Plant Support areas, Radiological Control was assessed as superior in safety focus and program and procedures, and good in problem identification and resolution and the quality of radiological controls. Security was assessed as good in all areas. Emergency Preparedness was assessed superior in safety focus and quality of Emergency Preparedness. Emergency Preparedness program and procedures was assessed as good and problem identification and resolution was indeterminate.

OVERALL ASSESSMENT SCOPE AND OBJECTIVES

This Integrated Performance Assessment of the Sequoyah Nuclear Plant Units 1 and 2, is being performed in accordance with NRC Inspection Procedure 93808 "Integrated Performance Assessment Process." The assessment will be performed in two phases; a preliminary assessment performed in NRC Region II, and a final assessment which will be performed on-site. The assessment is being conducted by inspectors from NRC, Region II. The preliminary assessment was performed during the weeks of October 30 and November 6, 1995. The final assessment is scheduled to be performed during a two week period beginning November 27, 1995.

The assessment objectives are to identify programmatic and performance strengths and weaknesses in the areas of Safety Assessment and Corrective Action, Operations, Engineering, Maintenance and Plant Support. The preliminary assessment is based on an in-office review of NRC inspection reports, licensee event reports, NRC and licensee performance indicators, enforcement history, regional assessments, and licensee internal and external assessments. The results from this phase of the assessment are contained in the following preliminary assessment report. References to source documents are contained throughout the report. The reference list is attached as Appendix A to the report.

Following the issuance of this preliminary assessment report, the team will attempt to validate its conclusion via a performance based, on-site assessment. The results of this phase of the assessment will be integrated with those of the preliminary assessment and documented in a Final Assessment Report which will be issued following the on-site visit. Included in the Final Assessment Report will be recommendations on where to focus future NRC inspection effort. These recommendations will be depicted on a Final Performance Assessment/Inspection Planning Tree.

ASSESSMENT METHODOLOGY

During the preliminary assessment, the team evaluated the Sequoyah inspection record and performance history for a two year period spanning October 1993 to October 1995. Conclusions drawn from this review were then compared with the conclusions contained in licensee internal and external assessment reports. Where the conclusions were relatively consistent, a performance rating of either decreased, normal, or increased inspection was given to the individual elements. These ratings correspond to superior, good, or adequate performance in the elemental areas. Where the conclusions obtained from the team's review of inspection and performance data differed significantly from those described in the licensee's internal and external assessments, or where sufficient information was not available to come to a meaningful conclusion, individual elements were rated as being indeterminate.

The results obtained from the preliminary assessment will be used by the assessment team to develop individual on-site assessment plans for each of the major assessment areas. The areas in which the team will focus during the on-site review will be those areas rated as indeterminate and those areas where the inspection or performance data record indicated potential performance weakness.

Following the on-site phase of the assessment, the team will issue a Final Performance Assessment and Inspection Planning Report. This report will contain an assessment of each elemental and overall area. The final report will also contain recommendations for future NRC inspection. These recommendations will be depicted on a Final Performance Assessment and Inspection Planning Tree and will be based on an assessment of overall plant performance, performance in the individual elemental area, and relative safety significance. The inspection recommendations will be scaled to what would be normal NRC inspection effort at a two unit site.

1.0 SAFETY ASSESSMENT AND CORRECTIVE ACTION

1.1 Problem Identification

Problem identification was assessed as good. The licensee satisfactorily identified problems through the use of independent assessments by the Nuclear Assurance organization. Site Quarterly Trend Reports were effective in evaluating and tending site organizational effectiveness. (References 134 and 139).

Nuclear Assurance assessments of the corrective action program in 1994 and 1995 identified implementation deficiencies in about 25 to 30 percent of the cases. Examples of issues included timeliness of long standing issues, inconsistent closure of PER documents, recurring problems, incomplete root cause analyses, incomplete corrective action, and similar event searches that were not thorough (References 138 and 141).

Lowering of the threshold for PER initiation in late 1993 was not effective in increasing the number of problems identified by the individual workers until mid 1995 following additional management actions (References 7 and 142). Management attention on corrective action program implementation deficiencies improved the effectiveness of this program late in the period in mid 1995 (Reference 136).

Normal inspection is recommended.

1.2 Problem Analysis and Evaluation

Problem analysis and evaluation was indeterminate. Nuclear Assurance audits continued to show problems associated with adequacy of root cause analyses that were not resolved (Reference 134). The licensee has instituted recent program and process changes in this area but results from those improvements were indeterminate.

The effectiveness of root cause training and program enhancements, changes to the Management Review Committee, and a quality improvement team initiatives were not assessed based on their recent implementation (Reference 136).

On-site and offsite safety committee assessments and reviews appeared to be effective (References 10, 35, 47, 53 and 55). Further, independent reviews by QA and ISEG provided good assessments and findings, and were determined to be beneficial for overall problem focus (References 6 and 9).

Periodic licensee trend and evaluation reviews and performance reports were effective in assessing real-time performance, including recent trends (Reference 130 - 135). These reviews and reports used a numerical grade or color coding to indicate performance level compared to site goals, and recent trends.

Equipment performance trends were evaluated against performance and availability criteria. Safety and power generation systems were evaluated for both units (Reference 137). Hardware issues and actions in progress were also discussed. With a few exceptions, safety related equipment met these performance criteria.

1.3 Problem Resolution

Problem resolution was assessed as adequate. Licensee corrective action programs were somewhat slow and ineffective in addressing known problems areas. Inspection reports indicated numerous examples of inadequate problem resolution and poor corrective actions. Equipment clearance and configuration control issues continue to surface even after licensee corrective action (References 3, 12, 17, 20, 21, 24, 53, 63, 66 and 74). Examples of long standing safety-related equipment issues included Arrowhart motor starters (References 21, 47, 63 and 65), ECCS room cooler leaks (Reference 40), charging pump failures (Reference 12), and HVAC chiller rebuilds and maintenance problems (Reference 59). Further, secondary plant problems have initiated reactor trips which challenge safety systems (References 5, 21, 45, 48, 63, 65 and 67). Further, although human performance problems have indicated an improving trend (Reference 133), recent personnel errors continue to challenge safety equipment and the units (References 66 and 74).

Recent licensee line and independent self-assessments, and performance indicators depicted a need for further improvement, and, at times, not fully effective corrective actions (References 130 and 134).

Effective problem resolution was noted relative to PORC and line management review of reactor trips (References 5, 24, 45, 21, 65, and 67), engineering and maintenance response to QA findings (References 7 and 21), training department followup and resolution of program deficiencies (Reference 56), and improvements in PER effectiveness and completion timeliness (Reference 135).

Increased inspection is recommended.

2.0 OPERATIONS

2.1 Safety Focus

Safety focus in the operations area was good with some weaknesses noted early in the period. Throughout the assessment period, operators responded very well to challenges resulting from unit transients, trips, and equipment malfunctions (References 5, 24, 45, 63, 65 and 67). Management demonstrated good oversight and performance as evidenced by increased in-field coaching and expectation discussions (Reference 17). Further, management meetings with all employees stress work standards and a management initiated survey of personnel with a feedback mechanism demonstrated a positive safety focus (Reference 31 and 35). However, based on recent independent QA observations, senior operations management does not conduct tours on a regular basis (Reference 130). Good PORC review and followup to reactor trips was noted (References 5, 24, 45, 21, 65 and 67). Third party assessments by ISEG and QA were good, and demonstrated beneficial assessments of operations (References 3 and 7). Unit restart readiness (including PORC activities) and oversight was comprehensive and thorough, and factored in lessons learned (References 13 and 40). The NSRB process was noted to be a good forum for communicating problems (Reference 21). Management's decision not to enter RCS reduced inventory and mid-loop operations with fuel in the reactor vessel during the recent outage was conservative (Reference 74). Further, effective operations control of on-line maintenance was noted (Reference 55). Licensed operators demonstrated good performance and safety focus as noted by their sensitivity for degraded equipment (Reference 17) and during restart and refueling evolutions (References 24 and 40).

Weaknesses noted early in the assessment period included poor oversight of shift activities (Reference 7), poor guidance for voluntary TS 3.0.3 entry (Reference 20), shift supervision TS entry errors (Reference 31), and weak management and shift oversight of the spent fuel pool rerack project (References 45, 48, 55, 57 and 59). Additional observed weaknesses were poor safety focus and sensitivity for TS compliance issues (References 20, 31, 66, 85, 106 and 108), unit restart with a cold leg accumulator instrumentation problem (Reference 57), failure to implement the clearance procedure (References 12, 17, 20, 21 and 74), including three instances that caused reactor trips (References 21, 24, 66, 91, 94 and 109). The majority of the weaknesses were early, and the overall trend was positive.

The licensee was partially effective in corrective action to resolve problems relative to operator human performance. There has been a substantial reduction in personnel errors (Reference 133). However, some recent problems caused clearance and configuration control program issues. These personnel errors have resulted in safety equipment degradation and inoperability, personnel endangerment, unplanned RCS inventory changes, and unit trips and transients. Further, these issues combined with secondary plant problems and equipment unavailability resulted in unit trips and transients, and challenges to safety systems.

Normal inspection is recommended.

2.2. Problem Identification and Resolution

2.2.1 Problem Identification

Inspection reports indicated improving performance in this area and the overall assessment was good. Operations performance was good relative to a problem identification during a Unit 2 restart (Reference 3), and during the post trip review process (Reference 7). Further, a good operations sensitivity to identifying degraded equipment was noted (Reference 17). Third party reviews appeared effective in also identifying issues. These included ISEG safety assessments (Reference 3) and QA findings (Reference 131). Operations self-assessments were effective in identifying problems and the need for improvements (Reference 132).

Weak or poor problem identification was also noted early in the period. Examples included not finding problems during a Unit 1 startup relative to auxiliary control room instrumentation (Reference 17), unknown erratic steam generator PORV operation (Reference 35), and not detecting a RCS inventory loss and nitrogen voiding problem for a long period of time (References 8, 12 and 83). Further, although PER initiation thresholds were lowered, supervisory personnel were not always using the process effectively to document problems (Reference 17). These weaknesses occurred early during the period. Since few recent issues concerning lack of problem identification have occurred, licensee attention in this area was apparently effective.

Reduced inspection is recommended, based on recent trends.

2.2.2 Problem Resolution

Operations problem resolution was slow, and sometimes ineffective in resolving known problem areas, and was not improving. Overall performance in this area was adequate with significant weaknesses. Equipment clearance and configuration control problems continue to exist even though the licensee initiated program changes and enhancements. Recent numerous examples of problems included poor performance of the tagout and clearance process (References 53, 63 and 74). Personnel error rates declined during the period (Reference 133); however, three reactor trips (including one recently) were caused by inadequate operator human performance and failure to implement the self-checking process (References 21, 24, 66, 91, 94 and 109). Configuration control problems occurred after corrective actions had been implemented including three CCS valves found out-of-position (Reference 20) early in the period; containment spray valves not verified to be lock closed (Reference 21); a spent fuel pool valve not appropriately locked

(Reference 40); and, incorrect instrument air realignment (References 40, 84 and 123).

Long standing safety-related equipment deficiencies challenged operators. These challenges appeared to be constant over the period, and were the results of maintenance, engineering, and operations performance. It was not clear whether operations was addressing these challenges with the other departments. The challenges included problems with charging pump room cooler leaks (Reference 40), rod step counters and position indication systems, feedwater regulating valves, and Arrowhart MOV starters (References 63 and 65). Interim compensatory measures for these MOV starters were addressed by a standing order which was inadvertently cancelled (Reference 64). However, senior management appeared to be addressing these issues (Reference 55).

Secondary plant issues resulted in unit trips which challenged safety systems. During the two years of review (October 1993-October 1995), seven of nine trips occurred due to secondary plant problems. These included a continuing main generator voltage regulator problem (References 5 and 117), a MFP trip due to operator error (References 21 and 91), an EHC power supply failure (References 45 and 97), three main transformer related problems (References 48, 63, 67, 111, 126 and 127), and a stator water cooling problem (References 65 and 128).

Increased inspection is recommended.

2.3 Quality of Operations

The overall quality of operations was adequate with noted weaknesses. A recent improving trend was noted. During routine evolutions, operating errors by licensed and non-licensed operators were caused by poor and inadequate self-checking. Root causes included unawareness, misinterpretation of information, and inadequate work practices. These errors have resulted in unit trips and transients, safety system degradation, and clearance and configuration control errors. Specific examples are noted in the following paragraphs.

Recent performance examples included slow operations response to a sample line leak (Reference 53) and a AFW valve leak (Reference 65), an AUO error during turbine front standard testing (Reference 66), and problems during containment airlock testing and off-normal followup for main transformer cooling and electrical board room high temperatures (Reference 67).

In addition, three Unit 1 reactor trips (one recent) were caused by operator inattention to detail and a lack of self-checking during the clearance process. These included an automatic trip when an AUO opened the wrong MFP lube oil pump breaker (References 21 and 91); a manual trip when an ASOS pulled the wrong fuses for 6.9KV unit board (References 24 and 94), and an automatic trip when an AUO opened the wrong breaker on a 120 VAC panel (References 66 and 109). These reactor trips were all related to inadequate human performance. Performance indicators show an improving trend in that operations personnel error rates have declined from fiscal year 1994 to fiscal year 1995 (Reference 133). However, TVA Nuclear Assurance tending and recent reports noted that operations continued to experience performance related problems, indicating a significant weakness (Reference 131).

Good performance was noted during response to reactor trips and unit transients, during outage periods, and during unit startup activities. Examples included good response to a letdown isolation event (Reference 3); strong performance during reactor trips (References 5, 24, 45, 48 and 65); good performance during Unit 1 restart including shift turnovers, knowledge of plant status and SRO tours (Reference 20); good response to a loss of air compressors event (Reference 22); good control of and performance during Unit 2 refueling/outage activities (References 24 and 40); good followup and actions associated with a Unit 1 RVLIS leak, unit shutdown, and NOUE (References 57 and 103); and, positive improvements in the shift turnover meetings and the overall process (Reference 69).

Performance has improved with noted weaknesses, including continuing personnel errors and historical significant weaknesses in the equipment clearance process (References 17, 66, 74 and 106).

Normal inspection is recommended, based on recent trends.

2.4 Programs and Procedures

The overall performance in this area was adequate. Weaknesses in this performance area occurred early in the period and included problems with non-licensed operator rounds and operator log keeping programs (References 7 and 74), EOP verification and validation process (Reference 9), and a lack of abnormal procedure implementation guidance while using EOPs (Reference 9). Further, inadequate procedures were recently identified for controlling entry into TS 3.0.3 (References 66 and 106), and for the spent fuel pool rerack project (References 45, 48, 55, 57 and 59).

Further, lack of a controlling process procedure was a causal factor for a reactor trip involving chlorination activities which caused a stator cooling water high temperature generator trip (References 65 and 128). Other reactor trips were caused by failure to follow the clearance procedure and inadequate self-checking (References 21, 24, 66, 91, 94 and 109).

Good performance was indicated in the use of alarm response procedures (Reference 9); during the process and procedures for unit restart from a refueling outage including criticality and low power physics testing (Reference 18); in the control of procedure change forms (Reference 57); and, in licensed operator training programs (Reference 50, 51 and 72).

Increased Inspection effort is recommended.

3.0 ENGINEERING

3.1 Safety Focus

The overall performance in this area was good. Nuclear engineering and systems engineering provided good inputs to the PORC during the PORC restart readiness review meetings (Reference 40). Diagnostic measurements of both torque and thrust, and operability checks following MOV testing were considered strengths (Reference 52). Effective design changes were implemented for analyzing heat exchanger tube plugging and upgrading of the lower containment coolers to safety-related (Reference 54).

Weaknesses noted included an initial evaluation of a potential generic safety issue involving SSPS susceptibility to a failure mode that was not thorough (Reference 57), not fully addressing the HPFP system with regard to testing and system design weaknesses (Reference 54), and improper classification of the ERCW system sump pumps as nonsafety-related which resulted in the pumps not being included in any pump testing or maintenance programs (Reference 54).

A good initiative was an engineering study which identified several single point BOP valve failures that would result in a plant trip or secondary side transient. However the study failed to recommend changes in valve maintenance (Reference 36). Sensitivity was lacking concerning BOP plant design reflecting the as-built plant configuration (Reference 55).

Normal inspection effort is recommended in this area.

3.2 Problem Identification and Resolution

Early performance in this area was adequate but improved late in the period. Early examples of weak problem identification included a lack of system engineer knowledge of the RVLIS which delayed identification of low RCS level during evaluation of gas voiding in the RCS (Reference 12), unqualified containment coatings for both units were not promptly identified and corrected (Reference 31), main steam check valve disc losses were not promptly detected (Reference 32). Later in the period, corrective actions for the Arrowhart motor starter problem was narrowly focused on early failures without factoring in later failures to achieve a more comprehensive corrective action (Reference 47), and expected degradation of ECCS throttle valves under accident conditions was not promptly evaluated and resolved (Reference 69).

In the area of problem resolution, there were several instances of longstanding problems associated with feedwater check valve leakage and containment sump reach rod valve indication that remained to be corrected (References 36 and 63). Poor material condition and degradation of the HVAC chillers, control air system, and fire protection system continued (References 59 and 48). Weaknesses were evident in the corrective action program, especially in personnel understanding what should be identified as an adverse condition (Reference 54).

Examples of good performance noted in problem resolution were troubleshooting of MSIV slow stroke timing and the corrective actions which improved the safety performance of the valves (Reference 40), timely evaluation and resolution of the high temperature effects on mechanical snubber operability prior to Unit restart (Reference 42), engineering involvement and increased management attention in troubleshooting problems related to the Unit 2 TDAFW pump bearing/control oil fluctuations (Reference 45), increased management attention and resources resulted in drawing backlog commitments being met (Reference 60), and engineering support for ISI/welding issues (Reference 73).

Normal inspection is recommended based on an improving trend.

3.3 Quality of Engineering Work

The quality of engineering work was adequate throughout the period. Early in the period, deficiencies were identified in the operability assessments for the ERCW and main steam system pipe supports (Reference 2), design of a containment ventilation system modification failed to evaluate the effect of the temperature change on safety-related cables in the lower containment steam generator enclosure (Reference 14), poor assumptions were made concerning pump performance flow testing which resulted in the TS cooldown limits for the pressurizer being exceeded (Reference 15), RTD wiring was installed improperly during a modification due to incorrect design drawings (Reference 20), drawing deficiencies and post modification testing discrepancies contributed to the need for enforcement discretion in exceeding a TS LCO for the EDG (Reference 24), incorrect information in design output documents and system operating instructions resulted in testing that damaged the AC output switch for a vital inverter (Reference 40). More recently, deficiencies included recalculated actuator capability was not verified to be above present torque switch settings for MOVs (Reference 52), inadequate design calculation and design control measures for ERCW and HPFP systems and the EDG batteries (Reference 54), instrument inaccuracy was not being considered in safety system testing (Reference 54), a drawing error contributed to operators not clearing the fuel storage rack when lifting a dummy fuel assembly (Reference 59), reach rod devices for containment sump recirculation MOVs did not appear on design drawings (Reference 63), and poor communications between engineering and operations led to untimely implementation of corrective actions for Arrowhart contactor problems (Reference 63).

Indicators of improvements noted recently were the technical evaluation and extent of condition review for Unit 1 RVLIS fitting failure was good (Reference 57), timely evaluation, good root cause, and appropriate corrective actions were provided for Arrowhart contactor problem associated with three safety-related MOVs (Reference 63), system engineering status reports for the AFW and CCS systems indicated good awareness of equipment status, problem areas, and knowledge of the systems (Reference 65), thorough engineering evaluation and corrective actions for waste gas analyzer problems and troubleshooting of the main generator stator cooling water system (Reference 66), and a thorough engineering review and root cause evaluation for sudden pressure relay failure which caused a Unit 1 trip (Reference 67).

Increased inspection in this area is recommended.

3.4 Programs and Procedures

Overall performance in this area was determined to be good. Examples of good performance in this area included focused management attention on flow accelerated corrosion activities has produced a strong erosion/corrosion program and improved plant reliability (Reference 73), strong design measures were implemented for analyzing heat exchanger tube plugging (Reference 54), the GL 89-10 MOV program was being satisfactorily implemented (Reference 52), and procedures for manual ultrasonic examinations were good and exceeded ASME Code requirements (Reference 26).

Examples of weak performance included inadequate procedural guidance for flood mitigation (Reference 54); deficiencies in Check Valve Program Implementation (Reference 36); EQ program responsibilities not clearly communicated initially (Reference 37).

Normal inspection in this area recommended.

4.0 MAINTENANCE

4.1 Safety Focus

Safety Focus in the area of plant maintenance was good. The performance of the safety related equipment has been good as evidenced by the lack of identified problems during the response to the plant trips (Reference 80-129).

Two plant trips could have been prevented by performing PM activities. The examples were the Unit 2 turbine trip/reactor trip related to the iso-phase bus duct failure on April 28, 1995 (Reference 63), and the Unit 2 turbine trip/reactor trip related to main bank transformer gas pressure relay control circuit fault while replacing a light bulb on January 5, 1995, (Reference 48). While power reductions for BOP maintenance indicated a problem with BOP material condition, the licensee has more recently demonstrated good safety focus by reducing power to make repairs to equipment rather than operating with known equipment problems. Initial efforts to reduce the maintenance backlog did not show progress (References 7, 13 and 22). Recent efforts were effective at significantly reducing the maintenance backlog (Reference 40). The U2 outage for condenser repairs demonstrated an improvement in safety focus (Reference 63). Progress was made on addressing safety attitudes, and methods associated with electrical safety standards and requirements (Reference 69).

Pipe chase and penetration room coolers were noted as exhibiting reduced performance but were still listed as low priority maintenance (Reference 54). Early in the evaluation period, a potential personnel safety issue was noted during hydrostatic testing of an EDG lube oil cooler (Reference 31).

Missed TS surveillances were noted during the review which included 4 Containment Isolation Valves (Reference 65), Backup Source Range Monitor (Reference 69), Containment Penetration (Reference 31), and ERCW Pumps Auto Start (Reference 96). Although two of these are recent examples, there has been an overall reduction in missed TS surveillances recently. Enforcement Discretion was requested and received for completion of TS surveillances on the vital inverters (Reference 40), and the reactivity control system moveable control assemblies (Reference 48). The enforcement discretion occurred early in the period and no examples of maintenance related enforcement discretion were noted in 1995.

Normal inspection in this area is recommended.

4.2 Problem Identification/Problem Resolution

Problem identification and resolution was assessed as good however, some long standing unresolved equipment problems were noted. Strong performance was noted in the significant reduction of the maintenance work backlog which showed effective problem resolution (Reference 40). Cable testing identified degraded ERCW cables which were replaced

(Reference 43). Thermography identified deficiencies in main transformer bushings which required a plant shutdown to repair (Reference 55).

Instances were identified where the licensee did not write PERs for adverse conditions including: EDG jacket water temperature alarms, 480 V Unit Board breaker settings, (Reference 44), turbine building isolation time testing and heat exchanger trending (Reference 54).

Long standing unresolved equipment problems included: control rod group demand step counters, (References 110, 115 and 125), Arrowhart motor starters (References 21, 47 and 64), MFW check valve leakage (Reference 36), containment sump manual valve reach rod valve indication (Reference 36), first out reactor trip and turbine trip annunciation (Reference 63), and S/G blowdown valve limit switches (Reference 57). Long term corrective actions had begun regarding replacement of the Arrowhart motor starters.

Maintenance developed formal corrective actions to improve performance following a QA audit and performance assessment (Reference 7). A maintenance area QA audit was judged to be good (Reference 7).

Normal inspection in this area is recommended.

4.3 Equipment Performance/Material Condition

Equipment Performance and Material Condition was adequate with recent significant improvements noted. Over 4000 feet of piping were replaced during the Unit 2 outage. Unit 2 containment lower compartment coolers were replaced (Reference 54). Safety system condition and performance was generally good as evidenced by system response to plant transients (Reference 80-129). The licensee repairs to the condenser were a strength (Reference 63). Housekeeping at hotwell pumps, vital battery rooms and RHR rooms was good (Reference 40 and 67).

Instances identified where plant shutdowns were required to comply with plant TS included RVLIS fitting leak (Reference 103), CCS check valves (Reference 81), and CCP shaft (Reference 118 and 119). The material condition of the BOP systems has impacted the power history of the units. Several plant shutdowns and power reductions were required to correct problems with BOP equipment. In the period of October, 1993, to October, 1995, 6 of 9 plant trips were related to BOP systems.

Other material condition deficiencies included: pin hole leaks on High Pressure Fire Protection system piping (Reference 2 and 48), AOV and air system problems (Reference 3, 5, 17 and 21), CCP room coolers ERCW leakage (Reference 40 and 67), Unit 1 containment lower compartment coolers (Reference 54). The control air system challenged maintenance and operations personnel (Reference 59). A temporary air compressor was installed to help maintain system reliability. The HVAC chillers required frequent maintenance and rebuild (Reference 59).

Normal inspection in this area is recommended.

4.4 Quality of Maintenance Work

The conduct of maintenance and surveillance activities was good. Early examples of poor maintenance practices included: Incorrect assembly of 2 AOVs which led to a letdown isolation event (Reference 3), PMT inadequate for air regulator replacement maintenance (Reference 5), Incorrect installation of a pump seal on 1AA CS pump (Reference 17), Repeat failures of glycol isolation valves and boric acid transfer pump seal failures (Reference 15). Several early maintenance activities caused inadvertent equipment actuations. Examples included non-essential control air which caused an inadvertent ESF actuation (Reference 31), and a main feedwater isolation on steam generator level (Reference 87). Deficiencies in returning equipment to service following maintenance and surveillance included the RCP oil collection system (Reference 2) and manual valve lineups (Reference 8, 35 and 21). Weaknesses in foreign material exclusion control were identified early in the period including work on Unit 1 TDAFW system (Reference 7), 2B EDG DC lube oil pump (Reference 7), CCP and RHR pump motors (Reference 17) and 1BMFWP (Reference 35). These items indicated that maintenance was not always performed correctly the first time (Reference 20).

Fewer problems were noted at the end of the assessment period. Examples included an EDG relay improperly wired (Reference 57), and an inadvertent main feedwater isolation during reactor trip breaker testing (Reference 67).

Troubleshooting was generally good with weaknesses identified on the Unit 2 main generator exciter (Reference 10), radiation monitors (Reference 67), and pressurizer level instrumentation (Reference 48). The area of M&TE was noted as requiring management attention. The M&TE control procedure allowed excess time for operability checks following maintenance for equipment found out of tolerance. The procedure lacked controls for issuance of test equipment based on safety train usage (Reference 74).

Examples of good maintenance performance included work activities on: Unit 2 main bank transformer (Reference 55), waste gas analyzer flow switches (Reference 63), CCS temperature control circuitry, Feedwater flow transmitter, EDG air compressor, HPFP pressure control valve (Reference 65). Unit 1 AFW pump and main steam safety valve testing was good (Reference 74), ERCW pump and EDG heat exchanger outlet check valve maintenance was considered good (Reference 54). Performance of maintenance on MOVs, AOVs, and vital inverters was noted as good (Reference 69).

Normal inspection is recommended for this area.

4.5 Programs and Procedures

The programs and procedures were adequate with improvement in recent performance noted. Several instances of inadequate maintenance procedures were noted during the review. Early procedural deficiencies included incorrect or unclear steps or acceptance criteria, incomplete steps and not incorporating vendor information. Examples included: Containment liner inspection procedure did not call for inspection behind flashing in areas which could exhibit potential corrosion (Reference 5), Containment Integrated Leak Rate Test Procedure contained inaccurate valve position for S/G blowdown valves (Reference 8), Reactor Trip Breaker Maintenance Procedure lacked sufficient detail, data from vendor documents not incorporated (Reference 20), Surveillance Instruction inadequate for EDG fuel oil transfer and RCS Inventory (Reference 17). More recent weaknesses were noted in portions of the following licensee programs: incomplete trending program for MOVs (Reference 52), PM program for 3 RHR manual valve reach rods inadequate (Reference 36), IST of the ERCW and ERCW travelling screen wash pumps (Reference 54).

Some equipment which was not included in the PM program exhibited poor performance. Examples included air regulators (Reference 3), CCS check valves not in the IST program (Reference 5), ERCW sump pumps (Reference 54), Auxiliary Building Crane (Reference 48), and the Security EDG (Reference. 59).

Strengths identified in the Maintenance Programs and Procedures area included a program for the control and reduction in the use of leak sealants (Furmanite) (Reference. 3), an initiative for the reduction and control of procedure change forms (Reference 57), and the control of welding was considered good (Reference 75). An On-line Maintenance Program was in place and satisfactorily implemented, however the program was not PRA based (Reference 48). The ERCW pump and valve PM program was good (Reference 54).

Normal inspection in this area is recommended.

5.0 PLANT SUPPORT

5.1 Safety Focus

5.1.1 Radiological Controls

The safety focus was superior as was evidenced by management's involvement with controlling personnel and environmental exposures and managements response to radiological events. Examples included targeting radioactive source term reduction as a major ALARA initiative, a successful Unit 2 Cycle 6 shutdown eliminating approximately 3200 curies of radioactivity which resulted in an 18 percent dose rate reduction in containment (References 49, 61, and 140), aggressively controlling contamination at the source resulting in a reduction in plant contaminated square footage and a reduction in personnel contamination events (Reference 61), an effective response to a reactor coolant system leak on the reactor vessel level indicator involving high levels of surface and airborne radioactivity (Reference 57) and managements immediate corrective actions to finding radioactive particles on the roof of the Auxiliary Building (Reference 15).

Reduced inspection in this area is recommended.

5.1.2 Security

The safety focus in this area was generally good based on the security force being adequately staffed and trained, and demonstrating an acceptable level of knowledge and capability. A positive safety focus has been a new facility security program upgrade (References 4 and 19). The licensee continues to have an effective access authorization program which was well managed and thorough.

Normal inspection in this area is recommended.

5.1.3 Emergency Planning

The licensee's safety focus in this area was generally superior based on response to actual operational events (Reference 57), the continued capability to maintain facilities and equipment in a state of operational readiness (References 25 and 38), and the overall performance of the licensee's 1994 Annual Exercise was considered satisfactory. Exercise strengths observed focused on the good control demonstrated by the Site Emergency Director in the Technical Support Center and the Central Emergency Control Center Director (Reference 38). However, safety focus regarding prompt action to revise Emergency Preparedness Implementing Procedures was not evident for a condition involving accelerated degradation of Emergency Core Cooling System throttle valves which could cause premature system failure during accident scenarios (Reference 69). Also, training selected emergency response participants in evaluated exercises is inconsistent with maintaining all emergency responders well trained (Reference 25).

Reduced inspection in this area is recommended.

5.2 Problem Identification and Resolution

5.2.1 Radiological Controls

The performance in the area of problem identification and resolution was generally good. On the positive side, a qualified auditor with health physics and chemistry experience was assigned to the station to better implement the licensee's assessment activities, audits were well planned and conducted, and contained items of substance. The Performance Evaluation Program was a strength. The Site Trend Analysis Committee, comprised of Operations, Maintenance, and Quality, and Radiological Controls assessed performance, addressed worthwhile issues and had substantive comments and recommendations (References 6, 30, 61 and 49).

Although licensee internal audits and assessments were effective in identifying issues, corrective actions were not always thorough and timely. As an example, many on-line chemistry instruments were inoperable for an extended period and require significant compensatory measures (References 22 and 23). Also, the licensee identified repetitive radioactive liquid spill events associated with post accident sampling equipment. These events were documented by the licensee in Problem Evaluation Reports. However, as evidenced by the repetition of this problem, licensee actions were not effective in precluding recurrence (Reference 23). The licensee was progressing toward accomplishing corrective actions to improve operability of online secondary chemistry monitors (Reference 39).

Normal inspection in this area is recommended.

5.2.2 Security

The performance in the area of problem identification and resolution was generally good. The licensee conducted a Nuclear Assurance audit of the access authorization program between February 7 and April 29, 1994, found no deficiencies (Reference 41). At the beginning of the assessment period, the licensee initiated corrective action for 6 examples of failure to comply with procedural requirements (Reference 4). However, one declining trend was noted during recent NRC inspections based on several examples of inattentiveness to duty. Examples included observations of inadequate control of visitors entering vital areas, the inconsistent manner in which officers issue site badges at a control point exterior to a protected area, and a vehicle left unattended in the protected area with the engine running (References 51, 68 and 72). These issues were resolved in 1995 as a result of the licensee initiating a Problem Evaluation Report to analyze, identify, and correct the issues (Reference 68).

Normal inspection in this area is recommended.

5.2.3 Emergency Planning

The licensee's performance in this area was indeterminate. The licensee continued to meet requirements for conducting an independent audit of the emergency preparedness program and the emergency plan implementing procedures based on a review of the licensee's 1993 Nuclear Assurance Audit Report. However, the 1994 audit had been conducted but not documented in NRC inspection reports (Reference 25). This area is indeterminate based on insufficient information being available when the review was conducted.

The licensee's performance in this area is indeterminate.

5.3 Quality of Plant Support

5.3.1 Radiological Controls

The performance in the area of quality was good. The Laboratory controls for water chemistry were considered to be a Chemistry Program strength (Reference 16). Positive performance continued in controlling contamination at the source resulting in a reduction in plant contaminated square footage and a reduction in personnel contamination events (Reference 61), the ALARA program continued to be effective in controlling overall collective dose (References 49, 61, and 140). However, there were examples of failure to follow procedures which include: a failure to control issuance of a high radiation area key, a failure to identify radiological hazards of materials stored in spent fuel pools (Reference 30), two individuals entered a posted high radiation area without being on a radiation work permit and without the appropriate monitoring devices (Reference 49) and two examples of missed surveillances in the area of chemistry (References 23 and 33).

Normal inspection in this area is recommended.

5.3.2 Security

The performance in the area of quality was generally good. The licensee's access authorization program was effective and thorough with strengths in terms of background investigations, psychological evaluations, and revocation of clearance and appeals. The officers demonstrated an acceptable level of job knowledge and performance capability (Reference 19). However, a failure to comply with access control procedural requirements was identified during the beginning of the assessment period because of inattention of security guards (Reference 4). Also, a declining trend was noted during the later half of the inspection period by the examples relating to inattentiveness to duty (References 51, 68 and 72).

Normal inspection in this area is recommended.

5.3.3 Emergency Planning

The performance in the area of quality was generally superior. Responses to actual events were appropriate (Reference 57). Facilities and equipment were maintained operationally ready (References 25, 38). The licensee demonstrated the ability to respond to a major event during its annual emergency preparedness drill. Good communications capabilities existed among the licensee's emergency response organization and between the licensee's emergency response organization and offsite authorities (Reference 38). Training and drilling requirements of the Radiological Emergency Plan were met (reference 25).

Reduced inspection in this area is recommended

5.4 Programs and Procedures

5.4.1 Radiological Controls

The quality and implementation of programs and procedures in the radiation protection and chemistry areas were superior. An effective water chemistry control program was implemented (Reference 16) and an effective training program for health physics technicians, chemistry technicians and personnel involved in shipment of radioactive material was implemented (References 16 and 61). Timely procedural changes were made as corrective actions for several identified problems in the areas of radiation protection and chemistry (References 23, 49 and 33).

Reduced inspection in this area is recommended.

5.4.2 Security

The licensee continued to maintain an approved Physical Security Plan, and programs and procedures for access authorization, and fitness for duty were generally good (References 4, 41, 68).

Normal inspection in this area is recommended.

5.4.3 Emergency Planning

Programs and procedures were generally good as evidenced by overall good performance demonstrated during the licensee's 1994 Annual Emergency Preparedness Exercise and an inspection of the licensee's Quality Assurance program indicated that the licensee's emergency preparedness program and procedures were satisfactory (References 25 and 38).

Normal inspection in this area is recommended.

ACRONYMS

AFW	Auxiliary Feedwater
ALARA	As Low As Reasonably Achievable
AOV	Air Operated Valve
ASOS	Assistant Shift Operations Supervisor
ASME	American Society of Mechanical Engineers
AUO	Assistant Unit Operator
CCP	Centrifugal charging Pump
CCS	Component Cooling System
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EHC	Electron Hydraulic Control
EOP	Emergency Operating Procedures
EQ	Environmental Qualification
ERCW	Emergency Raw Cooling Water
ESF	Engineered Safety Features
GL	Generic Letter
HPFP	High Pressure Fire Protection
HVAC	Heating Ventilating and Air Conditioning
ISEG	Independent Safety Engineering Group
ISI	In Service Inspection
IST	In Service Testing
KV	Kilovolts
LCO	Limiting Condition of Operation
MFP	Main Feedwater Pump
MFW	Main Feedwater
MOV	Motor Operated Valve
MSIV	Main Steam Isolation Valve
M&TE	Measurement and Test Equipment
NOUE	Notification of Unusual Event
NRC	Nuclear Regulatory Commission
NSRB	Nuclear Safety Review Board
PER	Problem Evaluation Report
PMT	Post Maintenance Testing
PORC	Plant Operations Review Committee
PORV	Pilot Operated Relief Valve
QA	Quality Assurance
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RTD	Resistance Temperature Detector
RVLIS	Reactor Vessel Level Indicating System
SRO	Senior Reactor Operator
SSPS	Solid State Protection System
TDAFW	Turbine Driven Auxiliary Feedwater
TROI	Tracking and Reporting of Open Items
TS	Technical Specifications
U1	Unit 1
U2	Unit 2
VAC	Volts Alternating Current

APPENDIX A
LIST OF REFERENCES

NRC INSPECTION REPORTS

Reference No.		Reference No.	
1	93-48	2	93-49
3	93-50	4	93-51
5	93-52	6	93-53
7	93-54	8	93-55
9	93-300	10	94-02
11	94-03	12	94-04
13	94-05	14	94-06
15	94-07	16	94-08
17	94-09	18	94-10
19	94-11	20	94-13
21	94-15	22	94-16
23	94-17	24	94-18
25	94-19	26	94-20
27	94-21	28	94-22
29	94-23	30	94-24
31	94-25	32	94-26
33	94-27	34	94-28
35	94-29	36	94-30
37	94-31	38	94-32
39	94-33	40	94-34
41	94-35	42	94-36
43	94-37	44	94-40
45	94-41	46	94-42
47	94-43	48	94-45
49	94-47	50	94-300
51	94-301	52	95-01
53	95-02	54	95-03
55	95-04	56	95-05
57	95-06	58	95-07
59	95-08	60	95-09
61	95-10	62	95-11
63	95-12	64	95-13
65	95-14	66	95-15
67	95-16	68	95-17
69	95-18	70	95-19
71	95-20	72	95-99
73	95-300	74	95-21

LICENSEE EVENT REPORTS

UNIT 1

Reference No.	Event Report
80	93028
81	93029
82	93030
83	94001
84	94002
85	94003
86	94003 (Rev.1)
87	94004
88	94005
89	94006
90	94007
91	94008
92	94009
93	94010
94	94011
95	94012
96	94013
97	94014
98	94015 (Rev 1)
99	94015
100	94016
101	94017
102	95001
103	95002
104	95003
105	95004
106	95005
107	95006
108	95007
109	95008
110	95009
111	95010
112	95011

UNIT 2

Reference No.	Event Report
115	93005
116	93005 (Rev 1)
117	93006
118	94001
119	94002
120	94003
121	94004
122	94005
123	94006
124	94007
125	94008
126	95001
127	95002
128	95003
129	95004

OTHER REPORTS AND DOCUMENTS REVIEWED

130 Site Quality Operations Performance Evaluation Final Report, January 23 - June 1, 1995, NA-SQ-95-009

131 TVA Nuclear Assurance and Licensing Level 1 Trend Analysis Reports and Site Quality (April 1 - June 30, 1995)

132 Operations Self-Assessment Reports 1994 - 1995

133 1995 Operations Performance Indicators and Personnel Error Trends

134 Site Quality Trend Report - 4th Quarter FY94

135 Business Plan and Performance Reports

136 Nuclear Assurance and Licensing Audit Report No. SSA9509

137 Technical Support Quarterly Reports (FY95, 2nd and 3rd Quarters)

138 Nuclear Assurance and Licensing Audit Report No. SSA94405

139 Site Quality Trend Report - 4th Quarter FY95

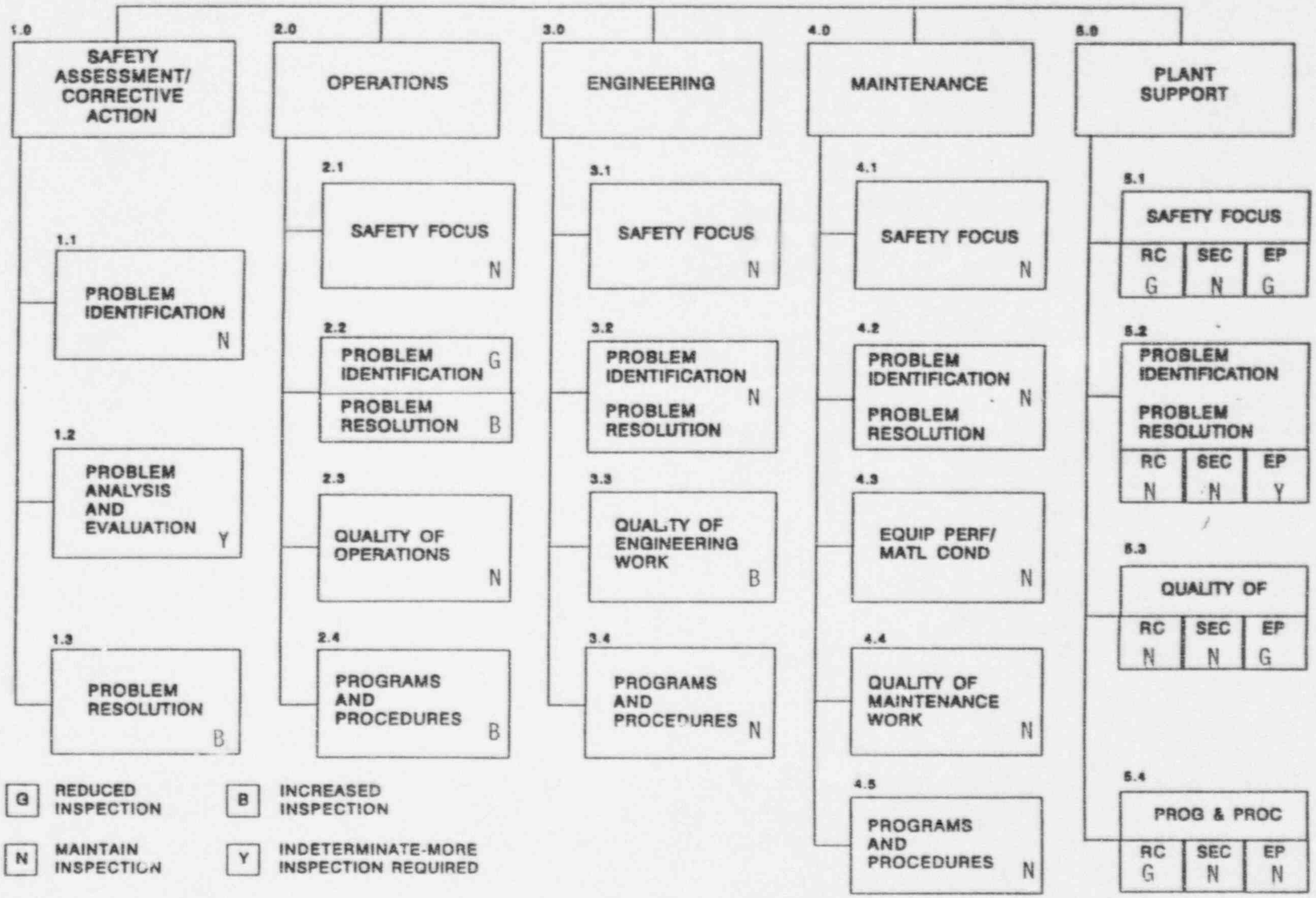
140 Annual ALARA Report - FY94; 3rd Quarter Trend Analysis

141 Nuclear Assurance and Licensing Audit Report No. SQA94502

142 Chart of Open/Closed PERs based on TROI data through 10/5/95

SEQUOYAH UNITS 1 AND 2

PERFORMANCE ASSESSMENT/INSPECTION PLANNING TREE



APPENDIX B