5.0 CONCLUSIONS

The primary conclusion reached by the Industrial Safety Category is that management within the Office of Nuclear Power was not fully effective in implementing the industrial safety program prior to 1986. This occurred even though TVA's policy statements identify industrial safety as having high corporate priority and clearly define management's direct responsibility and accountability for industrial safety activities.

This lack of management attention decreased the effectiveness of the industrial safety program at Watts Bar Nuclear Plant and other sites within the Office of Nuclear Power. Employees were aware that the enforcement of industrial safety rules and procedures by line management was, at best, inconsistent. This lack of management control resulted in an increased probability of accidents and injuries.

The deficiencies in the industrial safety program identified by this category were reported to the appropriate plant management organization, and corrective action plans were developed by them to adequately resolve all identified problems. These corrective action plans have been, or are in the process of being implemented.

Following the restructuring of the industrial safety program at Watts Bar and Browns Ferry Nuclear Plants, significant improvements have been observed. Management is becoming more involved in the day-to-day administration of the industrial safety program. These actions are resulting in an improved industrial safety "environment." Both management and employees are becoming more aware of unsafe acts and conditions within the workplace, and more importantly, are becoming proud of their industrial safety performance record.

While the industrial safety programs at Watts Bar and Browns Ferry Nuclear Plants have shown marked improvements as a result of increased management involvement, this level of achievement cannot be maintained without a long-term commitment by management within the Office of Nuclear Power to the Industrial Safety Program.

Even though much work has been done in addressing the program deficiencies, several commitments remain unfinished.

- The industrial safety program at Sequoyah and Bellefonte Nuclear Plants should be revised along the lines of the programs initiated at Watts Bar and Browns Ferry Nuclear Plants.

- The workplace inspection program being implemented at the plant sites will be expanded to include participation by all management levels. These periodic inspections serve to identify and correct unsafe acts and conditions, familiarize managers with the actual conditions of the workplace, and enable managers to communicate their safety expectations to their subordinates.

- The industrial safety programs of other utilities and companies will continue to be reviewed to determine if effective programs of other such companies can be utilized to improve the Office of Nuclear Power's industrial safety program.

TVA recently established as corporate health and safety objectives that (1) it would have an industrial safety performance rate (accident rate) in its power program equal or better than the average rate of neighboring utilities within the Southeastern Electric Exchange by fiscal year 1991, and (2) it would have the best health and safety performance record of any Federal agency by 1992. These performance objectives will require that industrial safety performance rates within TVA's power program improve by almost 20 percent each year.

The creation of an excellent industrial safety program is not a short-term goal. A good safety program requires continuous, day-to-day involvement of management and employees in order to properly serve to protect against workplace hazards and illnesses. Industrial safety must be managed in the same way, with the same degree of care and attention given to licensing and quality commitments, and to the operations and maintenance of nuclear safety related equipment.

APPENDIX A
INDUSTRIAL SAFETY CATEGORY TABLE OF REPORTS

Reports in the Industrial Safety Category comprise Volume 9 of the Employee Concerns Special Program Report of Findings and Conclusions. Each of the 11 reports within Volume 9 is identified with a Part number corresponding to its Employee Concerns Special Program report number.*

PART	REPORT TYPE AND NUMBER	TITLE
90000	**Category Report 90000**	**Category Summary and Conclusions**
90100	Subcategory Report 90100	Management of Safety
90400	Subcategory Report 90400	Protective Equipment
90500	Subcategory Report 90500	Life Safety
90600	Subcategory Report 90600	Electrical
90700	Subcategory Report 90700	Design
90800	Subcategory Report 90800	Emergency Equipment and Plant Response
90900	Subcategory Report 90900	Walking and Working Surfaces
91000	Subcategory Report 91000	Unsafe Conditions
91100	Subcategory Report 91100	Defective/Inadequate Equipment
91200	Subcategory Report 91200	Industrial Hygiene

* The Industrial Safety Category originally contained two additional subcategories: 90200 and 90300. These two subcategories were consolidated with the Management of Safety Subcategory (90100).

APPENDIX B
EVALUATOR PROFILES

The following is a brief professional profile on the evaluators and other key personnel who assisted in the evaluation of the employee concerns within the Industrial Safety Category.

Lonnie C. Ellis, Category Group Head

B.S. in Industrial Technology, Tennessee Technological University. Over 13 years experience as an industrial safety engineer and manager including six years as the manager of TVA's nuclear power safety program.

Gaines E. Bruce, Evaluator

Associate in Science Degree, Muskegon Community College, B.S. Mechanical Engineering, Michigan State University. Has 14 years experience as a safety design engineer, including nine years as a nuclear design engineer within TVA.

Charles C. Caudill, Evaluator

B.S. Geology, University of North Carolina, M.S. Industrial Safety, University of Tennessee, Knoxville. Has six years experience as a mine safety engineer in North Carolina Bureau of Mines. Has served as an industrial safety engineer in TVA's nuclear power program for eight years.

David K. Gray, Evaluator

B.S. in Industrial Sociology and Psychology, University of North Alabama. Has five years industrial safety experience within TVA's nuclear power program.

Jimmie C. Hodges, Evaluator

B.S. Chemistry and Biology, Murray State University, M.S. Public Health, University of North Carolina. Has 21 years experience in industrial hygiene and health physics programs within TVA including ten years within the nuclear power program.

Jasper C. Hodgins, Evaluator

B.S. in Industrial Hygiene, Auburn University. Has over 30 years of experience in industrial ventilation, and industrial hygiene. Has served as an industrial hygienist within TVA for 15 years including two years within the nuclear power program.

Steven B. Logan, Evaluator

B.S. Civil Engineering, University of Kentucky. Has 26 years of experience in industrial safety, including six years within TVA as an industrial safety engineer and manager in the nuclear program.

David H. Petree, Evaluator

B.S. Geology, Clemson University, M.S. Geology, University of North Carolina. Has 12 years experience in TVA's nuclear program with two years experience in industrial safety.

Charles K. Petty, Evaluator

B.S. in Mathematics, Memphis State University. Has over 20 years experience in industrial safety and engineering, including six years as an industrial safety program evaluator within TVA.

John T. Rogers, Evaluator

B.S. Industrial Management, University of Tennessee, Knoxville. Has nine years experience as an industrial safety engineer in private industry, and 11 years as an industrial safety engineer within TVA including six years within TVA's nuclear program.

Alfred C. White, Evaluator

B.S. in Aviation Management, Auburn University. Served for eight years with the federal Occupational Safety and Health Administration. Has been a industrial safety program evaluator for TVA for six years.

E. L. Wisseman, Report writer, Peer reviewer

B.S. in Mechanical Engineering, University of Delaware. Has 16 years experience with E. I. DuPont de Nemours, including five years as a plant safety engineer. Has served as a safety engineer and safety supervisor in TVA's nuclear program for three years.

APPENDIX C
SUBCATEGORY REPORT OVERVIEWS

This appendix contains a summary of each subcategory in the Industrial Safety Category. This summary briefly reviews the types of employee concerns contained within each subcategory, the issues addressed, the findings and conclusions reached, the problems identified, and the corrective actions taken or planned to resolve the identified problems.

The conclusions summary at the end of each subcategory description is derived from the subcategory investigations and is more fully supported by these subcategory reports.

1.0 Management of Safety Subcategory (Report 90100)

This subcategory evaluated those employee concerns about the management of the Office of Nuclear Power's industrial safety program prior to January 1, 1986. The investigation of this subcategory was conducted primarily at Watts Bar Nuclear Plant, although similar investigations were also conducted at the Browns Ferry and Sequoyah Nuclear Plants.

Many of the employee concerns in the other nine subcategories indirectly raised "management of safety" issues. Consequently, the issues, findings, and conclusions of this subcategory constitute the "bedrock" of the Industrial Safety Category evaluation, and are the most important in the determination of corrective actions on the category level.

The 92 employee concerns within this subcategory were subdivided into eleven discrete issues. These issues were evaluated over a three-month period by the Contractor. This investigation determined that the following four issues within the subcategory were <u>not substantiated</u>:

- The site industrial safety staff is not responsive.

  The site industrial safety staff was determined to be responsive both to observed unsafe acts and conditions, and to reported problems.

- Certain safety rules and practices are inadequate or improper for their intended purpose.

  Industrial safety rules and procedures were determined to be adequate to protect employees from injuries and workplace hazards.

- The safety program, as a whole, is inadequate.

The basic "written" industrial safety program, both at the site and for the Office of Nuclear Power, was determined to be adequate to protect employees from injuries and workplace hazards.

- Employees were ordered to violate safety rules or procedures.

  No incidents were found where employees were ordered to violate safety rules or procedures.

This evaluation concluded that the following seven issues within this subcategory were partially or fully substantiated:

- Management preached but did not practice safety.

  Management had given employees the perception that industrial safety was sometimes placed below other goals such as production. While industrial safety was talked about, in some incidents management did little more to promote employee safety.

- Management failed or was slow in responding to safety problems/suggestions.

  Management did not always place a high priority on the prompt resolution of industrial safety problems and the timely implementation of valid industrial safety suggestions. They also did not spend enough time in the field, observing and talking with employees.

- Supervisors failed to perform adequate job safety planning.

  Although adequate job planning requirements are in place, these job safety planning requirements were not always followed. Supervision depended upon employees to notify them of safety problems as work progressed.

- Accidents were not always adequately investigated.

  Accident investigations did not always receive adequate management attention. This was especially true for first-aid, near-miss, and medical treatment cases. More attention was paid to completing the paperwork than to analyzing the cause of the incident and determining realistic means to prevent its recurrence.

- Production was placed over safety by management.

  This issue was only partially substantiated. While few cases could be found to directly support the issue, employees interviewed felt that management placed production over industrial safety simply because "production" was mentioned more often than "safety" by management.

- Safety procedures were not always followed by employees or enforced by line management.

  This issue was determined to be substantiated. Although industrial safety policies, procedures and requirements are adequate, they are not being uniformly enforced, and frequently are not followed by employees.

- Enforcement of safety rules by line management was inadequate or selective.

  Management did not consistently enforce industrial safety rules. They also were less than effective in ensuring that the industrial safety rules and procedures of various site organizations were consistent among such organizations. This inconsistency led employees to erroneously conclude that enforcement was selective.

  Based on the evaluation of the employee concerns within this subcategory, management had not been fully effective in its support of the Industrial Safety Program. This lack of support has resulted in an increased probability of incidents and injuries at TVA's nuclear plants.

The subcategory evaluation concluded that the identified problems resulted from four deficiencies, which were generic to the safety program at WBN, SQN, and BFN:

a. A lack of understanding and acceptance by management of industrial safety philosophy, policy, and principles. The basic strategy for industrial safety excellence is to manage industrial safety through the line organization. The success of the industrial safety program is directly related to commitment, leadership, and drive of senior management.

b. An inadequate amount of management involvement in the industrial safety program. Effective safety management requires continual identification, review, action, follow-up, modification, auditing, etc.

c. Industrial safety rules, procedures, and practices that were inadequate and inconsistently enforced. Lack of enforcement tells employees that management does not really believe in the established rules.

d. Line management failed to adequately assume responsibility for the management of the industrial safety program.

As a result of the evaluation of the Office of Nuclear Power industrial safety program, the Contractor made 10 recommendations to correct the generic deficiencies. These recommendations comprise a formal, structured program to manage safety on an ongoing basis as opposed to reaction to problems. A key principle is line management

responsibility and safety staff support. The recommendations are described in Appendix D of the category report and in the Safety Management Evaluation report. The 10 elements (recommendations) of the formal program include:

1. Safety Policy
2. Central Safety Committee (CSC)
3. CSC Subcommittees
4. The Safety Organization
5. Safety Inspections
6. Safety Goals and Objectives
7. Safety Supervisors' Role
8. Injury Investigation
9. Workers' Compensation
10. Selection of Supervisors

Watts Bar and Browns Ferry Nuclear Plants are adopting and implementing the recommendations. Management at Sequoyah Nuclear Plant has committed to begin implementing these recommendations within three months following the start-up of unit 1 reactor.

2.0 Protective Equipment Subcategory (Report 90400)

This subcategory addressed those employee concerns which raised issues about the adequacy, availability, and use of personal protective equipment. The major issues involved the establishment of a 100 percent eye protection program at Watts Bar Nuclear Plant in April 1985, the difference between plant and construction rules on acceptable shoes, and the inadequate and inconsistent enforcement of the personal protective equipment rules by supervision.

The 34 employee concerns within this subcategory were grouped into six unique issues. The evaluation determined that the following four issues were <u>not substantiated</u>:

- Hardhats and safety glasses should not be required to be worn at all times.

  The current procedure of requiring head and eye protection decreases the risk that employees will be injured on the job. The benefits obtained as a result of this procedure outweigh employee objections.

- Safety glasses obstruct vision.

  Safety glasses available on site at Watts Bar Nuclear Plant are of good quality, and do not obstruct vision.

- The site does not have an adequate supply of safety glasses or safety belts, and gloves are not always issued.

There was an adequate supply of safety glasses, safety belts, and work gloves available to employees.

- Personal protective equipment for sandblasting operations is inadequate.

  Existing personal protective equipment for sandblasting is available and is adequate.

The investigation of this subcategory determined that the following two issues were partially or fully substantiated:

- The enforcement of personal protective equipment rules is inconsistent among Annual, Trades and Labor employees, and between the Division of Nuclear Construction and other Office of Nuclear Power organizations.

Because the two site organizations (plant vs. construction) had different rules on the use of personal protective equipment (such as allowable footwear), employees working in the same area had differing requirements. This issue was resolved through the corrective actions developed by the Management of Safety subcategory. Site management committed to develop consistent, site-wide industrial safety procedures, and to enforce these procedures.

- Employees fail to use portable welding shields when welding, and overhead protection was not provided in the unit 2 annulus area at Watts Bar Nuclear Plant.

The Division of Nuclear Construction will obtain and install roofing over scaffolding in those areas where work is being done directly overhead. They also will increase the inspections of such areas and require that tools be properly tied off or stored when not in use. It was determined that portable welding shields were properly utilized.

In summary, the conclusions reached by this subcategory are that (1) the site has an adequate supply of good quality personal safety equipment, but that (2) site management did not ensure that personal safety equipment rules were uniform and understood by all site employees.

3.0 Life Safety Subcategory (Report 90500)

This subcategory addressed employee concerns involving provisions for emergency egress from plant areas. The specific issue in most of the employee concerns is that two remote and unobstructed means of egress are not always provided to allow safe emergency exit.

The 21 employee concerns within this subcategory were subdivided into eight issues. Of these, the following five issues were not substantiated:

- **The radiochemistry laboratories at Watts Bar and Sequoyah Nuclear Plants are a life safety hazard because they do not have two remote exits.**

  It is true that the laboratories do not have two remote exits. However, management at both plants had implemented both engineering and administrative controls prior to this investigation that resulted in compliance with Life Safety Code requirements.

- **The large air lock doors on elevation 713 of the auxiliary building at Watts Bar Nuclear Plant could malfunction, blocking a main egress route.**

  While the operation of these doors does pose a potential hazard, they do not violate Life Safety Code requirements since an alternate means of egress is available through the adjacent radiochemistry laboratory.

- A personnel hatch needs to be installed in the top of the reactor pressurizer housing at Watts Bar Nuclear Plant to permit emergency egress.

  Existing administrative controls over work within this area are adequate to satisfy Life Safety Code requirements, and to provide adequate protection for workers within this area.

- Equipment doors within the turbine building at Browns Ferry Nuclear Plant are locked, blocking an emergency escape route.

  These doors are not intended to serve as an emergency exit. There is a personnel exit door located within fifteen feet of each set of equipment doors that serves as the emergency egress route.

- There is no second means of egress past the safety relief valves at Watts Bar Nuclear Plant.

  Existing administrative controls involving work within this area are adequate to satisfy Life Safety Code requirements, and to provide adequate protection for workers within this area.

The following three issues were determined to be partially or fully substantiated:

- The Unit 2 pipe chase was unsafe because of only one exit.

  The evaluation confirmed that the issue about life safety in the Watts Bar Nuclear Plant unit 2 pipe chase was fully substantiated at the time the employee concerns were expressed. Although the pipe chase was properly designed with two remote exits, the situation changed in January 1985, when the Unit 1 Security Plan was

implemented. At that time both exits were locked, and the only entrance and exit to the three-elevation pipe chase was through one temporary opening. A great deal of work was being conducted in this area during this timeframe.

This condition, which did not meet the National Fire Protection Association Life Safety Code requirements for two remote exits, remained until February 1986, when management at Watts Bar Nuclear Plant agreed to post a Public Safety Officer at each door when employees are working within the area. In the event of an emergency these officers could unlock the doors and allow egress from the area. Since the problems which gave rise to the employee concerns no longer exist, no corrective action was necessary.

- Emergency exits and routes are not clearly marked.

  This issue is substantiated in certain plant areas such as the pipe chase, the inside of the reactor pressurizer housing, and in the annulus. Management has recognized this problem and a Design Change Request has been issued to provide additional or improved exit markings throughout the plant.

- There is no second means of exit from the men's locker room.

  The men's locker room on elevation 729 of the Service Building did not meet Life Safety Code requirements. A Design Change Request and a workplan have been issued to install a second exit.

The conclusions reached by this subcategory were that (1) life safety considerations were not always incorporated at the design stage thus requiring management to provide additional safeguards in the form of design changes and/or administrative controls, (2) decisions regarding security were sometimes made without adequate consideration of life safety, and (3) although existing administrative and/or engineering controls can and are being provided to meet life safety requirements, employees are not always aware of these measures.

No specific unresolved problems were identified by this subcategory. However, it was determined that plant employees do not adequately understand life safety requirements. In order to address this problem, the plant will revise the monthly industrial safety bulletin to include a section on emergency egress requirements and administrative and/or engineering controls as applied to confined or concealed plant areas. Many of the problems addressed by this subcategory relate to the design process in place when Watts Bar and Sequoyah Nuclear Plants were designed. This process now adequately addresses Life Safety considerations.

4.0 Electrical Subcategory (Report 90600)

This subcategory addressed issues involving the safe use of electricity and electrical equipment. The issues raised within this subcategory involved possible National Electrical Code violations, improper procedures, and lack of adequate management control.

The 31 employee concerns and safety suggestions contained within this subcategory were subdivided by common attributes into ten issues. The following six issues were determined to be not substantiated:

- Shock hazards exist within the plant.

  Existing electrical maintenance procedures and programs and work practices are adequate to protect employees from shock hazards.

- The TVA method of tagging out electrical switch boxes as opposed to locking is unsafe.

  The TVA method of tagging out is standard practice in the power generation industry and provides adequate employee protection.

- 480 volt outlets within the plant do not have proper disconnect switches.

  These outlets within the plant are designed to permit full-load disconnects as part of the plug design. In addition, these outlets do have panel-mounted disconnects.

- Pendant-type cranes do not have proper wall-mounted disconnects.

  These cranes are not required to have wall-mounted disconnects within reach of the operator. The "stop" button on the control pendant is a "fail-safe" disconnect.

- Welding leads are hazardous due to poor maintenance.

  Welding leads were in good condition. Existing maintenance procedures and programs are adequate.

- Electrical supply transformers and temporary transformer trailers are unsafe.

  Electrical supply transformers and temporary transformer trailers were in good condition.

The following four issues were determined to be partially or fully substantiated:

- Temporary lighting within the plant is potentially unsafe and is not adequately maintained.

  While the existing procedures for the routine inspection and maintenance of temporary light stringers, service cords, and extension cords are adequate, there was a lack of management control to ensure the implementation of these electrical maintenance procedures. There was a lack of enforcement of existing site standards and requirements for such temporary wiring and lighting.

  In addition, the policy of requiring bulb guards on plastic-coated bulbs in use at Watts Bar Nuclear Plant was unclear and inconsistently applied.

  Management at Watts Bar Nuclear Plant has committed to (a) upgrade the electrical inspection program, (b) ensure that qualified personnel are assigned to electrical maintenance functions, (c) hold line management accountable for the enforcement of existing electrical maintenance policies and procedures, and (d) develop a site-wide temporary wiring/lighting policy. They also committed to ensure that all bulbs, including plastic-coated "shatter proof" bulbs would be guarded in accordance with applicable National Electrical Code requirements, and that only National Electrical Code-approved materials be used on site.

- Employees are required to drill into concrete structures without adequate protection against electrical shock, and without the assistance of a "wall-survey."

  This issue was determined to be partially substantiated. Both the plant and construction organizations at Watts Bar Nuclear Plant had adequate procedures for drilling into concrete structures containing electrical circuits. In addition, they both had obtained or were in the process of obtaining equipment which could identify conduit-encased electrical circuits within concrete to protect an individual from accidentally drilling through the conduit into a live circuit. However, neither organization was fully aware of the existence of such equipment on site, and neither procedure contained guidelines on the use of such equipment.

  Watts Bar management committed to revise the existing "workplan" procedures to identify and quantify the use of wall scans and shock protection equipment. These procedures would also be revised to ensure that the individuals responsible for conducting such work would be aware of both existing available protective equipment and the results of any "wall survey" before commencing such work.

- There is a lack of permanent lighting or adequate permanent lighting in certain plant areas.

  This issue was substantiated. The major part of this issue involved the lack of permanent lighting in the condensate demineralizer tank rooms at Watts Bar and Sequoyah Nuclear Plants.

When Sequoyah Nuclear Plant was designed, no permanent lighting was thought to be needed within the condensate demineralizer tank rooms due to expected radiation levels, and since the system was expected to be relatively maintenance-free. Operating experience has now shown that the area is not as radioactive as was anticipated, and that the system does require periodic inspection and maintenance. The total lack of permanent lighting makes work within this area unnecessarily hazardous.

Sequoyah Nuclear Plant will address this problem by conducting a formal evaluation to determine if permanent lighting is required within the condensate demineralizer tank rooms. This evaluation will be completed within six months following startup of reactor unit 1.

The similar area at Watts Bar Nuclear Plant was designed and built with adequate permanent lighting. However, as a result of this investigation, it was determined that the means of access to the demineralizer tanks was inadequate to permit inspections to be conducted in a safe manner.

While unrelated to the lighting issue, this problem was reported and resulted in the issuance of a Maintenance Request to install stairways and work platforms within each of the tank rooms.

- No action was taken to correct an electrical problem identified by a winning safety suggestion at Browns Ferry Nuclear Plant.

  This issue was partially substantiated. Although the suggestion identified a potential electrical hazard, nothing was done to correct this problem. This inaction resulted from a deficiency in the plant's safety suggestion program. The plant recognized and corrected this deficiency and has addressed and resolved the problem identified by this employee concern.

The major conclusions reached within this subcategory report are (1) that existing electrical maintenance procedures and policies are adequate, but that (2) management did not always ensure that these procedures are enforced.

5.0 Design Subcategory (Report 90700)

The design subcategory addressed employee concerns involving unsafe, or perceived unsafe plant working conditions which resulted from the design process. The 23 employee concerns within this subcategory were divided into five issues.

The following three issues were <u>not substantiated</u>:

- Work within certain highly congested plant areas is unduly hazardous.

This evaluation determined that, although certain plant areas are very congested, existing administrative controls, such as procedures governing work within confined and concealed plant areas, provide adequate employee protection.

- A purge air valve within the unit 2 annulus at Watts Bar Nuclear Plant blocks a walkway and is hazardous.

  This issue was not substantiated. This valve, and the identical valve in unit 1, do partially block a walkway. However, the valve operation does not pose a significant safety hazard based both on the nature of the valve movement, and on the very infrequent employee exposure to such motion. In addition, there are alternate routes of egress past these valves.

- Working near main steam lines within the plant is hazardous.

  The main steam lines do not pose an unsafe condition to permanent or transient work locations. Main steam lines within the plant are designed to meet applicable industrial safety codes, standards, and requirements.

The following two issues were determined to be substantiated:

- The method employed to remove and reinstall the main steam relief valves at Browns Ferry Nuclear Plant is unsafe.

  The issue concerning the method utilized to remove and reinstall the main steam relief valves at Browns Ferry Nuclear Plant was determined to represent a significant potential industrial safety hazard. These valves, which serve to remove excess pressure from the reactor during accident conditions, weigh about 1380 pounds each. All 13 valves for each unit must be removed from the drywell area, inspected, and reinstalled during each scheduled outage. The current means of removing these valves from this congested area requires that the valves be swung between adjacent pivoting "jib" cranes using chain falls. This operation must be repeated up to four times before a valve can be lifted out of the drywell, and must be repeated to reinstall the valves. This method of handling these valves poses a high degree of risk that a serious accident may occur. This problem has been recognized by plant management for several years.

  The management at Browns Ferry Nuclear Plant will incorporate into Mechanical Maintenance Instruction - 13 a specific rigging procedure with sufficient detail to safely remove the main steam relief valves. Long term, two additional jib cranes will be added and access hatches will be installed in the grating to facilitate the transitions of the valves to the lower levels.

- The carbon dioxide fire protection system is hazardous.

The issue involving the safety of carbon dioxide fire protection systems was determined to be substantiated. The Office of Nuclear Power has initiated efforts to replace CO2 fire protection systems in the nuclear plants. In the interim period, administrative controls will be used to reduce the potential exposure.

The conclusions reached by the subcategory report are that (1) the design process that was in place when Watts Bar and Sequoyah Nuclear Plants were designed did not always adequately address personnel access as a design consideration, (2) management has been effective in correcting and/or mitigating hazards associated with working in congested areas protected by carbon dioxide fire systems, (3) management has been less than effective in communicating with employees concerning the existence and purpose of such engineering and/or design controls and safeguards, and (4) management at Browns Ferry Nuclear Plant has failed to correct an identified, potentially serious industrial safety problem associated with the removal of the main steam relief valves.

6.0 Emergency Equipment and Plant Response Subcategory (Report 90800)

This subcategory contained employee concerns which questioned the ability of plant personnel to respond promptly and correctly to emergencies, both medical and fire. It also included employee concerns about the adequacy of the emergency equipment available for use by plant personnel.

The 28 employee concerns within this subcategory relate specifically to Watts Bar Nuclear Plant and were subdivided into eight issues. The following four issues were determined to be <u>not substantiated</u>:

- Fire fighting equipment at the plant is not available or is not maintained.

  The plant has adequate, well maintained fire fighting equipment.

- The response time of the Emergency Medical Response Team is too slow; members are not competent.

  The Emergency Medical Response Team (EMRT) is generally able to respond to most accident scenes within four minutes of notification. While this is considered adequate, program enhancements and additional member training programs are under consideration.

- Rescue of injured employees from highly congested plant areas such as the annulus would be "impossible."

The issue which questioned if an employee could be rescued from congested plant areas was determined to be not substantiated. The Emergency Medical Response Team is trained in difficult rescue techniques and has adequate rescue equipment to perform such rescues. However, certain deficiencies in the program were identified. These identified problems were: (1) no means currently exists to permit a caller to easily identify his or her location when reporting an accident or injury, (2) while Emergency Medical Response Team members are trained to conduct rescues from difficult areas, not enough actual rescue drills are performed in such congested areas, (3) formal records of emergency medical responses are not maintained, and (4) all employees working in the annulus and other congested plant areas are not aware of existing procedures for working in such confined and concealed areas.

Management responded to these identified program deficiencies by stating that an evaluation would be done of the most practical and appropriate means of posting information at each phone within the plant to allow the caller to easily identify his or her location. Additional realistic drills will be conducted involving medical emergencies in difficult-to-access locations within the plant, and the Emergency Medical Response Team procedure will be revised to include a requirement for a documented evaluation of emergency medical responses. The problem concerning some employee's lack of knowledge about existing procedures will be resolved by ensuring that site personnel working within such confined and congested plant areas are aware of procedures governing work within such areas.

- Site evacuation drills and evacuation plans are not adequate.

  All sites have approved radiological emergency evacuation plans. Routine site evacuation drills are not required.

The following four issues were considered to be partially or fully substantiated:

- Self contained breathing apparatus (SCBA devices) should be made available to plant employees throughout the plant.

  There are adequate numbers of self-contained breathing apparatus within the plant. This equipment is intended for use only by trained and qualified personnel. However, the issue involving emergency breathing apparatus is substantiated as it applies to the use of "emergency escape" devices such as the Robert Shaw 5-Minute Air Capsule. While these devices are adequately deployed throughout the plant and employees are adequately trained in their use, the current instructions describing their use are inadequate. The plant responded to this identified problem by stating that the current Hazard Instruction which described the use of personal emergency escape devices would be revised to address all types found in the plant.

- Emergency eyewash and shower facilities may not be adequately provided or may be improperly located.

  This issue was determined to be partially substantiated. While the problem areas addressed by the employee concerns were not substantiated, the site requirements for the placement of eyewash stations and/or showers were determined to be unclear.

  Hazard Instructions which address conditions or situations which require the use of an emergency eyewash or shower station will be revised. These revisions will clarify when and where such eyewash and shower facilities are required.

- Emergency lighting has not been installed in the stairwells in the turbine building as required by Life Safety Code provisions.

  The substantiated issue which involved the installation of emergency lighting within the turbine building stairwells did not require additional corrective action since the lighting is scheduled to be installed under a current Engineering Change Notice.

- The wheeled stretcher in the construction ambulance and the stretcher in the plant ambulance are not interchangeable.

  These stretchers had been modified prior to this investigation to be compatible with both ambulances.

The conclusion reached from the evaluation of the issues within this subcategory is that additional communication is needed to inform plant personnel about the existence of emergency procedures, policies, and work instructions, and about the availability and use of personal emergency escape equipment available on site.

7.0 Walking and Working Surfaces Subcategory (Report 90900)

This subcategory addressed those employee concerns and safety suggestions which dealt with the potential for employees to be injured by tripping or slipping or by falling from elevated work locations such as scaffolds, ladders, or floor openings.

The 54 employee concerns assigned to this subcategory were subdivided into seven issues. Six of the seven issues were determined to be not substantiated. These issues were:

- Guardrails are not provided at elevated work locations.

In those situations identified by employee concerns or observed during the evaluation, guardrails were properly installed where employees were exposed on a regular basis. Alternative means of fall protection (bodybelts and lanyards) were required in those situations where personnel access was infrequent. Access surveys are used to identify areas having potential need for guardrails.

- Scaffolds are not properly installed, inspected, or maintained.

  The scaffold program at Watts Bar Nuclear Plant is functioning as intended. Scaffolds within the plant are in good condition, and are properly installed and adequately maintained.

- Walking/working surfaces are not properly installed, maintained or protected to prevent employees from slipping.

  These surfaces are being properly constructed and maintained, and are free from tripping hazards.

- Floors and aisleways are not being adequately maintained free from tripping hazards and obstructions.

  Floors and aisleways are being adequately maintained free from tripping hazards and obstructions.

- Floor openings are not properly guarded.

  Adequate procedures are in place, and are being implemented to protect employees from falls through unguarded floor openings.

- Catwalks and grate decks are not being provided in sufficient numbers to permit safe access.

  Areas requiring additional catwalks and/or grate decks are identified through a formal Plant Access Survey. However, the Plant Access Survey program did not have a written procedure to track, identify, and update future access needs. Plant management has addressed this problem by assigning the plant's Safety Section the responsibility for revising the Plant Access Survey procedure.

The only substantiated issue within this subcategory was that ladders are not always properly provided, installed, inspected, or maintained. This issue was addressed in two parts: one dealing with portable ladders, and one dealing with fixed, permanent ladders.

The portable ladder program at Watts Bar Nuclear Plant was found to be adequate in scope, but not functioning as intended. Although existing procedures on ladder use clearly state that ladders are to be returned to their proper storage location following usage, this is not always done.

Since ladders within the plant are used by several organizations, this has led to "shortages" during periods of high activity. This condition encourages employees to commit unsafe acts such as climbing on fixed equipment (pipe, seismic supports, etc.) rather than searching for an available ladder.

Watts Bar management addressed this problem by committing to (1) place greater emphasis on existing ladder use procedures, (2) conduct a supply/demand evaluation of all portable ladders in use at the site and adjust inventory as required, and (3) pursue a site-wide ladder policy.

Fixed ladders at Watts Bar Nuclear Plant were found to have numerous ladder rung obstructions. Such obstructions, if in front of or near to a ladder rung, could prohibit the proper placement of the foot on a ladder rung, thereby increasing the risk of a fall. This condition constitutes noncompliance with Federal Occupational Safety and Health Administration standards which dictate minimum allowable clearances. These obstructions consisted of both small-diameter "field routed" pipe and instrument lines, and large diameter "design routed" pipe.

This condition is being addressed by conducting a review of all existing permanent ladders to identify, evaluate, and correct deficiencies. The Division of Nuclear Engineering will assist the plant in correcting these deficiencies. The Division of Nuclear Engineering will develop a procedure on mandatory industrial safety design requirements, and will also develop a design standard which will be used to reference industrial safety requirements in design input documents. In addition, a line item in the Engineering Change Notice checklist will be revised to ensure that industrial safety design requirements are properly incorporated in all future work.

The conclusions reached as a result of the investigation and evaluation of the employee concerns within this subcategory are that (1) walking and working surfaces are being effectively managed at Watts Bar Nuclear Plant, however, (2) management has not effectively enforced existing procedures governing the use of portable ladders at Watts Bar Nuclear Plant, and (3) permanent ladders within the plant were allowed to exist with numerous ladder rung obstructions.

8.0 Unsafe Conditions Subcategory (Report 91000)

This subcategory deals with those employee concerns and safety suggestions addressing general unsafe working conditions which developed in day-to-day plant operations or activities performed in the workplace. These employee concerns and safety

suggestions include those situations that have the potential to injure employees but are not otherwise specifically classified in the other nine industrial safety subcategory reports.

Due to the broad spectrum of topics covered by this subcategory report, the 59 employee concerns and safety suggestions were divided into a total of 15 issues, several of which contained only one unique concern.

This subcategory contained a large number of safety suggestions (29) that were reported through the existing safety suggestion programs at Watts Bar Nuclear Plant and Sequoyah Nuclear Plant before the February 1, 1986 commencement of the Office of Nuclear Power's Employee Concerns Program. The great majority of these suggestions had been investigated and resolved through established channels at the plants. Since each of these safety suggestions was about a specific, unique problem, they were grouped, by originating plant site, into two issues. The intent of the investigation of these issues was (1) to determine if the site's industrial safety suggestion program was adequately and timely addressing all submitted safety suggestions, and (2) if not, to identify program deficiencies, and to address unresolved safety suggestions.

The investigation and evaluation of this subcategory concluded that the following eight issues were <u>not substantiated</u>:

- Housekeeping is inadequate.

  Housekeeping requirements, as they related to industrial safety considerations (prevention of tripping/slipping hazards, proper storage of flammable liquids, etc.) were adequate.

- TVA vehicles speed on the site in violation of posted speed limits.

  Speeding was not a problem on the site. Public Safety periodically monitors traffic using a radar gun. Tickets are issued and disciplinary action can be taken for habitual violators.

- Crane operators are allowed to swing loads over crew shacks near the entrance to the turbine building.

  This issue was not substantiated. In the incident in question a pre-planning meeting was held to ensure the crane and loaded vehicle were placed so that loads were not carried over crew shacks.

- An exterior door is a safety hazard.

This exterior door was determined to be well maintained, and did not constitute a safety hazard.

- The brackets and control lights on explosive detectors (in the portal security area) are a safety hazard.

  These brackets and lights do not constitute a safety hazard.

- "Booby-traps" exist within the plant.

  Investigation concerning the issue on "booby-traps" revealed that one isolated incident had occurred in either 1981 or 1982, but that no such incidents had recurred since that time.

- The Watts Bar Nuclear Plant safety suggestion program does not result in the correction of unsafe conditions.

  The evaluation of the safety suggestion program at Watts Bar Nuclear Plant revealed that the program is functioning and is correcting reported unsafe conditions as intended.

- Flammable liquids are stored near the access portal and workplan booth on elevation 708 of the turbine building.

  This concern was not substantiated. Storage of flammable liquids is permitted in this area. However, the investigation of this issue revealed that too many flammable liquid storage cabinets were in the area. Those cabinets exceeding the permissible limit were removed. The plant also committed to publish flammable liquid storage restrictions in an industrial safety bulletin.

The following seven issues were determined to be partially or fully substantiated:

- Materials (bricks, compressed gas bottles, etc.) are not being stored safely on site.

  The investigation of this issue revealed that materials were being safely stored. The issue was partially substantiated because one concern within the issue reported that compressed gas bottles were being stored in a shed needing floor repairs. Repairs were made to this storage shed as a result of this concern prior to this investigation.

- The traffic control system and lighting for some access roads and parking lots for Division of Nuclear Construction personnel are inadequate.

This issue was determined to be partially substantiated. The current method for controlling traffic has minimized congestion and expedited peak traffic flow. However, burned out lighting in the second shift parking lot created an unsafe condition. The lighting was replaced as a result of this investigation.

- Oxygen and acetylene headers are sometimes interchanged, and protective header caps are not being provided.

  The portion of the issue which addressed interchanging oxygen and acetylene headers was not substantiated. Acetylene cylinders and headers have left hand threads while oxygen cylinders and headers have right hand threads. That part of the issue concerning protective caps on headers was determined to be partially substantiated. At the time the employee concerns were expressed, gas headers within the plant did not have protective caps. These caps were installed in 1985 and are still in place.

- The air lock doors at elevation 713 between the service building and the auxiliary building are not adequately maintained, do not have safety switches, are sometimes inoperable, and open too fast.

  The investigation of this issue determined that it was substantiated. These doors are large and heavy, and represent a potential hazard to employees who must use the doors as an access route. Due to continued mechanical problems and employee complaints, several engineering and administrative controls were attempted to make the doors safer. These controls did serve to decrease the probability of injury, but did not improve the doors' reliability. In March of 1986, these doors were taken out of service and blocked open. The Division of Nuclear Engineering and the manufacturer are currently working to redesign the doors.

- The unit 2 scrap metal drop chute is hazardous due to falling/bouncing materials.

  This issue was substantiated, however due to the subject concern, the chute was redesigned in 1985 adding a wooden barrier and a deflector shield. This drop chute does not now pose a significant hazard.

- The Sequoyah Nuclear Plant safety suggestion program does not result in the correction of unsafe conditions.

  This issue was partially substantiated. The basic safety suggestion program was determined to be functioning adequately and as intended. However, one safety suggestion which was forwarded to TVA's Nuclear Safety Review Staff in 1986 had not been adequately resolved. The plant safety staff had issued a Maintenance Request to resolve the issue, but it was cancelled without their knowledge, and without completing the required corrective actions. Further investigation revealed that the existing procedure for cancelling Maintenance Requests did not contain

specific provisions for cancelling requests issued by the plant industrial safety staff. The plant resolved these two identified problems by (1) reissuing and completing the original Maintenance Request, and (2) by revising the existing procedure for cancelling Maintenance Requests to provide feedback to the work request originators as to why the request was cancelled.

- Browns Ferry Nuclear Plant management has not fully implemented a winning safety suggestion concerning improving lighting, improving access roads, and installing handrails.

  This issue was fully substantiated. The safety suggestion, which was received in October of 1985, requested that improvements be made to access roads and existing lighting on intake gate structure No. 3. and that handrails be installed. A hazard assessment conducted on the problem identified by this concern indicated that there is employee exposure to an unsafe condition that could produce a serious injury. However, the Design Change Request issued to do the necessary work to resolve the concern was tied to a future unit 3 outage cycle.

  This unnecessarily delayed the correction of a known unsafe condition. The plant resolved this identified problem by assigning a higher priority to the completion of the necessary work to resolve the concern.

The conclusion reached by this subcategory evaluation is that management, with some exceptions, has been effective in resolving valid unsafe conditions reported through the site safety suggestion programs. However, line management has not been fully effective in performing their responsibility to conduct routine workplace inspections. As a consequence, unsafe conditions have not been promptly recognized and corrected.

9.0 Defective/Inadequate Equipment Subcategory (91100)

This subcategory report dealt with those employee concerns involving defective equipment, equipment which could not be safely used, or equipment which was unsafe due to inadequate or improper maintenance.

The 15 employee concerns within this subcategory were divided into six issues. The investigation of this subcategory revealed that none of the issues were substantiated. The six issues are as follows:

- Forklifts are not properly maintained.

  Forklifts in use at Watts Bar Nuclear Plant were determined to be properly maintained.

- Portable power tools are not properly maintained, or do not have proper guards.

Portable power tools were judged to be in good operating condition and properly maintained. Portable power tools are issued with proper hand and grinding wheel guards.

- Vises in the plant are not properly maintained.

  Inspections of vises in the plant revealed no industrial safety problem.

- Portable yard ramps cannot/are not being moved safely.

  This issue was not substantiated at the time of this investigation. As a result of the original subject concern, tow bars had been obtained by the site to allow these ramps to be moved in a safe manner.

- Trucks and heavy equipment used by the Division of Nuclear Construction are not maintained in safe operating condition.

  The investigation of this issue revealed that existing maintenance activities were adequate to keep the equipment in safe operating condition.

- Sandblasting equipment is not properly maintained.

  Sandblasting equipment at Watts Bar Nuclear Plant was also determined to be in safe operating condition.

  The conclusion reached by this subcategory report is that equipment and tools in use at Watts Bar Nuclear Plant are maintained in safe operating condition.

10.0 Industrial Hygiene Subcategory (Report 91200)

This subcategory addressed employee concerns involving potential health hazards present in the work environment. It contained the largest number of employee concerns (98) in the Industrial Safety Category, and was divided into 11 issues.

The following seven issues were <u>not substantiated</u>:

- Employees are exposed to various hazardous materials or to the improper disposal of hazardous materials.

  This issue which involved exposure to hazardous materials (other than those subsequently addressed) or to improperly dumped hazardous materials was not determined to be substantiated. Existing site controls and procedures are adequate to prevent the accidental exposure to hazardous agents and to prohibit improper dumping of hazardous materials.

- **Employees stay, or are "encouraged" to stay, too long in high temperature plant areas.**

  No evidence could be found to support the contention that employees stay, or are "encouraged" to stay, for long periods in high temperature plant environments.

- **Oxygen monitors are improperly stored.**

  Oxygen monitors were properly maintained, calibrated, and stored.

- **Fiberglass cloth creates dust which is a health hazard.**

  Exposure to fiberglass fibers within the plant were measured to be two orders of magnitude below permissible exposure limits.

- **Miscellaneous (this issue is a grouping of several unique employee concerns about drinking water, toxic fumes, pest control, etc.)**

  The employee concerns within the "miscellaneous" issue were about minor perceived problems, none of which could be substantiated.

- **Employees are not adequately protected from asbestos exposure.**

  Although the issue about asbestos exposure contained nearly one-fifth of the employee concerns within this subcategory, none of the employee concerns were substantiated. Procedures exist, and are being adhered to at all of TVA's nuclear plants, which provide adequate employee protection from exposure to asbestos. Efforts are also underway to identify and clearly label insulation and other materials containing asbestos.

  Even though the asbestos issue itself was not substantiated, the investigation revealed that the asbestos exposure data base was incomplete. While the database included exposure data for asbestos workers, little data was available on "casual" exposure of employees who work around asbestos. This problem was transmitted to Watts Bar, Sequoyah, and Browns Ferry Nuclear Plants for resolution. The plants committed to monitor all asbestos removal operations and to coordinate such monitoring with TVA's Division of Occupational Health and Safety.

- **Compressed breathing air lines could be contaminated. Breathing air quality is not properly tested.**

  This issue was determined to be not substantiated. Both the service air outlets and the hoses used for breathing air are clearly tagged or otherwise identified as to their use. Daily inspection is required for all hoses in use over 24 hours. Compressed

breathing air quality is tested on a six month interval by the Industrial Hygiene Branch. Test records indicate that compressed breathing air meets all applicable quality standards.

The following four issues were determined to be partially or fully substantiated:

- Inadequate control of hydrazine allows numerous spills and leaks resulting in unnecessary employee exposure.

  This issue was determined to be substantiated when the employee concerns were addressed in 1985. Plant management recognized the problem, and has since developed procedures for handling hydrazine and hydrazine spills. The plant has also committed to place additional emphasis on plant operations and activities which use hydrazine.

- Polychlorinated biphenyls (commonly known as "PCBs") have been spilled or allowed to leak into the ground in switchyards and transformer storage areas, and are improperly stored.

  The issue was determined to be partially substantiated since spills have occurred. Areas contaminated by these known spills have been decontaminated and the PCB contaminated materials have been removed for disposal as a hazardous waste. Each plant now has spill prevention and control procedures and countermeasures in place to control polychlorinated biphenyls.

  Due to the recognized hazards posed by electrical equipment containing polychlorinated biphenyls, the Office of Nuclear Power will review all site procedures, and provide guidance to the plant sites as to the effectiveness of existing programs in dealing with polychlorinated biphenyls.

- Ventilation in the unit 2 reactor building at Watts Bar Nuclear Plant, and in the drywell at Browns Ferry Nuclear Plant, is inadequate.

  The investigation of this issue determined it to be substantiated as applied to ventilation in the drywell area at Browns Ferry Nuclear Plant. The problem in the drywell area is caused by residual heat, and is compounded by ambient outside temperature and by the confined nature of the area itself. The solution to the ventilation problem is through the current method of using both administrative controls to avoid heat stress, and providing auxiliary cooling. Ventilation problems identified at Watts Bar Nuclear Plant have been corrected.

- Noise levels are very high in the health physics dosimetry lab on elevation 708 of the turbine building at Watts Bar Nuclear Plant. Reactor coolant pumps are too noisy during operation.

That part of this issue pertaining to high noise levels in the health physics dosimetry lab area at Watts Bar Nuclear Plant was substantiated. The noise source is a bank of service air compressors beside the lab building. Sound level measurements taken in the area ranged from between 72 and 83 decibels (A-weighted). While these measurements do not substantiate possible hearing loss, they are high enough to make routine daily work within this area uncomfortable. At the time of this investigation intake silencers had been ordered and were on site for the three largest and loudest compressors. However, even though the condition continued to exist, these silencers had not been installed. The plant responded to this problem by installing these intake silencers.

The issue about the reactor coolant pumps startup noise was determined to be partially substantiated. While these pumps are quite large, and are very loud when operating, existing administrative controls require that hearing protection be worn in the area. The investigation did reveal that existing startup instructions did not adequately warn all personnel within the area prior to starting a pump. These instructions will be revised at Watts Bar and Sequoyah Nuclear Plants to require both a local verbal warning and an announcement over the plant's public address system prior to pump startup.

While no major problems were identified in the evaluation of this subcategory, the conclusion was reached that management has not been totally effective in communicating the relative hazards of chemicals and materials in the workplace to the employees. The large number of unsubstantiated employee concerns about asbestos is indicative of this problem. Management has also not been fully effective in ensuring that employees are aware of the various administrative and engineering control programs in place to mitigate employee exposure.

APPENDIX D
CONTRACTOR RECOMMENDATIONS

DuPont Company-Safety Management Services conducted an in-depth evaluation of TVA's management of the industrial safety program. This evaluation was conducted primarily at the Watts Bar Nuclear Plant, but encompassed both the Browns Ferry and Sequoyah Nuclear Plants, and the Office of Nuclear Power as a whole.

The resulting Safety Management Evaluation report was sent to management at the nuclear plant sites and was distributed within the Office of Nuclear Power. This report contained ten recommendations to improve management of the Industrial Safety Program. Although designed to be specific for the Watts Bar Nuclear Plant, these ten recommendations have generic applications at all Office of Nuclear Power sites. The following is a summary of these recommendations.

Recommendation No. 1: Consistent Industrial Safety Programs

The differences between industrial safety program statements between the plant operations organization and that of the Division of Nuclear Construction onsite at Watts Bar Nuclear Plant should be resolved. A workable, site-wide industrial safety program should be developed. The industrial safety program elements must then be given wide and effective communication by a series of group meetings held by each level of supervision. The purpose is to improve communication at all levels and reinforce supervisory commitment to the industrial safety policy.

Recommendation No. 2: Central Safety Committee

A Central Safety Committee is needed to ensure that industrial safety efforts are coordinated and guided on a site-wide basis and to establish industrial safety as a line management responsibility. The site director should chair the committee, with the project manager as vice-chairman. The committee is a decision making body which implements policy, determines the degree of adherence to policy, and develops plans and programs for improving adherence to policy.

Recommendation No. 3: Subcommittees

A system of subcommittees should be established to achieve the following purposes:

- Provide the Central Safety Committee with factual analysis.
- Involve appropriate subcommittee in developing recommendations for Central Safety Committee review.

- Broaden involvement by employees in development of industrial safety policies.

- Reduce the workload of Central Safety Committee members.

The formation of four subcommittees and one ad hoc subcommittee is recommended at this time. Membership on each subcommittee should total five to seven persons selected from a broad diversity of jobs at the site. The initial subcommittees are:

- Industrial Safety Program and Activities
- Industrial Safety Rules and Procedures
- Process Hazards Review
- Injury and Serious Incident Investigation
- Workers' Compensation (ad hoc)

Recommendation No. 4: The Industrial Safety Organization

The Central Safety Committee should be established as the basic framework for the organization for industrial safety. Each area of the site is tied into this organization, and each manager who is a part of the Central Safety Committee sets up an industrial safety organization covering his or her area. Membership in the Central Safety Committee ties area industrial safety organizations together and ensures a unified approach to industrial safety. By meeting on a regulary scheduled basis, each organization will raise the industrial safety consciousness of employees about all phrases of industrial safety: rules and procedures, audits, goals, and objectives.

Recommendation No. 5: Industrial Safety Inspections

A system of interlocking industrial safety inspections (audits) should be initiated. These audits should involve members of management at each level, together with an immediate subordinate, auditing employee work practices within the subordinate's area of responsibility on a regularly scheduled basis. These audits start with the site director and continue down the organizational structure to the first-line supervisor and his or her immediate supervisor.

Recommendation No. 6: Industrial Safety Goals and Objectives

Each section of the organization should establish industrial safety goals (injury performance statistics) and objectives (specific program activities). These goals and objectives must be more structured than in the past, and represent higher levels of performance and activity. Communicating the desired level of industrial safety performance is important to establish the appropriate expectations among members of the work force.

Recommendation No. 7: Industrial Safety Supervisor's Role

The industrial safety supervisor's job description should be altered to define more clearly the role as a supportive staff position. This definition, when communicated, will reinforce the basic concept that industrial safety is a line management responsibility.

Recommendation No. 8: Injury Investigation

Current injury investigations and reporting techniques must be revised because they involve unproductive effort and are not used as a means of achieving improved industrial safety performance. Injury investigation should be a joint effort of the injured person, other co-workers, several members of supervision, and a member of the plant industrial safety organization conducted under a nonadversarial atmosphere The purposes of these investigations are to:

- Get all the facts, so steps can be taken to prevent a recurrence.
- Build credibility for management's commitment to industrial safety.
- Cause line management to understand the short-coming in the organization that allowed the injury to occur.
- Develop line management commitment to corrective action.

Recommendation No. 9: Workers' Compensation

To underline the magnitude of workers' compensation costs, and to provide incentive for improvement, these costs should be charged to cost centers. Cost centers should be at least at the organizational level of project or site management.

The Division of Medical Services has an extremely important role in workers' compensation improvement. All injuries should be reported immediately to supervision and to the site medical organization for consideration of treatment. The site medical organization will furnish appropriate treatment and discuss the situation with private physicians as appropriate. To enable site medical personnel to interact with private physicians on an equal professional basis, the Office of Nuclear Power Nuclear Plants should each have their own onsite physicians.

Recommendation No. 10: Selection of Supervision

Improved selection procedures for first-line supervision are needed to help ensure that those selected have the potential to capably fill this important role. Present selection procedures are largely subjective and dependent upon personal

relationships between existing supervision and prospective candidates. These procedures should be substantially augmented by more objective criteria designed to achieve these goals:

- An improvement in the supervisory potential of persons selected.
- Improvement in employee moral as a result of an objective, open process.
- Development of avenues for the recognition of candidates from underrepresented, nontraditional sources.