

**FIGURE III-8  
NORTHERN STATES POWER COMPANY  
CORPORATE ORGANIZATION**

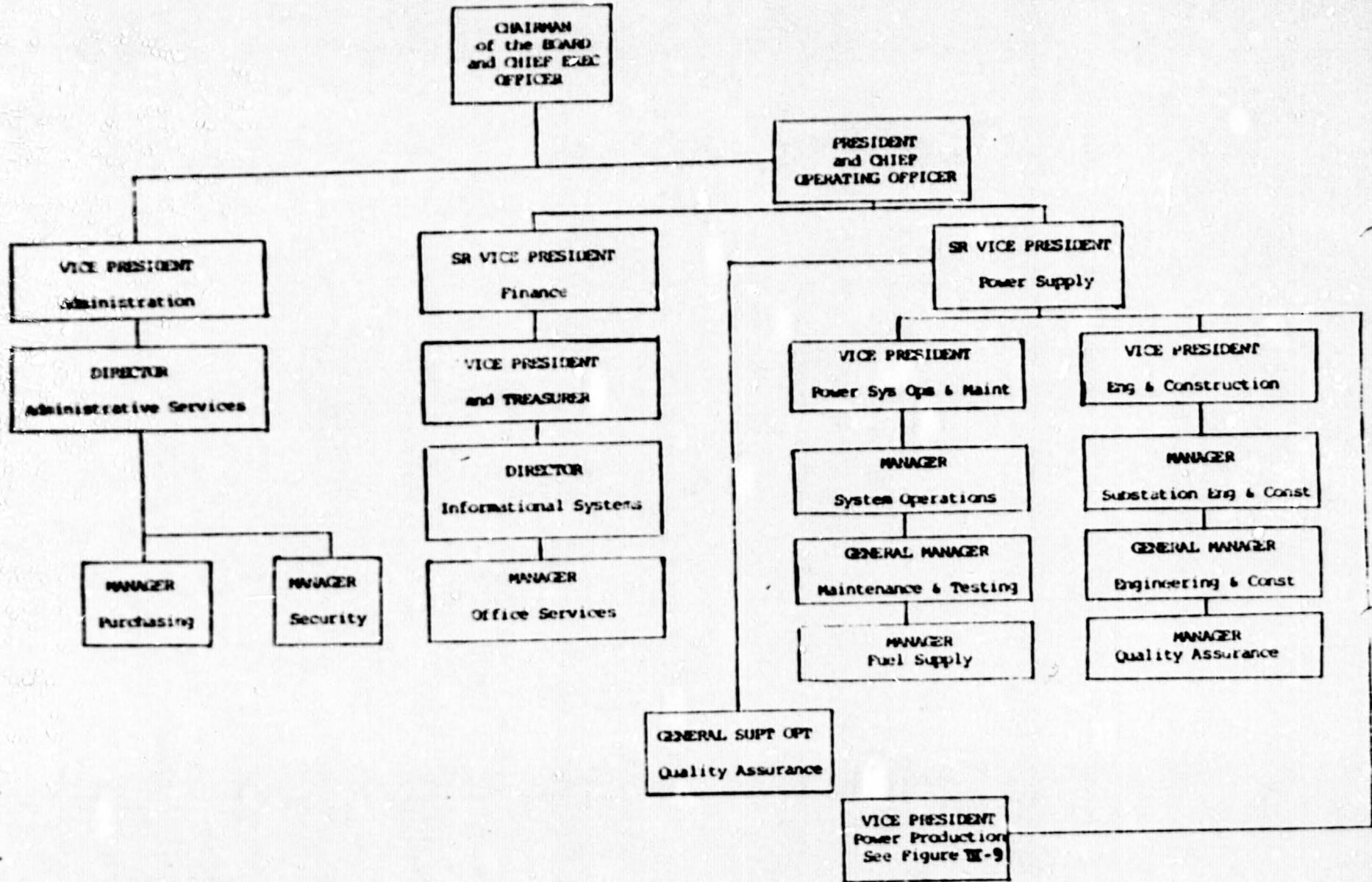


FIGURE III-9  
 NORTHERN STATES POWER COMPANY  
 POWER PRODUCTION ORGANIZATION

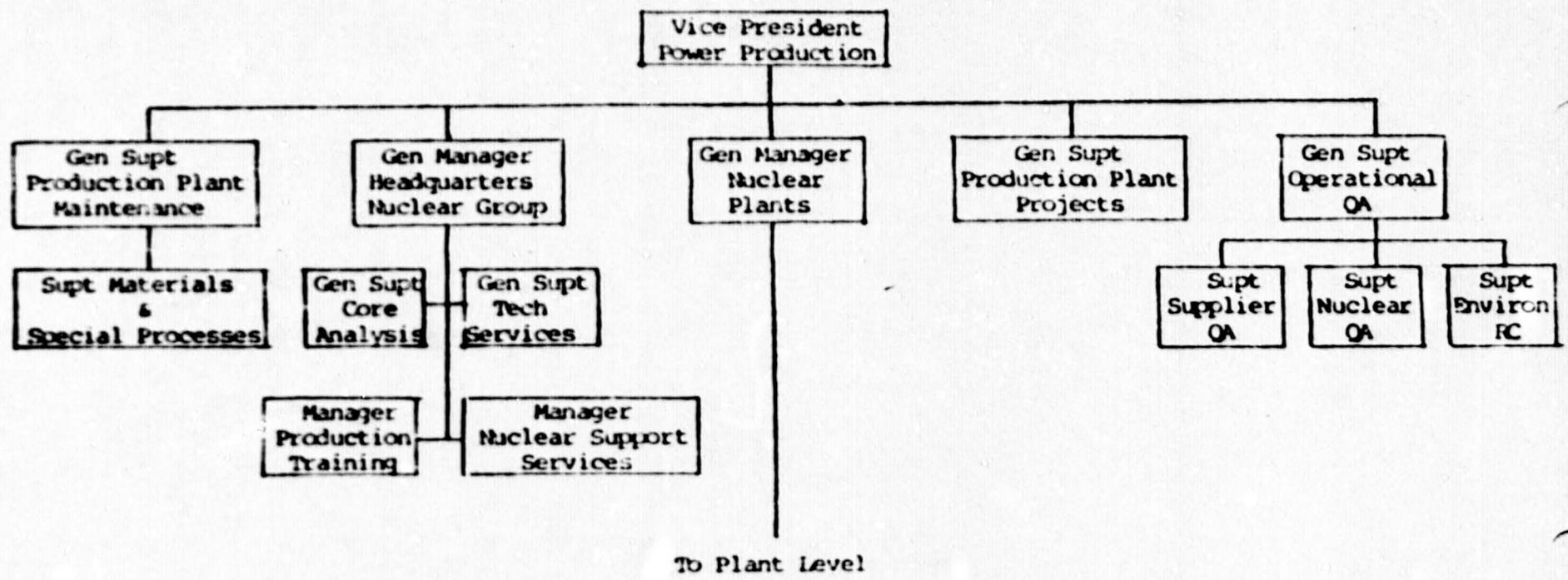


FIGURE III-10  
NORTHERN STATES POWER COMPANY  
NUCLEAR PLANT ORGANIZATION

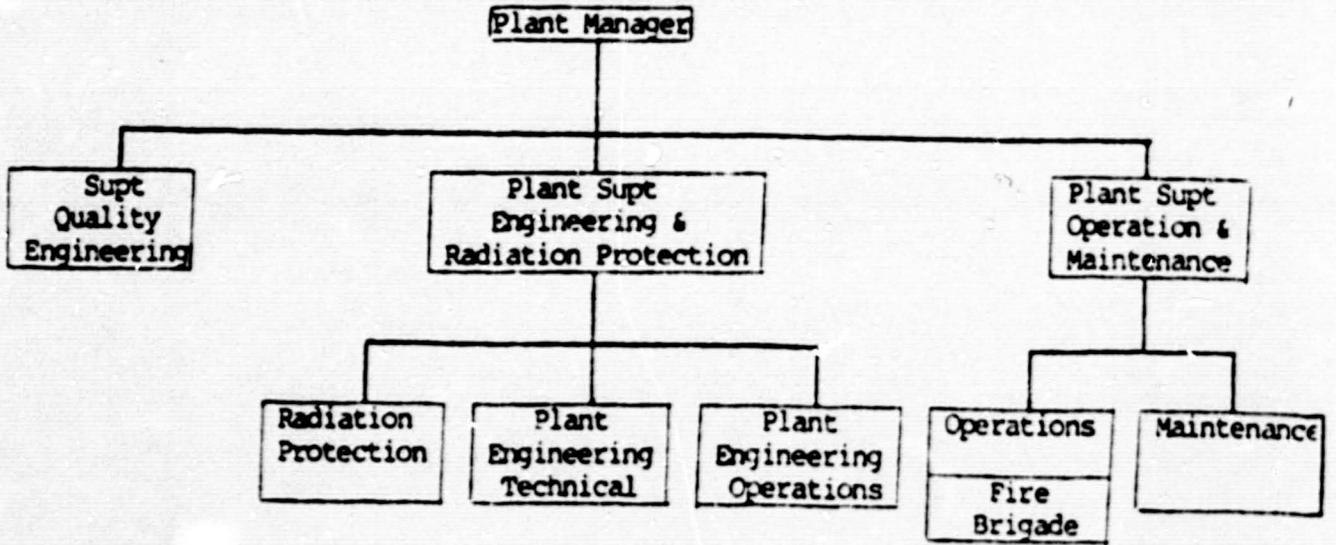
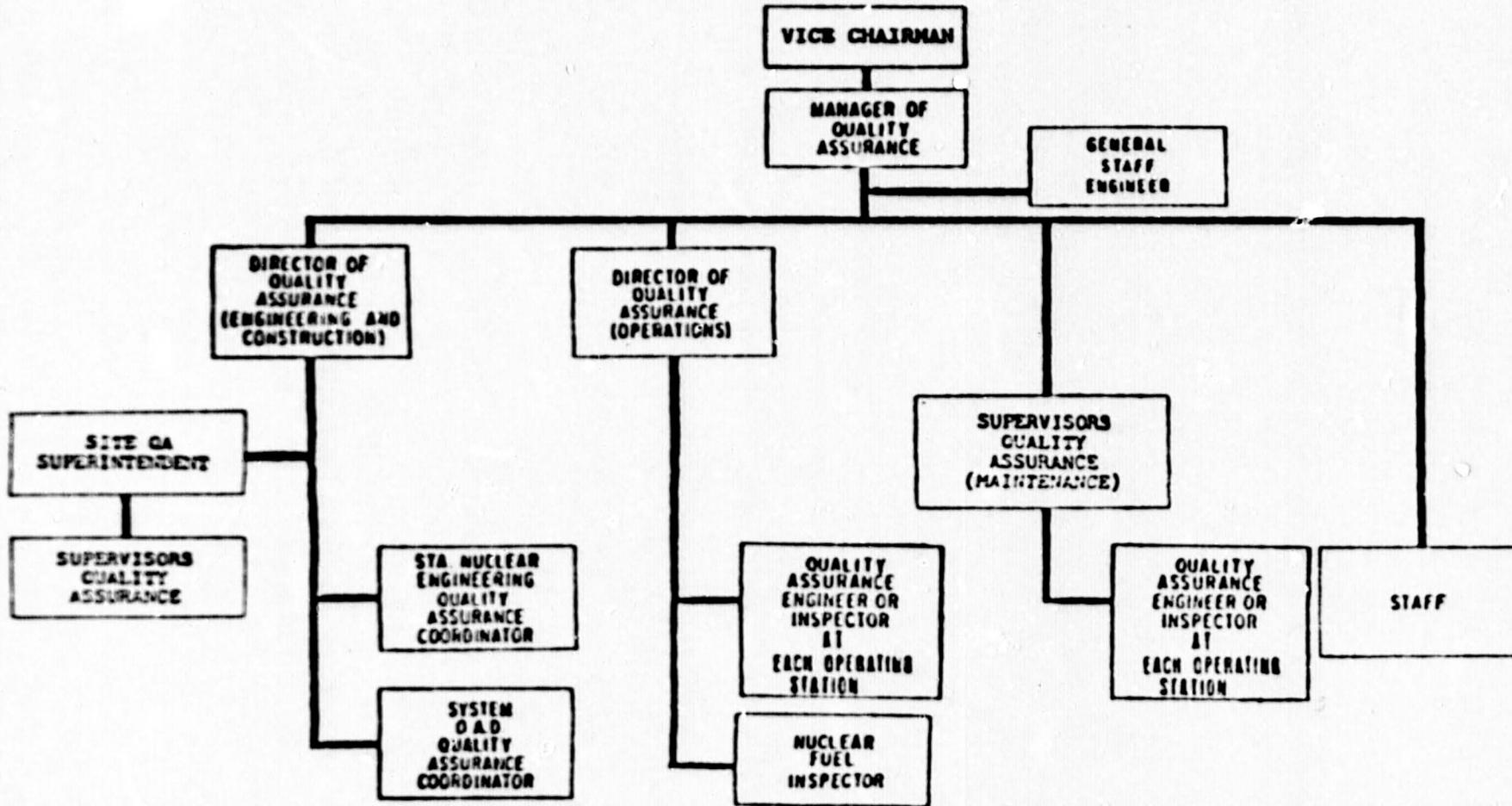




FIGURE III-12  
COMMONWEALTH EDISON COMPANY  
QUALITY ASSURANCE ORGANIZATION



#### IV. ALTERNATE METHODS FOR ORGANIZING QA WITHIN TVA

##### A. OPTION A

###### 1. Organizational Description

This option would have an organization essentially the same as the one that presently exists within the TVA organization. The QA units would report to line managers at the division level, both in EN DES and CONST and at the plant level and division level in NUC PR. QA staffs would report to the office managers in OEDC and POWER. This basic organization is schematically shown in figure IV-1.

###### 2. Advantages

°No disruption to existing organizations.

###### 3. Disadvantages

°There is no single manager in TVA responsible for QA.

°Fragmented QA programs.

°Excessive pressure on line managers responsible for quality performance and assurance.

°Potential problems at interface between organizational units.

°Potential exists for QA organizations to be dominated by line managers.

##### B. OPTION B

###### 1. Organizational Description

This option would basically retain the QA staffs to interface with EN DES, NUC PR, and CONST as presently exists but have these QA organizations report to a level within the office above the division level. Office audit staffs would also report at this same level above the division level. This basic organization is schematically shown in figure IV-2.

###### 2. Advantages

°Minimum disruption to existing organizations - Only involves the reporting chain of the QA branches in the three divisions.

°Decreased pressure on division managers.

°Decrease potential for QA organization to be dominated by line managers.

°Increase effectiveness of interfacing between divisions within OEDC in assuring uniform interpretation and implementation of QA policies and requirements.

3. Disadvantages

°No single manager in TVA responsible for QA.

°Fragmented QA programs.

°Potential problems at interface between offices units.

C. OPTIONS C AND D

1. Organizational Description

This option would retain the QA staffs to interface with EN DES, CONST, and NUC PR, similar to what presently exist, and provide for audit by a central auditing group that would audit overall operation of the QA organization. All of these QA units would report to a manager of TVA QA. This organization is shown schematically in figures IV-3 and IV-4. In one case, the QA manager would report at an appropriate level in POWER, in the other case the QA manager would report to the General Manager.

2. Advantages

°Decreased pressure on line managers.

°Reduces potential for QA organization to be dominated by line managers.

°Single QA manager to speak for TVA.

°Unified QA program.

°Problems at interface between organizational units eliminated within QA organization.

3. Disadvantages

°Problem of acceptance by line managers.

°Will disrupt existing system and require rework of the TVA QA manuals.

FIGURE IV - 1  
QA/QC ORGANIZATION IN TVA  
OPTION A

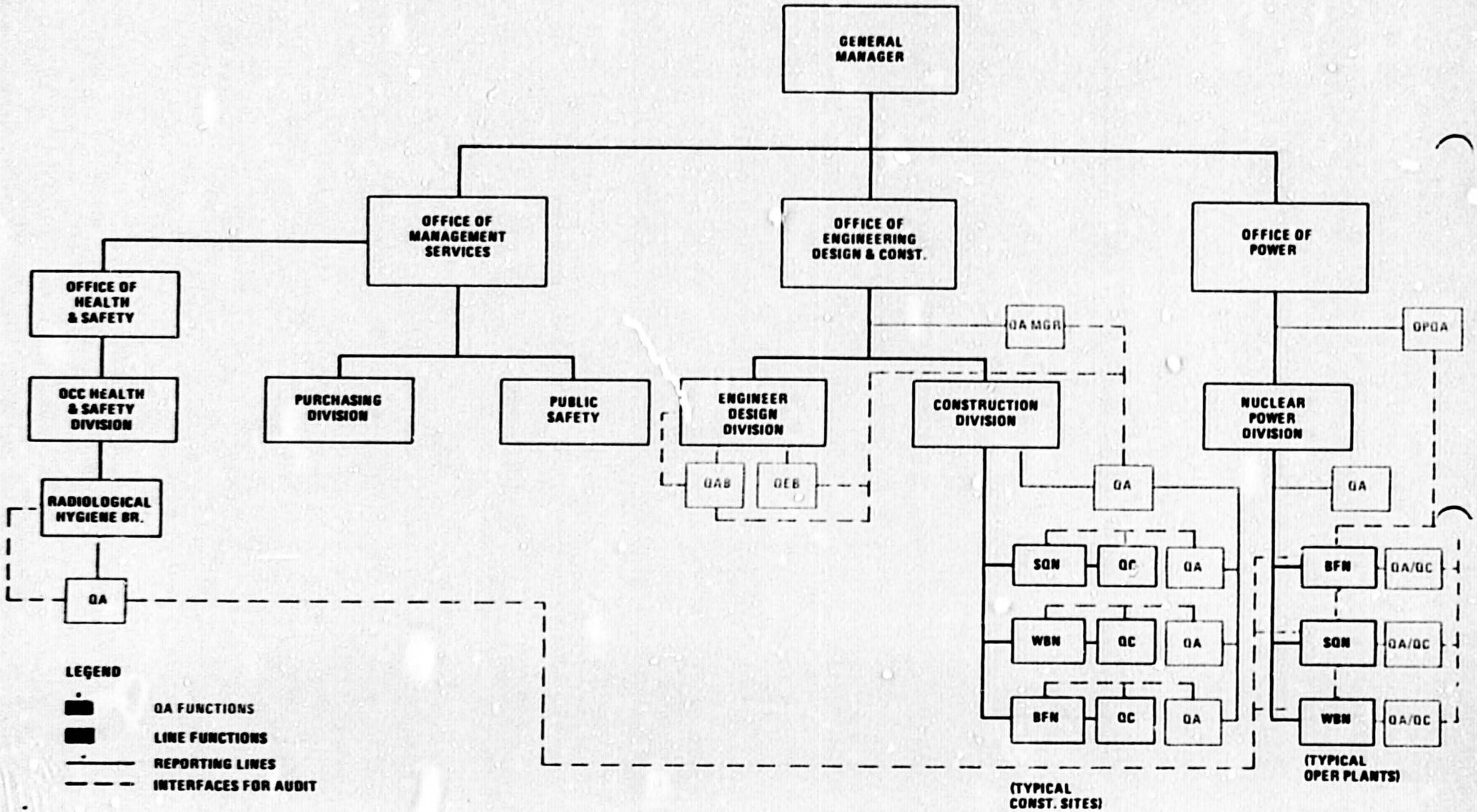
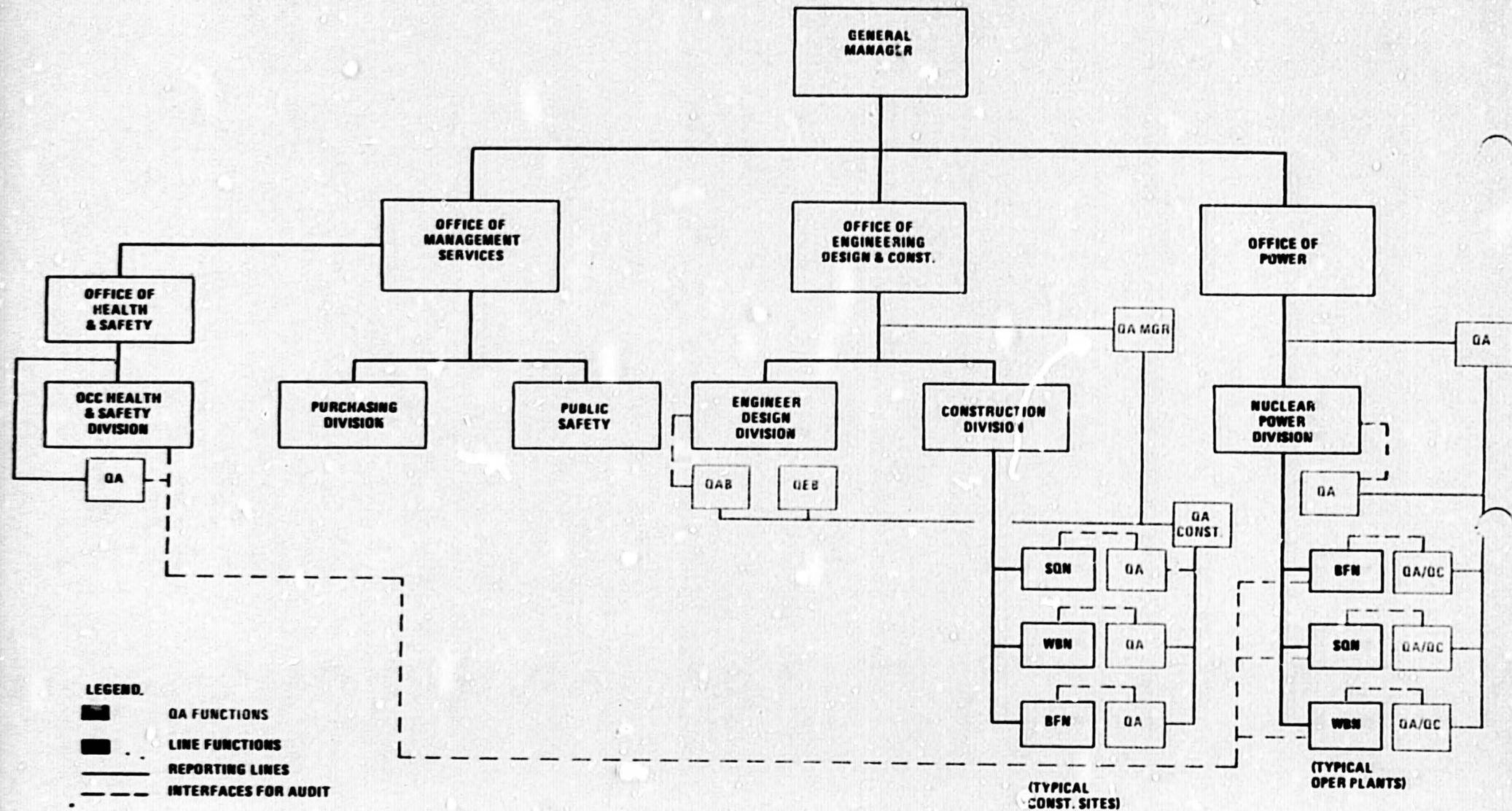
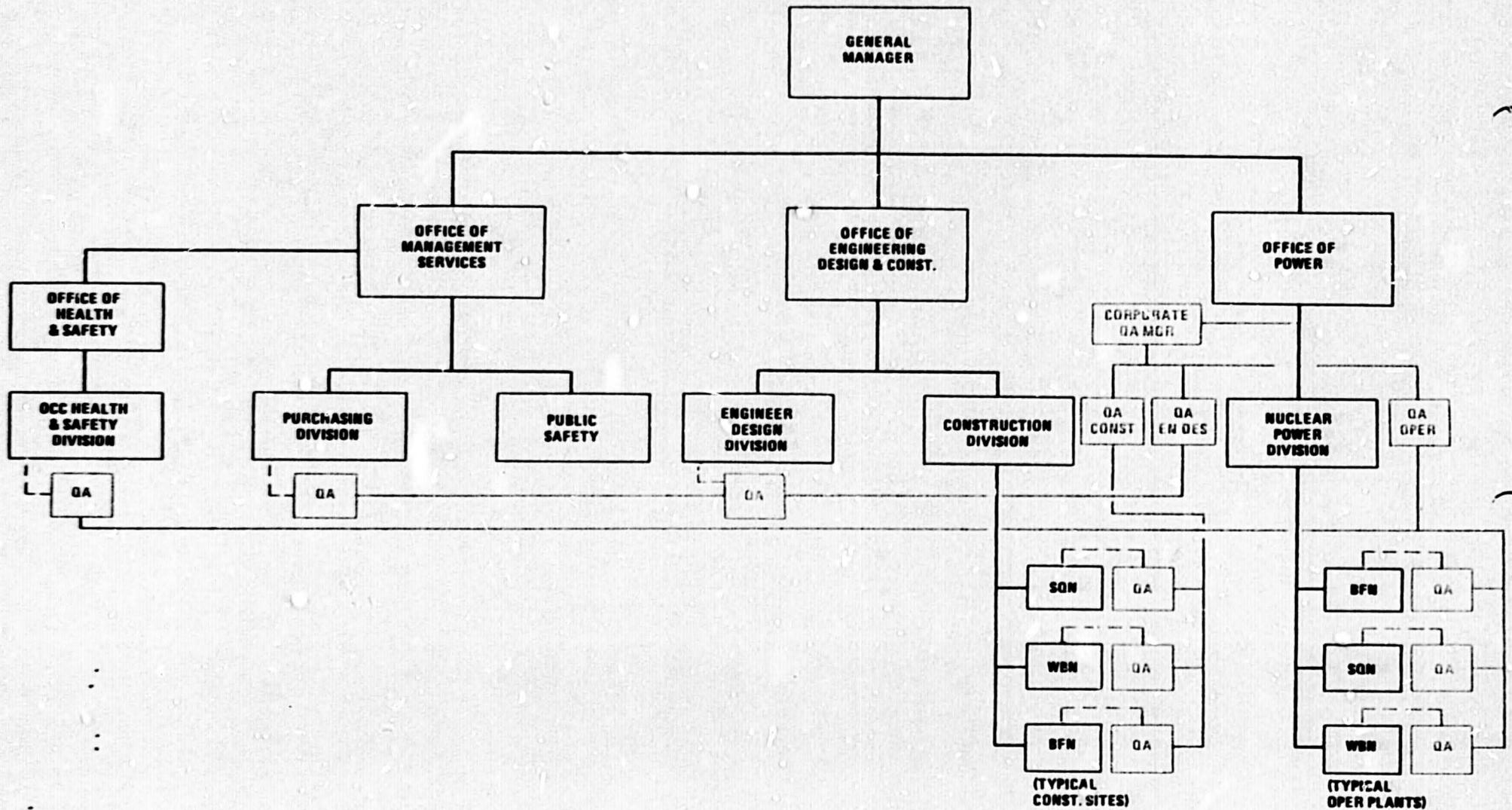


FIGURE IV - 2  
QA/QC ORGANIZATION IN TVA  
OPTION B

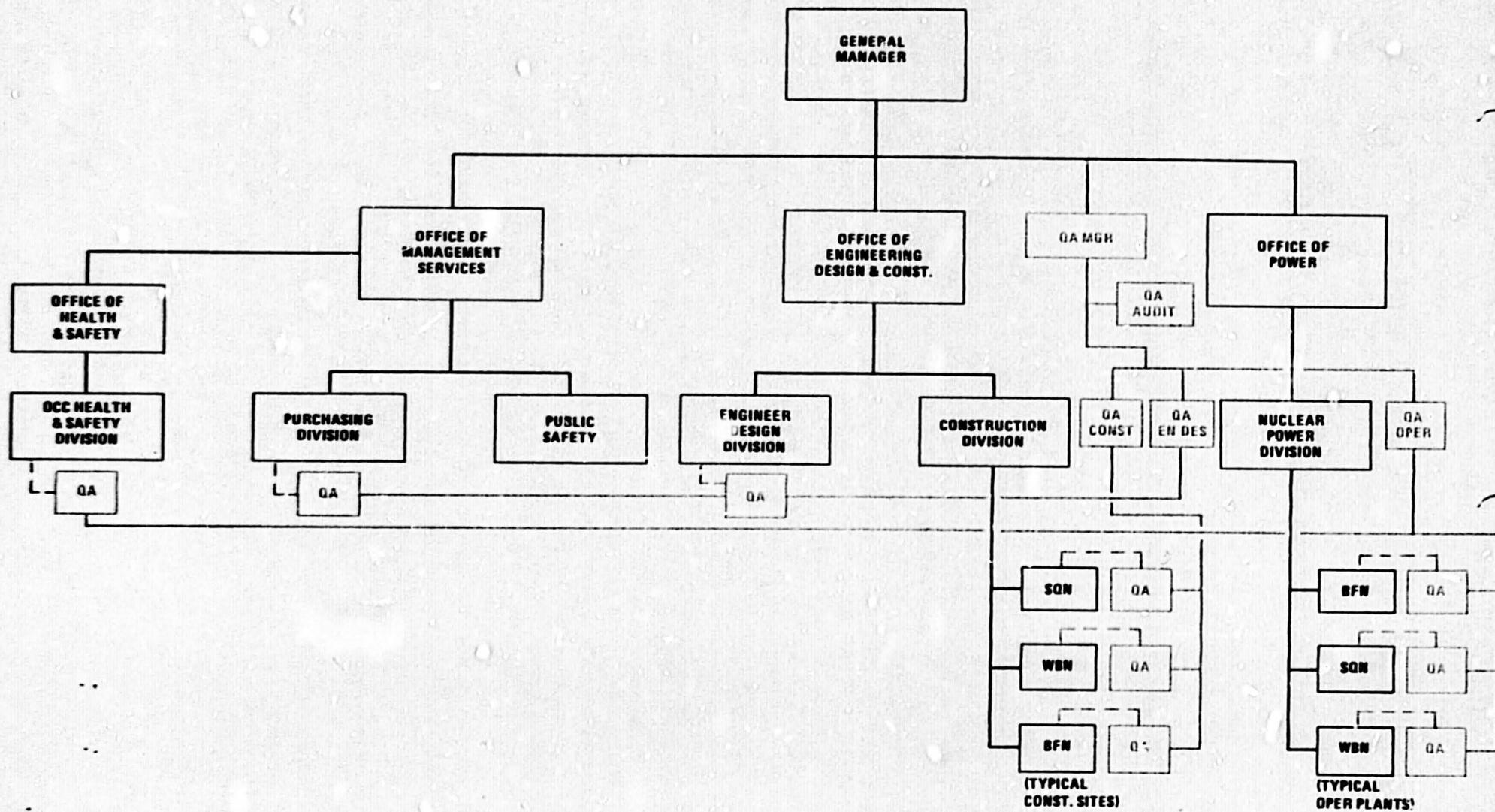


**LEGEND.**  
 ■ QA FUNCTIONS  
 ■ LINE FUNCTIONS  
 — REPORTING LINES  
 - - - INTERFACES FOR AUDIT

**FIGURE IV - 3  
QA/QC ORGANIZATION IN TVA  
OPTION C**



**FIGURE IV - 4  
QA/QC ORGANIZATION IN TVA  
OPTION D**



## V. EVALUATION OF FINDINGS

An effective QA organization, like any other functional organization, is one that serves a need within the overall organizational structure. The basis for the formation of the QA group will be well established; the authority, objectives, and responsibilities will be thoroughly planned, understood, and supported by management. The QA group will be organized in a structure that will best serve management goals and will be staffed with highly motivated personnel particularly suited to advance management's mission for QA. It will then be controlled on a routine basis to assure the appropriate level of effort.

The basic functions involved in the management of any activity include planning, organizing, staffing, directing and controlling. If these five functions are adequately addressed for the quality assuring activity, it will result in a successful and beneficial endeavor for TVA. The fundamental assumption that the present overall TVA QA organization is not performing adequately must be made. This is the reason that NSRS was asked to evaluate the QA program. The fact that the QA groups are not performing at the desired level doesn't necessarily mean that they should be reorganized. However, after an extended period of ineffectiveness, organizational changes present one viable method for effecting a great number of corrective measures. As a part of this review the desirability of pulling all of TVA's QA activities together into one central organization headed by a single QA manager has been considered. The primary driving force for this consideration has been the excessive violations of NRC requirements at TVA nuclear plants under construction and in operation, the concern by NRC that there is no single manager within TVA that is responsible for QA at the nuclear plants, and the overriding concern that TVA's QA program is not getting any better.

NSRS does not believe that the QA groups should be reorganized into one central organization unless there is reasonable assurance that such an organization will result in improved performance by the QA personnel. Some of the conditions that would suggest a need for a more centralized organization are lack of management support for QA, lack of QA independence from line activities, or inadequate interfacing practices between the various QA groups and between QA and line organizations. If any of these conditions exist and it appears that corrections within the existing QA organizations are not being made to effectively remedy this situation, then one central organization may be a desirable approach. An assessment of the TVA management functions as related to the QA activity and of the conditions listed above that directly impact on the final decision regarding the appropriate TVA QA organizational structure is presented in the following paragraphs.

### A. APPLICATION OF MANAGEMENT FUNCTIONS TO TVA QA

#### 1. Planning

It appears that very little planning was involved in the establishment of the original overall TVA nuclear QA role. The NRC established a requirement for QA and TVA responded

by establishing a number of QA groups to satisfy the requirement. The long term TVA needs to be satisfied by the QA effort do not appear to have received close consideration. In fact the long range needs were probably not well understood. This is understandable under the circumstances of the immediate action necessary to satisfy the NRC requirement. However, during the past seven years following the NRC QA edict, planning for more effective QA activities has not greatly improved. TVA seems to have acted on a periodic basis under the stimuli of NRC enforcement actions rather than determining a course of action through the establishment of meaningful objectives and realistic strategies for the accomplishment of these objectives. The continued inability of TVA to implement an effective overall quality assurance program is testimony to the inadequacy of planning in the area of QA.

## 2. Organizing

The proper organization to fulfill the TVA mission for QA was apparently given very little attention. In fact, the TVA mission for QA does not appear to be well defined. QA was organized in the typical functional organization framework. OEDC and POWER established QA groups within their organization framework to serve their individual purposes. Groups of people were put together and given the title of QA. Through actions resulting from experience and regulatory pressure, the present QA effort represented by the many separate groups has evolved. The lack of overall TVA planning resulted in organizations that served the purpose of individual organizational units rather than TVA.

## 3. Staffing

Discussion with QA and line personnel indicate that sound management decisions were not the hallmark of the selection of many of the individuals that became the QA staff. While many QA personnel were well qualified and determined individuals, QA also appears to have represented a repository for individuals that did not fit into other organizational units. This was evidently more prominent in some QA groups than in others. Partially as a result of this practice, QA personnel failed to gain the proper respect of the line organizations that they audit. An important aspect of successful QA organizations seems to be the insistence by management that QA or QC personnel have equivalent expertise as those personnel performing the work being audited or inspected. TVA QA management personnel indicate that this has been a recent goal and that progress has been made in attaining the goal. However, not all groups have achieved the desired level of qualification.

4. Directing

Several problems have existed within the QA organizations that have had an adverse impact upon the direction of activities within the units. The lack of an overall TVA plan regarding QA has resulted in fragmented programs with each organizational unit only responsible for a part of the overall QA activities within TVA. Efforts to integrate QA activities by use of committees has not been successful.

Directing has also been adversely impacted by what must be considered mixed signals by management. When the NRC initially imposed QA requirements upon TVA, the TVA response was more directed toward meeting a requirement rather than establishing a system to make QA work in TVA. Management support to QA at all levels has historically been very poor in TVA. Although improvement has been made in the past year, it is not obvious that the improvement is due to a complete change in attitude or more a result of NRC enforcement action. (See section V.B.1 for additional discussion relating to management support.) Although management at the highest levels have indicated support for QA activities, the followup effort within the line organization has been weak.

Direction of QA activities has also been adversely impacted by the low morale that has existed within the QA organizations. The degree of acuating or motivating of personnel depends to a large extent on the type and quality of personnel involved. If people that were not self-motivated in line organizations are placed in QA groups, they aren't likely to be self-motivated there either. Line organizations don't usually have a vested interest in building the confidence of QA people when they don't like the idea of being audited and have doubts about the qualification of the auditors. Auditors are not likely to strive to do a good job if they think they are not respected by their peers and management. TVA line personnel have had a tendency to downgrade the finding of TVA QA auditors and to refer to their efforts as nonproductive. It is very difficult for QA supervision to instill confidence in their personnel without management's commitment to the QA effort. In summary, it appears that personnel chosen to perform the quality assuring functions were not generally the most highly motivated and serious actuation was not applied to advance the cause of QA and to improve the motivation of those not totally suited to the performance of QA activities.

5. Controlling

If the first four management functions discussed in this section had been performed in a conscientious and effective manner, the only remaining function to be performed would be that of controlling the QA effort at the desired level. The QA effort should be performed in a preventive as well as

corrective mode. This would help to assure procedures and processes were adequate before they were used as well as to identify deficiencies after the fact. When a large number of deficiencies are being identified, either by the NRC or by QA, this indicates poor performance by the line organizations. When this situation exists the QA effort should be increased. As the number of deficiencies and their significance decrease, indicating improved line performance, the QA effort can be lowered. Therefore, the QA effort should be looked upon as dynamic in nature and adjustable to the quality of work being performed at any given period. The lack of definitive goals in the QA program has contributed to the lack of control of the QA program.

TVA QA should strive to identify and prevent deficiencies such that the number of NRC violations are minimized. In order for TVA QA to identify the deficiencies before NRC does, a systematic program which utilizes an effort at least equivalent to the NRC effort would be necessary. At present the TVA QA audit effort is much smaller than that devoted to TVA by the NRC. A comparison of the TVA audit effort with that of the NRC and a limited number of other utilities is presented in figure V-1.

The numbers used in figure V-1 are approximate. The information presented in the various utility organization charts was subject to interpretation. For example, the Duke Power QA organization charts showed a surveillance staff and a records staff reporting to the site operational QA engineer. Both of these staffs were considered to be a part of the audit organization since both were responsible to the QA manager and had no line responsibilities. Only QA personnel have been considered in the discussion and in the figure. No attempt has been made in this section to compare QC efforts.

The other utilities discussed in the report have relatively small corporate QA audit groups. The audit effort is supplemented by plant QA personnel or with other personnel outside the QA organization. Table V-1 includes both corporate offices and site QA personnel. However, it does not include the non-QA personnel used to supplement the audit effort. Credit is taken for the plant QA personnel in cases where they are functionally and administratively responsible to the offsite QA organization that fulfills the required audit functions. However, where the plant QA staff reports to the plant superintendent, it was not considered to support the audit effort.

The appropriate level of the audit effort has been debated for several years within TVA. Since the TMI accident, the audits have increased significantly and the debate has progressed proportionately. A theory has been presented by

some management representatives of TVA organizations being audited that the present impact on nuclear plant personnel could be adverse to plant safety. This theory is based on the perceived high probability that "excessive" audits combined with frequent investigations of specific events could result in serious personnel morale problems, confusion, and frustration of supervisors.

NSRS has evaluated audit-related data for BFN for the period May 1, 1980 to April 30, 1981. The results of this evaluation are tabulated in tables V-2 through V-4. As can be seen from these tables, there are two primary sources of audit type activities imposed on TVA nuclear plants. These sources are represented by government and industry organizations external to TVA and safety and QA groups within TVA. The external contributors to plant audit activities include NRC, INPO, NSAC, TVA insurance agents, and GAO. The major internal contributors are NSRS, OPQA&A Staff, NSRB, and H&S. Other activities that have less impact on the time of plant personnel includes investigations performed by NUC PR, Nuclear Safety Staff, and the Office of the General Counsel; audits by fire protection contractors; and job surveys by the personnel office. There can be little doubt that all of these activities represent a finite impact on plant management. The degree of impact is not a simple determination. Many members of management feel strongly that the impact is costly from the production standpoint and has approached the point of having a negative impact on nuclear safety. The fundamental question is--Are the plant managers and personnel being required to spend so much time on audit activities they they are unable to perform their assigned duties in a thorough and safe manner? If the answer is yes, then the audits should be reduced or more personnel should be made available to handle the auditors and audit findings.

As shown by table V-2, almost half of the audit effort at BFN during the period under consideration was by the NRC. This effort was nearly three times that of the OPQA&A Staff. The TVA goal should be to prevent or identify and correct deficiencies before the NRC finds them. This is very difficult to accomplish with a TVA audit effort that is only a third of the NRC effort. A greater effort will be required by TVA to accomplish this goal to compensate for the greater experience of NRC inspectors and the more structured and effective inspection program utilized by NRC. Table V-1 indicates that the TVA QA audit effort is far below the average industry level. It is not clear that sufficient resources are not assigned to the QA effort. A fragmented QA structure may be contributing to the deficiency. A more structured organization and reassignment of available personnel might improve the overall QA effectiveness without additional expenditures for personnel. In any event, a reduction in the level of internal audits does not appear to be appropriate at a time when the NRC, NSRS, and QA audits all identify deficiencies in the quality performance by the line organization.

As previously explained, NRC was the greatest single contributor to the audit effort during the period studied. The effort represents 2,529 onsite inspection hours. The NRC minimum budget effort for BFN during FY82 is 4,000 man-hours of inspection. Therefore, it appears that NRC inspection time will not be reduced. The only way to convince NRC to inspect less is to convince them that the plant activities are being performed in accordance with requirements and commitments. Fewer violations of NRC regulations and TVA commitments is one indicator to NRC that activities are being performed safely. Fewer violations will be realized when adequate programs are developed by the line organization and adhered to. While a reduction in the plant audit effort through improved performance by the audit groups should be pursued, this does not appear to be the immediate answer to the question of how to minimize the impact of the audit effort while assuring safety of plant operations. Therefore, the other option of providing additional line personnel appears appropriate. This has already been accomplished to a large degree at the operating facilities by the establishment of the compliance staff to interface with external and internal auditors. This seems to have been recognized by TVA management as the most reasonable approach since TVA has very little control over a major portion of the external audits and since increased internal audits appears to be one of the more feasible methods to exercise whatever control that is available.

The NSRS believes that the most rapid method of alleviating the problems of the large number of audits is for the line organization through its normal management and supervising process to critically examine their own activities and to demonstrate to existing auditors (NRC, NSRS, etc.) that the line can perform its activities as required.

#### B. ORGANIZATIONAL CONSIDERATION

As discussed above, a minimum amount of management effort was devoted to the original establishment of the TVA QA organization. Problems are still being experienced in the overall quality assurance program. Based on its management reviews conducted this year, NSRS believes the problems are basically due to line deficiencies, but the QA groups have been unable in most cases to identify the root problems or to bring about sufficient corrective action to effect and maintain a viable program. The key question at this point is whether or not QA can adequately perform in the present organizational configuration to correct the root problems. Some of the factors that must be considered in the evaluation of the desirability of separating the QA function from the line at all levels of the TVA organization include management support for QA, independence of QA from line activities, and interfacing considerations. Each of these is briefly discussed below.

## 1. Management Support

The discussion of section V.A of this report indicates that in the establishment of the TVA QA organization, management directed very little effort toward normal management functions. The fact that the TVA nuclear program has deteriorated to the point that violations of regulatory requirements appear to be accepted practice and civil penalties are common with essentially no real messages of concern by QA is an indication that TVA management has not been overly supportive of a strong quality assuring program.

A number of problems identified by NSRS and summarized in section II.B of this report indicate that management has not fully supported QA. As an example, the OPQA&A Staff is tucked away in another staff and removed from the accountable manager by at least two levels. A possible conflict of interest exists within the QA management structure, and OPQA&A personnel were concurring in NUC PR procedures they would later need to audit. All this represented inadequate management support for and interest in the QA program.

In discussions with QA personnel, one of the most commonly expressed concerns is that they are unable to effect meaningful and timely corrective actions for the deficiencies identified by QA. This is another indication of inadequate management support. If the findings are significant, prompt corrective action should be important to management. If the findings are not significant the QA effort should be redirected by management or the level of effort should be adjusted.

Based on the above, NSRS concludes that QA as presently established within TVA does not have adequate management support. This conclusion supports the premise that the QA function should be more distinctly separated from the line.

## 2. Independence from Line

As discussed in section II.B.3 of this report, it appears to NSRS that there is not a clear distinction between the responsibilities and functions of QA and line organizations. Some of the groups that carry QA labels are performing line activities. Some of them may perform a combination of line and QA while others perform line work altogether. An example of this is NUC PR QA. OEDC QA personnel become very involved in responding to review and inspection findings which address line deficiencies. QA personnel also represent and speak for TVA during regulatory enforcement conferences. During such meetings QA personnel describe actions that the line is taking to resolve various issues. This appears to NSRS (and NRC) to be inappropriate. This has the appearance of QA actually being involved in the performance of activities that they must audit. NSRS also believes that in some cases QA groups become too involved in the preparation of procedures that are used in the performance of line activities.

This lack of a clear understanding of QA responsibility suggests a need to separate QA from the line to such a degree that the line will accept its responsibilities to do its assigned tasks without dependence on QA.

### 3. Interfacing

A common complaint from those that deal with TVA (particularly NRC) is that there is no individual within TVA that speaks for the TVA quality program. It should be recognized that when NRC representatives make this statement, they are discussing the entire quality program and not just QA. However, the statement applies equally to QA. There is not a single QA spokesperson for TVA. Problems are usually encountered at interfaces such as equipment turnovers and preoperational testing. The trouble seems to be that there are usually two parties that are anxious for the equipment transfer to take place, but seldom is there firm agreement on the transferability of the responsibility for resolution of deficiencies associated with the equipment. It appears that a single manager that could resolve difficulties in these troublesome interfacing areas would be a positive step. This would be an improvement even if it could only be applied within the quality assuring function.

A few key areas have been considered which indicate that it might be advisable to consolidate all of TVA's QA audit activities into a single organization unit reporting to a single QA manager. Such a reorganization would have a structure as depicted in figure IV-3 or IV-4. Such a reorganization would clearly eliminate the image of a fragmented program, diminish the potential for lack of management support, and assure the necessary degree of independence from the line organization. It would in NSRG's opinion also provide status to the QA organization which would ultimately lead to acceptance of the QA function within TVA. These benefits would address head on the concerns that NRC has raised about the TVA QA program.

Information developed during the review also indicates that there are some valid reasons for not reorganizing the QA function but rather modifying the QA functions within the existing organizational framework. The management reviews both within POWER and OEDC indicate that the basic problems within TVA regarding quality relate to performance by the line organization. This implies that improvements in TVA's overall effort can best be accomplished by addressing the problem within the line organization. Although the problem of improved performance by the audit groups is also deemed necessary, the problems identified within these groups are of a nature that an overall reorganization of TVA QA is not imperative to their solution. However, specific cases of management structure that appeared to reduce the effectiveness of the QA groups were identified.

The NSRS review also identified other negative aspects associated with a reorganization of the QA function. The managers of the existing organizational QA units generally do not believe that reorganization would be effective in improving the independent QA function. Although NSRS does not necessarily agree with the position of the managers, it is fully recognized that the leadership in an organization can greatly influence the output of an organization. If collectively the QA management believe a change from the present system would result in decreased effectiveness of the QA function, then such a change would, with the present set of managers, be at a disadvantage from the outset.

One further overriding factor that must be considered in any realignment of the organizational units is the leadership of the created organization. The manager of a united QA organization, with the framework of the existing line organization, would be under extreme pressure. In section III of this report, it is indicated that most other utilities have a single QA organization. This is practical at other utilities since most other utilities are organized as a basic operating organization. Thus the operating arm of the organization is assigned to a single manager and this manager functions in the areas of design, construction, and operation. This is basically shown in the cases examined at Duke, Carolina, and Commonwealth. (See figures III-1, -4, -8, and -11.) With this alignment of the line organization, it is then consistent to have QA report to this same senior manager. Unless basic changes are made within the TVA line organization to accomplish a realignment of line responsibilities, then it becomes less effective to reorganize the QA audit function. The QA manager would have difficulty interfacing with the line organizations and there would be the overriding problem of selection of a manager to head up the QA organization. Recruitment of a manager from outside TVA to fill the position is not considered a viable option due to TVA's salary structure. Selection of a manager from within TVA would present extreme problems of acceptance by the existing QA organizational units as well as by line management.

A final consideration in evaluating the advisability of changing the QA organization at this time relates to the impact of the change itself upon the ability of the organization to function. Each time organizational changes are made, a considerable effort by management must be directed toward the planning, directing, and control of the change itself. By necessity this would involve changing the procedures that have already been established. As indicated in section II, there were a number of changes made in the OEDC QA programs approximately a year ago and effects of these changes are just beginning to be seen. The NSRS review of OEDC QA indicated improvements had been made but that it was too early to determine the full impact of the changes. For this reason, it appears to be premature to start all over again without giving these changes a change to show improved performance. In effect, with the limited resources available for the QA effort, there is strong argument that the resources should be devoted to

solving the problems that have been identified in the existing system rather than creating a new system, which may have a new set of problems.

No major effort has been made as a part of this review to identify actions that should be taken to provide improved quality performance by the line organization. The management reviews by NSRS of POWER, OEDC, PURCH, and H&S have been directed toward identification of problems within the line organization. In the major management reviews the objectives were to examine the adequacy of the existing programs and the degree of implementation of those programs rather than to examine the need for any major reorganization of TVA line units. However, as a part of this review, a number of suggestions by TVA personnel, as well as observations of what other utilities are doing, indicate some possible means of coping with the problems identified by NRC. These include the following:

- a. Establish an "Office of Nuclear Activities" through which all TVA nuclear activities would be conducted. The office would contain Divisions of Nuclear Design, Nuclear Construction, Nuclear Operations, and Nuclear Quality Assurance. In addition, it would contain the staff functions necessary to support the major activities. This organization would encompass all of the nuclear activities in TVA.
- b. Establish a "Project Management Group" to be responsible for the design, construction, and preoperational testing of the nuclear plants. All personnel and work relating to these phases would be controlled by project management. Project management would be responsible for completing and licensing the plant. Preoperational testing and operational preparedness activities would be performed by POWER personnel but they would be under the administration and functional control of project management until licensing. At the time of licensing and prior to fuel loading POWER would assume total responsibility for and control of the licensed unit(s). Any remaining work required by Project Management would be performed under the administrative and functional control of POWER. This approach is essentially the one used by Commonwealth Edison. See figure III-11.
- c. Establish POWER as the administrative authority of all nuclear activities. As such POWER would have the ultimate responsibility for final quality of the nuclear plants.

EN DES would serve as the architect/engineer and CONST would serve as the constructor. Each would have their own quality assurance program which would be subject to POWER approval. Interfaces between POWER and EN DES or CONST would be similar to the interfaces between POWER and other major nuclear vendors.

NSRS has not evaluated any of the above three changes to the basic line organization. In principle any of the above would address head on the problems identified by WRC.

TABLE V-1

<u>Organization</u>	<u>Type of QA Organization</u>	<u>Audit Staff Level (No. of Auditors)</u>		
		<u>Composite Audit Level</u>	<u>Per Plant Site</u>	
			<u>For Plants Under Const</u>	<u>For Plants In Operation</u>
TVA	Fragmented	72	13	2*
Duke Power	Consolidated	99	26	11*
CP&L	Consolidated	51	35	8**
NSP	Two-Element	6	No Nuc Const	3**
Commonwealth E.	Consolidated	Not Available	Not Available	4
NRC	Not Applicable	Not Applicable	8	6

\*One of the plants in operation is a three-unit facility.

\*\*One of the plants in operation is a one-unit facility.

TABLE V-2

PRINCIPAL AUDIT ACTIVITIES AT BFN  
MAY 1, 1980 TO APRIL 30, 1981

<u>AUDIT GROUP</u>	<u>AUDIT HOURS</u>
NRC	2529
REGIONAL	1128
RESIDENT	1401
TVA NUCLEAR	1520
QA&A	928
NSRS	592
OTHER TVA ACTIVITIES	608
NUC PR	320
H&S	288
INPO	<u>1112</u>
TOTAL	5769

PERCENT OF SIGNIFICANT ACTIVITIES

PERCENT OF NUCLEAR AUDIT ACTIVITIES

NRC = 43.6%	49.0%
INPO = 19.3%	21.5%
QA&A = 16.1%	18.0%
NSRS = 10.3%	11.5%
OTHER = 10.5%	

TABLE V-3

SECONDARY ACTIVITIES

TVA	352
FINANCE	120
VARIOUS - NOT SPECIFIED	80
GENERAL COUNSEL	64
PERSONNEL	40
OEDC	16
POWER SECURITY	16
NORRIS LABS	16
INSURERS	144

TABLE V-4

SITE VISITS

MAY 1, 1980 TO APRIL 30, 1981

OUTSIDE - NONREGULATORY	9
NRC CONTRACTOR	1
GE	2
NSAC	1
INPO	3
FIRE INSURERS	2
NRC	25
TVA	49
QA&A	15
NSRS	8
NUC PR	6
OTHER	20
TOTAL	83

## VI. CONCLUSIONS-RECOMMENDATIONS

### A. CONCLUSIONS

The problems encountered by TVA in meeting NRC requirements has resulted from both breakdowns within the line organization as well as within the quality assurance audit organization. The NRC generally has referred to these breakdowns as problems with quality assurance, meaning that the overall quality program within TVA has not been adequate. From the reviews that have been made by the NSRS of POWER and OEDC, there is ample indication that these breakdowns are caused by a combination of a lack of complete programs and a lack of complete implementation of those programs that do exist and are considered adequate.

The problems that appear to exist in TVA are not dissimilar to those that have been encountered by other utilities. In TVA's case as well as in other utilities the rapid growth of nuclear programs, with attendant rapid increase in operations, design, and construction staffs, has resulted in many of the breakdowns or discontinuities in line and audit programs. Quality assurance problems at other utilities have been addressed by changes in the utility organizations where the changes have been directed toward consolidation of the QA function under one manager (option C or D identified in section IV). The indication from the utilities surveyed was that this step has improved overall quality performance.

From a review of both the TVA organization and the organizations of other utilities, it appears that other factors strongly influence the choice of where the QA function best fits within TVA. In one sense TVA is unique to all other utilities. TVA is large with a large nuclear commitment. TVA is also deeply committed to all aspects of the nuclear program, including design, construction, and operations. Unlike most utilities, TVA has a large design and construction organization that is responsible for activities generally contracted out in other utilities. TVA's bigness provides the opportunity for high achievement but also presents the opportunity for problems not encountered in most other utilities. One of these unique problems is caused by the mere geographical separation of the large organizational units within TVA. This separation has caused not only functional separation but has impeded information flow, cause problems in communications and in problem solving. Historically, the long term separation of organizational line units has led to poor cooperation between these units. This has caused many of the interface problems identified by NRC as well as NSRS.

Overall evaluation of the findings indicated that the most important problems relate to performance by the line organization, although the QA groups could be considered culpable for not having identified these problems. Thus, a change to the audit organization to collect all audit units under one manager (option C or D) would not necessarily improve line performance.

Further, it was determined that within the framework of the existing TVA organization, the change from option A to C or D might not increase overall performance of the audit groups. This review did not examine in any detail the need to completely reorganize the line organization. However, a number of potential changes to the line that were identified as a part of this review should warrant further investigation. It was concluded that:

1. A complete reorganization of the QA audit groups into a single QA organization with the organization reporting to the GM (option D) or to a senior manager in POWER (option C) is not warranted at this time.
2. A change to an organizational arrangement as depicted in option B does not appear to offer significant improvement over the organization depicted in option A.
3. Retention of the organizational structure as presently exists in TVA (option A) while implementing the recommendations below should result in improved program performance. In retaining this organization, specific problem areas must be addressed as indicated in the recommendations.
4. An effort is required by the line organization to determine more effective means of obtaining quality performance. The advantages and disadvantages of the three alternate changes to the line organization (identified in section V) should be determined and then used to determine if changes to the TVA safety policy and assignment of responsibility to line organization units in TVA is required.

## B. RECOMMENDATIONS

The following paragraphs contain recommendations which NSRS believes must be implemented to assure a viable, effective quality assurance program, including line and audit functions. The recommendations are directed toward the specific problems evaluated in section V.B and are intended to assure (1) adequate management support of QA, (2) independence of the audit groups from the line, and (3) increased effectiveness of the interfaces between all organizational units involved in the nuclear program. The recommendations are presented in the context of the applicable management activities that were discussed and evaluated in section V.A including planning, organizing, staffing, directing, and controlling.

### 1. Planning

#### a. Program Identification

The line organization should reevaluate the adequacy of the programs that exist to control the design, procurement, construction, and operation of TVA nuclear plants.

The results of the reevaluation should be presented in an auditable form that identifies:

- °Requirements and commitments that must be met
- °TVA policies or goals that must be achieved
- °Implementing procedures that have been established
- °Organizational unit responsible for performance
- °Organizational unit responsible for independent audit

b. Management Support

Management at all levels within the organization should take measures to demonstrate that a strong TVA quality assurance program is desired within TVA. Steps that should be taken include:

- °Establish positive policy statements regarding QA and translate them into implementing programs
- °Initiate a program to provide management training in QA
- °Assure more frequent followup by management to determine if management objectives are being achieved
- °Hold managers accountable for quality performance

c. Interfaces Between Divisions and Offices

- (1) All interface points, with emphasis on interface problems that presently exist within offices or between offices, should be identified. The organizational units involved with the interface should identify the organization having overall responsibility and the support responsibility.
- (2) Interoffice and interdivisional procedures should be developed for identified interfaces where no procedures presently exist.
- (3) Interdivisional and interoffice procedures should be modified as needed to implement the assignment of responsibility for problem areas established in c.(1).
- (4) Office managers should review the charter and performance of the TVA Quality Assurance Steering Committee. Actions should be taken to make this Committee function as originally intended, or the Committee should be abolished.

- (5) A final authority/arbiter for TVA quality assurance matters should be established. This person or group would provide interpretation of or obtain answers to questions relating to requirements, commitments, and standards in the quality assurance area. The TVA Quality Assurance Steering Committee may have been intended to fulfill this role; however, it does not appear to have accomplished this function.

2. Organizing

a. Definition of Roles

Deliberate, concentrated efforts must be provided by TVA management to assure that the roles/functions of the line organizations and audit groups are clearly defined and separated.

b. Office of Power Quality Assurance Staff

A reorganization of POWER QA should be implemented to provide the audit group equal organizational status with the line. There should be one manager who is responsible and accountable for both audit and line functions. This is equivalent to the recommendation NSRS made in NSRS Management Review Report No. R-81-08-BFN.

3. Staffing

- a. Staffing levels of the QA units should be established based upon a planned program (as identified in recommendation B.1.a) that assures management that the audit program will be effective in meeting management goals.
- b. Technical capability and grade status of QA audit units should be established and maintained at a level to assure comparability to the line organization that the auditors are interfacing with.
- c. Interchange of technical personnel between the line and QA audit groups should be encouraged to upgrade each program and to foster better understanding and cooperation.
- d. The line organization should evaluate the need for additional staff at the operating plants and construction sites to effectively interface with NRC, NSRS, or QA auditors.

4. Directing

Direction of the QA units should be to emphasize the independent role of the QA audit organization.

Activities should concentrate on:

- a. Independent review of the program developed by the line organizations to meet NRC requirements and TVA commitments.
- b. Independent audit of the implementation of the line programs.
- c. Interpretation of QA requirements for the line organization that the unit interfaces with.

5. Controlling

- a. Management should assure adequate feedback systems to identify if line programs and audit programs are effective in meeting goals. The feedback system should be clearly identified.
- b. Audit activities should be periodically reviewed by management to establish proper level of effort (see also VI.B.3.a).

## Memorandum

TENNESSEE VALLEY AUTHORITY  
GNS '82 0603 051

TO : G. H. Kimmons, Manager of Engineering Design and Construction, W12A9 C-K

FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : June 3, 1982

SUBJECT: MAJOR MANAGEMENT REVIEW OF WATTS BAR NUCLEAR PLANT - NUCLEAR SAFETY REVIEW STAFF REPORT NO. R-82-02-WBN

- References: 1. My memorandum to you dated September 29, 1981 (GNS 810930 054)  
2. My memorandum to you dated January 20, 1982 (GNS 820120 050)

The final report of the subject review is attached for your information and action. Many people in your organization were contacted during the review to discuss their duties and responsibilities under the quality assurance program. All persons contacted, including managers, supervisors, engineers, inspectors, and craftsmen, were cooperative and displayed a genuine interest in designing and constructing a safe, reliable plant.

The results of this review, the review performed onsite last year (Report No. R-81-28-WBN), and in some instances, the review performed on OEDC last year [Report No. R-81-14-OEDC(BLN)] were considered in our overall assessment of the Watts Bar quality assurance program. The results of the OEDC review were considered because the EN DE3 quality assurance program is applicable to all nuclear plants.

Our overall assessment of the Watts Bar quality assurance program is that the program is less than adequate because of deficiencies identified in design process controls, training and qualification of personnel, special process controls, the quality control program, the joint audit program, top-tier QA documents, and interface controls. The programs established for OEDC audits, configuration control, ASME Section III QA, design changes (CONST), craft training, procurement, equipment and facilities control, and work planning were considered adequate overall. The remaining areas reviewed were considered adequate with exceptions either in the written program or in implementation of the program.

Corrective action is already underway for some of the deficiencies that have been identified. This action combined with the actions being taken to implement the 1982 OEDC Action Plan for Quality Improvements should, when completed, result in an adequate quality assurance program for the ongoing effort at Watts Bar. We believe the number and significance of many of the identified deficiencies make it necessary that an indepth review be performed of one of the safety systems to assure TVA management that Watts Bar has been designed and constructed in accordance with applicable requirements.



2

G. H. Kimmons  
June 3, 1982

MAJOR MANAGEMENT REVIEW OF WATTS BAR NUCLEAR PLANT - NUCLEAR SAFETY REVIEW  
STAFF REPORT NO. R-82-02-WBN

Please provide us with you plan for resolving the recommendations contained in this report within 60 days of the date of this memorandum. If you have any questions concerning the report, contact J. A. Crittenden at extension 6860.

  
H. N. Culver

*jac* <sup>WBS</sup> JAC:LML  
Attachment

cc (Attachment):

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R. A. Costner, W11C126 C-K  
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M. N. Sprouse, W11A9 C-K  
G. Wadewitz, Watts Bar Nuclear CONST

TENNESSEE VALLEY AUTHORITY  
NUCLEAR SAFETY REVIEW STAFF  
NSRS REPORT NO. R-82-02-WBN

SUBJECT: MAJOR MANAGEMENT REVIEW OF WATTS BAR NUCLEAR PLANT

DATES  
OF REVIEW: FEBRUARY 16-24, MARCH 1-5, MARCH 15-19, 1982

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J. A. CRITTENDEN

6-3-82  
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## I. BACKGROUND

The basis for the establishment of the Nuclear Safety Review Staff (NSRS) was to provide an independent group to advise the General Manager and the Board on nuclear safety policy and to assist in making decisions affecting the safety of TVA nuclear plants. The need for this type of staff was established on the premise that nuclear safety questions should be reviewed independently of the normal engineering and operating divisions of TVA, and that this review should be incorporated into the decisionmaking process.

In order to fulfill its stated purpose, NSRS must independently assess all phases of TVA's nuclear program. Investigations and reviews are the two basic activities performed by NSRS in the assessment of the program. Investigations are usually reserved for employee concerns and significant events relating to safety. The reviews cover a large variety of activities and may involve an indepth evaluation of a very small area or the scope may be greatly expanded with a corresponding reduction in depth.

The review of Watts Bar Nuclear Plant (WBN) as reported herein and in NSRS report R-81-28-WBN was broad in scope and somewhat limited in depth. The purpose of the review was to assess the overall management control systems as they relate to nuclear safety/quality during the design and construction of WBN.

## II. SCOPE

This review of WBN has been classified by NSRS as a major management review since it was designed to cover essentially all aspects of the management controls system associated with obtaining quality. To accomplish this task, the programs for management controls of quality-related activities were reviewed for compliance with regulatory requirements and TVA commitments.

Since NSRS previously reviewed the management controls established by the Office of Engineering Design and Construction (OEDC) and reported the results in NSRS report R-81-14-OEDC(BLN), the scope of this review did not include the complete OEDC organization. Management controls established for WBN by the OEDC Quality Assurance organization, the Division of Engineering Design (EN DES) and the Division of Construction (CONST) were assessed in the following areas, as applicable to the organizations' responsibilities.

<u>Functional Areas</u>	<u>See Note</u>
Quality Assurance Audits	(1)
Quality Assurance Program Review	(2)
Quality Assurance Program Improvements	(3)
Quality Control Program	(1)
Design Process Controls	(2)
Construction Process Controls	(2)
Interface Controls	(2)
Training and Qualification of Personnel	(2)

<u>Functional Areas</u>	<u>See Note</u>
Design Changes	(2)
Configuration Control	(2)
Corrective Action	(1)
Procurement	(2)
ASME Section III QA Program	(2)
Equipment and Facilities Control	(2)
Special Process Control	(2)
Work Planning	(2)
Records and Document Control	(2)
System Transfer	(3)
Construction Tests and Preoperational Tests	(3)
System Cleanliness	(3)

- NOTES:
- (1) Functional area reviewed during this review and during NSRS R-81-28-WBN review.
  - (2) Functional area reviewed during this review.
  - (3) Functional area reviewed during NSRS R-81-28-WBN review.

### III. MANAGEMENT SUMMARY

The management review of Watts Bar Nuclear Plant (WBN) was conducted by the Nuclear Safety Review Staff (NSRS) to assure an adequate level of nuclear safety/quality is being provided by the presently established programs during design and construction activities. The management review was specifically directed toward determining whether written programs were established to satisfy regulatory requirements, TVA commitments, and TVA policy; whether the programs were adequate to satisfy the intended purpose; whether the programs were being implemented effectively; whether personnel in the organizations were cognizant of the programs and their responsibilities for carrying out the programs; and whether the training programs were adequate to assure management that personnel would be qualified to perform their responsibilities

The review was conducted in two parts: (1) the mini-management review which was performed at the construction site during November 16 through December 4, 1981 with the results provided in NSRS report R-81-28-WBN and (2) the present review which was performed at the OEDC QA, CONST QA, and EN DES offices in Knoxville and at the construction site during February 16-25, March 1-5, and March 15-19, 1982. The findings of these two reviews form the basis for the summary statements which follow concerning management controls over safety/quality-related activities. In addition, certain deficiencies were identified during the review that are identical to those identified during the 1981 major management reviews of the OEDC and PURCH programs for the Bellefonte project [R-81-14-OEDC(BLN) and R-81-15-PURCH(BLN)].

When program deficiencies appear generic to both Bellefonte and Watts Bar, they have a bearing on our final appraisal. In order to avoid duplicate actions, reference is made to previous findings and recommendations where action is already underway.

The overall program established by OEDC to design and construct the Watts Bar Nuclear Plant in accordance with NRC requirements and TVA commitments is considered less than adequate. The review report identifies programs that are considered to be strong and well implemented, but the report also identifies programs that are deficient and where implementation has been less than adequate. A summary of the review effort is shown in Table 1.

As the table indicates, the programs of greatest concern are the quality assurance program, quality assurance interdivisional audits, interface controls, design process controls, training (engineers and quality control inspectors) and the quality control program. The reviews indicated that major deficiencies were present in these areas of sufficient magnitude that management could not have reasonable assurance that activities have been accomplished according to the regulations and commitments.

Table 1 also indicates several of the programs which were reviewed and determined to be adequate or adequate with only a few exceptions. Findings for each of the functional areas reviewed are presented in this management summary as they pertain to OEDC QA, EN DES, and CONST.

#### OEDC QA

Within the areas that OEDC QA is responsible for, three areas were considered deficient for which improvements will be needed as follows:

- ° The interdivisional audit program was inadequate because all interface activities affecting quality were not required to be audited nor were they being audited; all interdivisional programs which were required to be audited in 1981 were not audited. In addition, line management responses to all phases of OEDC audits had not been submitted in a timely manner.
- ° The OEDC QA program top tier documents were considered inadequate because the total scope and applicability of the program had not been adequately defined.
- ° Interface controls were judged inadequate because all interface activities were not prescribed and controlled by written procedures.

There were several areas which were considered adequate or adequate with minor exceptions as follows:

- ° Lead auditor training and certification was judged to be a strong, well-administered program with no deficiencies or areas for improvement noted.

- The OEDC QA audit program was well written, and implementation was adequate with one minor exception.

#### EN DES

Within the areas that EN DES is responsible for, two areas contain major deficiencies for which improvements will be needed as follows:

- The controls for the design process were considered inadequate because of failure of the program to completely and adequately identify the safety-related structures, systems, and components; inadequacies in the design criteria documents to adequately document the design bases for various safety-related systems; and failure of the engineering procedures to provide sufficient guidance to assure that all requirements will be incorporated into the design. Similar deficiencies were identified by NSRS for the Bellefonte project in report R-81-14-OEDC(BLN), recommendations 17, 20, and 22.
- The program for QA training of engineers and draftsmen was not being implemented in a timely fashion, and all individuals that should receive the training were not included in the program. The actual training conducted appeared to be high quality and effective.

The programs established for design changes, configuration control, QA audits, corrective action, records and document control, procurement, ASME Section III QA, and control of special processes were also reviewed. Deficiencies were identified in some of these programs that are identical to those identified during a previous management review of the Bellefonte project [R-81-14-OEDC(BLN)]. The EN DES programs are essentially the same for all nuclear projects. Action has been initiated to correct these previously identified deficiencies, but NSRS has not verified the actions have been fully implemented. Additional deficiencies were identified in some of the programs during this review; however, the overall assessment of these programs was adequate or adequate with some exceptions.

#### CONST

There were three areas for which CONST is responsible in which major deficiencies were identified as follows:

- The quality control program was considered inadequate because of conflicts, overlaps, and extraneous information in quality control procedures. This deficiency was identified during a previous NSRS review (R-81-28-WBN). The procedures are being revised to more clearly describe inspection requirements.
- The training program for inspectors and engineers was determined to be inadequate because of conflicts in upper-tier and lower-tier procedures, failure to provide training as specified in the procedure requirements, and failure to document training that had

been completed. Further, interviews with inspectors and engineers indicated they were not adequately trained, and reviews of nonconformance reports indicated that the nonconformance was often caused because of lack of training. This deficiency was also identified during NSRS review R-81-28-WBN. Since that time management has taken action to revise procedures and more clearly define and document training requirements.

- ° The program for control of special processes in the area of structural welding was inadequate. Due to deficiencies discovered during this review, a special review was performed on structural welding. The review results are presented in NSRS report R-82-07-WBN with deficiencies identified in the written program, management controls, and implementation of the program.

The recently initiated procedural training program for crafts appeared excellent, and the program appeared to be adequately implemented. In addition to the procedural training program, management had also initiated a feedback system from the crafts on procedures applicable to their activities. This idea is excellent; and although it was too early to judge its effectiveness, we believe it will prove to be beneficial. The programs established for construction processes, design changes, QA audits, configuration control, records and document control, procurement, work planning, ASME Section III QA, and special processes (protective coatings) were also reviewed and judged adequate or adequate with exceptions.

#### Summary

In summary, OEDC programs did contain a number of deficiencies for which improvements will be needed; however, in a number of cases, action is being taken and/or studies are under way by OEDC to correct and improve their programs or the implementation of them. These actions are primarily the result of the OEDC Action Plan for Quality Improvements which was implemented as a result of deficiencies identified by a number of organizations. NSRS is in full support of this program and the support given to it by OEDC management. Certainly, complete implementation of the Action Plan and action on the recommendations in this report will provide assurance that management control over design and construction activities in the future will be adequate.

However, this review indicated that stringent management control programs were not (and in some cases still are not) in effect throughout the design and construction of Watts Bar. It appeared that OEDC had in the past relied upon the experience and dedication of employees as opposed to development of strong, well-administered management control programs. Although systems may have been designed, procured, installed, inspected, and tested in accordance with all applicable requirements, it has not been possible in many instances to retrieve objective evidence to prove it. Thus the NSRS believes that further indepth reviews are needed to ensure TVA management that Watts Bar has been designed and constructed in accordance with the requirements. This can best be demonstrated by the detailed review of the design and construction of one of the safety systems.

TABLE 1  
EVALUATION SUMMARY

	<u>Written Program</u>	<u>Management Controls</u>	<u>Imple- mentation</u>	<u>Overall Assessment</u>
<u>OEDC</u>				
1. Quality Audits				
a. OEDC Audits	A	A	E	A
b. Joint Audits	I	I	I	I
2. Program Review	I	I	N	I
3. Interface Controls	I	I	E	I
<u>EN DES</u>				
1. Design Process Controls	I	I	A	I
2. Design Changes	E	E	A	E
3. Configuration Control	E	A	A	A
4. Quality Assurance Audits	A	E	I	E
5. Corrective Action	E	E	A	A
6. Training and Qualification of Personnel	A	I	E	I
7. Records and Document Control	E	I	E	E
8. Procurement	E	A	E	E
9. ASME Section III QA Program	E	A	A	A
10. Special Process Controls	E	E	E	E
<u>CONST</u>				
1. Construction Processes	E	E	E	E
2. Design Changes	A	A	A	A
3. Configuration Control	A	A	A	A
4. Quality Assurance Audits	A	E	E	E
5. Quality Control Program	I	I	I	I
6. Training and Qualification of Personnel				
a. Craft	A	A	A	A
b. QC Inspectors & Engineers	I	I	I	I
7. Records and Document Control	E	I	E	E
8. Corrective Action	A	A	N	N

	<u>Written Program</u>	<u>Management Controls</u>	<u>Implementation</u>	<u>Overall Assessment</u>
9. Procurement	A	A	E	A
10. Equipment and Facilities Control	A	A	E	A
11. Work Planning	A	I	A	A
12. ASME Section III QA Program	A	A	A	A
13. Special Process Controls	I	I	I	I

DEFINITIONS OF TERMS AND GRADING SYSTEM FOR TABLE 1

Definitions

Written Program - The system of procedures, instructions, and policies which prescribe TVA methods to comply with regulatory requirements, commitments, nuclear safety requirements, and industry codes and standards.

Management Controls - The administrative mechanisms by which the various elements of the nuclear program are established, implemented, measured, and modified. These mechanisms include:

- a. Communication of TVA goals and objectives to the organizations responsible for achieving the goals and objectives;
- b. Delegation of responsibility and authority and provision of adequate resources to achieve specific goals and objectives; and
- c. Identification and resolution of variances from expected performance.

Program Implementation - Performance of activities affecting nuclear safety and quality as directed by the written program.

Overall Assessment - An evaluation of the program which includes the written program, management controls, program implementation, and quality of the results achieved.

Grading System

- A - No deficiencies identified in the areas reviewed
- E - Some deficiencies identified.
- I - Significant or numerous deficiencies identified.
- N - Area not reviewed or not reviewed in sufficient depth to evaluate.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

The following paragraphs contain the conclusions followed by recommendations if applicable. An R or E in parentheses has been placed at the end of each recommendation. The (R) indicates that NSRS has concluded the recommendation is based on a regulatory requirement or a commitment. The (E) indicates NSRS has determined that the recommendation has no regulatory basis. It is considered an enhancement and based on subjective judgment. The responsible organization is required to respond to all recommendations. NSRS classified each functional area reviewed as (1) adequate, (2) adequate with exceptions, or (3) Inadequate. These terms are defined as follows:

Adequate - No deficiencies identified in the areas reviewed

Adequate with exceptions - Some deficiencies identified

Inadequate - Significant of numerous deficiencies identified.

#### A. OEDC

##### 1. Quality Assurance Audits

Lead auditor training and certification was determined to be a strong, well-administered program with no deficiencies or areas for improvement noted. The interdivisional audit program was inadequate because all interface activities affecting quality were not required to be audited. OEDC audits were not as effective as they could be because responses to findings were not in all cases submitted in a timely manner. Specific problem areas with recommendations for corrective action are as follows:

##### a. R-82-02-WBN-01, Interdivisional Audits

Not all interdivisional activities affecting quality, presently prescribed in the Interdivisional Quality Assurance Procedures (ID-QAPs), were required to be jointly audited periodically or otherwise reviewed for adequacy. Not all the interdivisional programs which were required to be audited annually have been audited in 1981, nor were they scheduled for audit in 1982.

##### Recommendation

OEDC QA, in conjunction with POWER, should reevaluate each of the interdivisional activities described by the procedure in the ID-QAM to determine jointly which of

these activities are of sufficient importance to quality or nuclear safety to warrant periodic audit. The evaluation process and the results should be described in a revision to ID-QAP 18.2. A requirement should be included that new ID-QAPs be evaluated for joint audits per this prescribed evaluation process. Refer to section V.A.1.a for details. [R]

b. R-82-02-WBN-02, Untimely Audit Response

Not all OEDC QA audit responses had been received in a timely manner.

Recommendation

The QA open audit items summary list should be rearranged so that response dates are visibly associated with their corresponding deficiencies for timely follow-up action. OEDC management should emphasize to division management the importance of timely responses to audit deficiencies. Responses to audit deficiencies should be within the time period prescribed by procedures. Refer to section V.A.1.b for details. [R]

2. Program Review

The OEDC QA program was considered to be inadequate because the total scope and applicability of the program had not been adequately defined in the Topical Report nor in TVA's upper-tier documents. Not all activities affecting quality had been addressed or referenced in upper-tier documents. Specific problem areas with recommendations for corrective action are as follows:

a. R-82-02-WBN-03, Activities Affecting Quality

OEDC management was not provided with assurance that all activities affecting quality were conducted in accordance with prescribed approved instructions consistent with their importance to nuclear safety. There appeared to exist disagreement and inconsistencies on the subject of which activities constituted "activities affecting quality," as well as to what, and when, their associated controls should have been applied. Further, management controls for some activities affecting quality had not been established in upper-tier documents.

Recommendation

An overall coordinator should be assigned with authority to determine the scope of the OEDC QA program, to identify the activities affecting quality, to what and when they should be applied and to document the revised

program in a revision to the Topical Report. Controls should be prescribed for those activities affecting quality for which none now exist or for those which are determined to be inadequate. Refer to section V.A.2.a for details. [R]

b. R-82-02-WBN-04, Exceptions to Regulatory Guides

Neither the Topical Report nor the Program Requirements Manual (PRM) commitment sheets identify the alternative programs necessary where exceptions were taken to requirements of USNRC Regulatory Guides to which Watts Bar is committed.

Recommendation

The Topical Report and/or the PRM commitments section should identify the nature of the "alternative" programs implemented for Watts Bar which satisfy the intent of the Regulatory Guide requirements. This recommendation is similar to R-81-14-OEDC(BLN)-3. Refer to section V.A.2.b for details. [E]

c. R-82-02-WBN-05, Authority/Responsibility Delineation

It was not clear from review of the Topical Report or PRM that OEDC QA or EN DES QAB have stop-work authority over QA programs other than ASME. Additionally, responsibility had not been assigned for establishing or implementing the "Special Controls" program addressed in table 3 of the PRM (page 5).

Recommendation

Both OEDC and EN DES QAB stop-work authority should be documented and responsibility should be assigned for "Special Controls" program establishment and implementation in the PRM. Refer to section V.A.2.c for details. [R]

d. R-82-02-WBN-06, PRM Review Conflict

The PRM and Manager's Office QA Manual contained conflicting requirements on the frequency of the PRM review.

Recommendation

The PRM should be changed to permit annual review, per MO-QAP 2.6. This recommendation is similar to R-81-14-OEDC(BLN)-4. Refer to section V.A.2.d for details. [R]

In addition to the above recommendations, OEDC QA should participate in the resolution of recommendation R-82-02-WBN-27 presented in section IV.C.4.a.

### 3. Interface Controls

The area of interface controls appeared inadequate to meet regulatory requirements because of the uncompleted corrective actions on R-81-14-OEDC(BLN) items 13 and 14 and the following new items:

#### a. R-82-02-WBN-07, Inaccuracies in Identifying the Scope of Work Under QA Control

There were many differences between the EN DES defined list of QA valves and the CONST defined list of QA valves.

#### Recommendation

- (1) EN DES should be established as the single point of control for identifying the equipment to be installed, inspected, and tested under the QA program. This control should be established by designating EN DES solely responsible for the identification of all safety-related components or by delegating specific responsibilities to CONST with final review and approval by EN DES. [R]
- (2) An OEDC QA procedure should be prepared and issued which describes the Engineering Construction Monitoring and Documentation (ECMD) computer program and how the program is used by EN DES and CONST. The procedure should provide for timely identification of all safety-related components by EN DES and should describe the EN DES-CONST interface to determine applicable inspections and tests to be performed on safety-related components. This recommendation is similar to R-81-14-OEDC(BLN)-25. [R]
- (3) An OEDC QA procedure should be prepared and issued which describes the CONST Universal program. The procedure should describe the generation of data, how revisions to the program are controlled, EN DES review of components designated QA or non-QA by CONST, and the EN DES-CONST interface to determine applicable inspections and tests to be performed on safety-related components. See section V.A.3.a for details. This recommendation is similar to R-81-14-OEDC(BLN)-25. [R]

b. R-82-02-WBN-08, OEDC QA Review of EN DES Trend Analysis Report

No written commitment exists for the OEDC QA Manager to review the EN DES Trend Analysis Report for generic or programmatic problems.

Recommendation

Appropriate procedures should be issued or revised to require the OEDC QA Manager to review the EN DES Trend Analysis Report for generic or programmatic problems. Refer to section V.B.5.a for details. This is similar to recommendation R-81-28-WBN-18. [R]

While at the construction site, NSRS identified a deficiency (R-82-02-WBN-27) in the CONST QA audit program pertaining to the scope and depth of audits. If CONST QA performs audits to procedural requirements, it appears this would duplicate the OEDC QA audit program. OEDC QA should participate in the resolution of this deficiency. Refer to section V.C.4.a for details.

B. Division of Engineering Design

1. Design Process Controls

Because of the items listed below and the as-yet uncompleted corrective actions for R-81-14-OEDC(BLN) recommendations 17-25, the program for design process control was considered inadequate.

a. R-82-02-WBN-09, Lack of Control of Safety-Related Structures, Systems, and Components Lists

There was not a comprehensive, controlling list of safety-related structures, systems, and components, nor was there a program to control such a list.

Recommendation

EN DES should develop a comprehensive, controlling list of safety-related systems, structures, and components covered by the QA program and should develop a program to control the list. This recommendation is similar to item R-81-14-OEDC(BLN)-20 for BLN. Refer to section V.B.1.a for details. [R]

b. R-82-02-WBN-10, Inadequate Documentation of System Design Bases

Design criteria and FSAR descriptions of system design bases were incomplete and sometimes contradictory.

Recommendation

EN DES should develop complete descriptions of the design bases of safety-related systems for WBN and should develop a program to control these descriptions. This recommendation is similar to item 23 in NSRS report R-81-14-OEDC(BLN). Refer to section V.B.1.b for details. [R]

c. R-82-02-WBN-11, Improper Inactivation of Some Watts Bar Design Criteria

Inactivated Watts Bar design criteria deviated from many of the requirements contained in EP 3.01.

Recommendation

The inactivated Watts Bar design criteria should be brought into compliance with EP 3.01, or exceptions to the requirements should be documented and justified. Also, see item R-82-02-WBN-10 for a similar recommendation. Refer to section V.B.1.c for details. [R]

2. Design Changes

A program for design change was in place and was implemented. One new finding was disclosed by this review. When corrective action for this finding and R-81-14-OEDC(BLN)-26 through -30 is complete, the program should be adequate. Implementation was adequate in the areas reviewed for the existing program.

a. R-81-02-WBN-12, Inadequate Controls to Ensure Validity of Seismic Analysis As Changes Occur

NSRS' review of the design process indicated that in those areas of the design that were not vendor-supplied, there were no formal controls to initiate, verify, and document the validity of seismic analysis when a design change occurred.

Recommendation

To ensure that the original (or existing) seismic analysis remains valid, EN DES-EP 3.02 should be revised to define an auditable system whereby the validity of the seismic analysis is documented as changes occur. Refer to paragraph V.B.2.d for details. [R]

3. Configuration Control

A program was in place and was implemented for this functional area. No new findings were disclosed by this review. It

was concluded that this functional area was adequate except for the corrective action to be implemented for a deficiency reported in NSRS R-81-14-OEDC(BLN)-31.

4. Quality Assurance Audits

Audits of the EN DES Quality Assurance Program appeared adequate with the exceptions noted in the following paragraphs.

The EN DES QA Branch had not completed its assigned schedule of internal audits for 1981. The effectiveness of the audit program was further diminished by untimely reports as well as responses and by the practice of documenting valid deficiencies for information rather than as "findings" requiring responses. As with OEDC QA, auditor training and certification was a strong program. Specific problem areas identified with recommendations for resolution are as follows:

a. R-82-02-WBN-13, Completion of Scheduled Audits

Nine internal audits scheduled for performance in 1981 were not completed.

Recommendation

Evaluate the goals for QAB. If the annual regional office, branch, project, and special studies series of audits is determined necessary, then take action so that these goals may be achieved in a timely manner. However, it may be determined that annual audits of all projects, branches, and offices is excessive, especially if some areas or activities are consistently adequate. This recommendation is similar to R-81-14-OEDC(BLN)-33. Refer to section V.B.4.a for details. [R]

b. R-82-02-WBN-14, Untimely Audit Reports/Responses

A majority of audit reports reviewed in detail were issued late. Responses to audit findings were not consistently returned to QAB in the time period specified by EN DES procedures.

Recommendation

Develop and use a system for scheduling and tracking audit reporting activities to preclude overdue reports/responses. Assure that audited organizations are aware that a partial response to a finding within 30 days is acceptable provided the due date for a complete response is agreed upon. QAB should identify to EN DES management those TVA organizations and vendors which are consistently unable to comply with the commitment to Regulatory Guide 1.44. EN DES management should emphasize to the line organizations the importance of timely responses

to audit deficiencies. Responses to audit findings should be within the time period prescribed by procedures. Refer to section V.B.4.b for details. [R]

c. R-82-02-WBN-15, Audit Findings Not Documented

Not all program deficiencies documented on EN DES audits were identified as findings (i.e., problems requiring corrective action).

Recommendation

The cited examples should be reviewed and evaluation sheets should be generated as required by EP 1.29. EP 1.29 and Regulatory Guide 1.44 should be complied with. Refer to details section V.B.4.c. [R]

5. Corrective Action

NSRS reviewed the program established for WBN by EN DES to assure that conditions adverse to quality were promptly identified and corrected. The corrective action program was considered adequate with some exceptions. Since the corrective action program for WBN was identical to the programs established by EN DES for other TVA nuclear plants, the NSRS conclusions and recommendations (35 through 39) documented in report R-81-14-OEDC(BLN) also apply to WBN. During this current review, NSRS identified two additional items of concern in this area. One item is identified as R-82-02-WBN-08 in section IV.A.3.b of this report and applies to the OEDC QA Manager. A description of the remaining item is as follows:

a. R-82-02-WBN-16, No Written Procedure for the Trend Analysis Program

EN DES had not written and issued a procedure to describe the Trend Analysis Program, including the generation and use of the Trend Analysis Report.

Recommendation

A procedure should be prepared and issued to describe the Trend Analysis Program, Trend Analysis Report, and how the Manager of EN DES uses the report information to identify and correct generic or recurring problems. This recommendation is similar to R-81-14-OEDC(BLN)-39. Refer to section V.B.5 for details. [R]

6. Training and Qualifications of Personnel

The quality assurance training program established by EN DES appeared to be inadequate to meet regulatory requirements.

Deficiencies in the training program were previously identified by OEDC QA in report M78-5, deficiency 6, and by NSRS in report R-81-14-OEDC(BLN), recommendations 16, 40, and 41. Based on this review, NSRS concluded that EN DES had not established a program to provide timely and appropriate quality assurance training to all personnel performing activities affecting quality. Recommendation R-81-14-OEDC(BLN)-16 will remain open until EN DES identifies all personnel who perform activities affecting quality and conducts appropriate training. Refer to section V.B.6 for details.

7. Records and Document Control

The implemented program for records and document control appeared to be adequate with exceptions. However, major program deficiencies existed in records management for Watts Bar which have been addressed as inadequacies in the OEDC QA program in section IV.A.2 and described in detail in section V.A.2.a. Minor program and implementation deficiencies were disclosed in the records and document control program for EN DES.

Specific problems noted with recommendations for resolution are as follows:

a. R-82-02-WBN-17, Control of Vendor Documents

EN DES had failed to establish adequate requirements for the control of vendor drawings.

Recommendation

In cooperation with OEDC QA, consistent requirements should be developed for the collection, retention, and control of vendor records. Refer to section V.B.7.a for details. [R]

b. R-82-02-WBN-18, Accountability of Records

EN DES had not established adequate requirements for accountability of records or controlled documents which are removed from a retention facility.

Recommendation

Revise EN DES-AI 9.01 to provide guidance on the duration that records and controlled documents may remain checked out of a control facility and to require that these documents be accounted for if the record recipient is transferred, terminated, etc. Refer to section V.B.7.b for details. [R]

c. R-82-02-WBN-19, Storage Facility Audits

There was no evidence that National Underground Storage's records facility had been reviewed for adequacy or handling of TVA records since April 1976.

Recommendation

OEDC QA or EN DES QAB should formally review the facility for adequacy of maintenance of TVA records on a periodic basis. Refer to section V.B.7.c for details. [R]

d. R-82-02-WBN-20, Retrieval of NSSS Documents

NEB did not have a retrieval system for NSSS contract records which permitted retrieval without undue delay.

Recommendation

In cooperation with OEDC QA consistent requirements should be developed for the collection, retention, and control of vendor records. Refer to section V.B.7.d for details. [R]

8. Procurement

A program for procurement was in place and was implemented. NSRS concluded the program was adequate to meet regulatory requirements and commitments except for the uncompleted corrective actions for R-81-14-OEDC(BLN) findings 45-48 and the following:

a. R-82-02-WBN-21, EN DES Lacks Retrievable Evidence of Procurement Document Interface Reviews

EN DES was not able to retrieve evidence of all required interface reviews, in particular protective coating specification reviews. EP 5.01 does not reflect requirements for such reviews and maintaining evidence of the reviews. The inadequacy of EP 5.01 was previously documented by NSRS as finding R-81-14-OEDC(BLN)-47.

Recommendation

EP 5.01 should be revised to require interface reviews of procurement documents. These reviews should be performed in accordance with assigned technical expertise responsibilities of branches and projects and the interfacing scopes of work in and between branches and projects. Maintenance of QA records of reviews should be required. An evaluation of past QA procurements on all nuclear plants should be completed to determine whether undocumented reviews may have not been covered

by subsequent post-award reviews. Where undocumented reviews or unreviewed specifications are identified, they should be reviewed by the responsible organizations, and the reviews should be documented. Refer to section V.B.8.a for details. [R]

b. R-82-02-WBN-22, A Contract Document Requirement Not Enforced by NEB

NEB had not enforced a requirement for the seller to provide storage instructions, nor was there an effective tracking and accounting system in place to enforce all provisions of the NSSS contract.

Recommendation

EN DES contracts should be reviewed for documentation requirements, and the document requirements should be entered into a tracking system which will ensure receipt of the required documents prior to the time they are needed. Where storage requirements were not provided to CONST prior to material receipt, a followup should be done to verify conformance with QA requirements and to preclude use of materials damaged by improper storage and handling. Refer to section V.B.8.b for details. [R]

9. ASME Section III QA Program

The program for control of ASME Section III QA activities appears to be adequate to meet regulatory requirements and commitments except as follows:

a. R-82-02-WBN-23, EN DES Engineering Procedure Inadequacy

The engineering procedure which delineates the nondestructive examination personnel qualification requirements is not in accordance with the ASME Boiler and Pressure Vessel Code, Section III (ASME III) and the Society for Nondestructive Testing, Test Code 1A (SNT-TC-1A; 1975 edition).

Recommendation

The procedure should be revised to include the applicable code requirements in the area of practical examination, and any affected NDE personnel records should be reviewed to assure these requirements have been adhered to.

Refer to paragraph V.B.9 for details. [R]

10. Special Process Controls

The program for special process controls appears to be adequate to meet regulatory requirements and commitments with the following exceptions:

a. R-82-02-WBN-24, Control of Welding Processes

Structural welding (cable tray supports, conduit supports, instrument tubing supports, piping supports, etc.) had not been accomplished in accordance with all the requirements of the AWS-D1.1-1972 structural welding code.

Recommendation

EN DES should provide technical justification for all of the specific AWS-D1.1 code deviations and should obtain written approval from the Nuclear Regulatory Commission to allow for these less stringent requirements. Refer to section V.B.10 for details. [R]

b. R-82-02-WBN-25, Control of Protective Coating Processes

EN DES has not defined which areas, structures, systems, and components are to be coated with class I service level protective coatings as required by 10CFR50, Appendix B.

Recommendation

An EN DES procedure should be issued which includes a definitive listing of all structures, systems, and components where class I service level coatings are to be applied. Refer to section V.B.10 for details. [R]

C. Division of Construction

1. Construction Processes

The programs established by CONST for control of construction processes were reviewed to determine adequacy and implementation. Based on this review, NSRS concluded that the program is adequate except in the area of computer program generation and use.

a. R-82-02-WBN-26, Lack of Approved Procedures for Certain Computer Programs

CONST did not have approved QA procedures for the generation and control of computer programs used in quality-related applications such as the ECMD and Universal Computer systems. (Also see Bellefonte report R-81-14-OEDC(BLN) item 25.)

Recommendation

CONST should provide QA procedures for the generation, verification, and use of computer programs in quality-related applications. Refer to section V.C.1 for details.  
[R]

2. Design Changes

A program for design change control was in place and was adequately implemented. The persons interviewed by NSRS during the review had an adequate understanding of their responsibilities. No specific adverse findings or recommendations resulted from review of this program. It was concluded that this functional area was adequate. Refer to section V.C.2 for details.

3. Configuration Control

A program was in place and was implemented for this functional area. This functional area was adequate. Refer to section V.C.3 for details.

4. Quality Assurance Audits

As with OEDC and EN DES QA Auditor Training Programs, the program for CONST auditor training and certification was determined to be adequate. Minor implementation deficiencies were corrected prior to completion of the review and are not included in the report. However, NSRS determined that the scope of the site QA audit program was too broad to be effectively performed in a timely manner with the available resources. If the audit program were in compliance with QASP 7.1, it would largely duplicate the program evaluation effort of OEDC QA. One PRM guideline concerning "prompt corrective action" was not incorporated in CONST upper-tier or implementing procedures.

Generally, the audit program was determined to be adequate with some exceptions. Specific problems identified with recommendations for resolution are as follows:

a. R-82-02-WBN-27, Scope and Depth of Site Audits

Audits performed by the QAU do not indicate by plan, checklist, scope, or results, the depth of review required by QASP 7.1, revision 9.

Recommendation

CONST QAB, in conjunction with OEDC QA, should reevaluate the intended goal of the site QAU audits. The OEDC and CONST QA audit programs should be structured such that

duplication of effort is avoided. Specifically, OEDC QA should verify through their audit/review program that:

- TVA program commitments are clearly specified in design and quality documents (such as the FSAR and PRM).
- The requirements of these commitments are clearly and completely translated into OEDC's upper-tier documents (design criteria, specifications, and office- and division-level procedures, etc.)
- Changes to these upper-tier TVA requirements remain in compliance with approved commitments.
- Changes or additions in commitments, i.e., scope or intent, are promptly translated into upper-tier documents.

The site QAU could be more effective with its available resources if its audits concentrated on assuring that specific implementing procedures were in compliance with construction specifications, division-level CONST QA policies and procedures, and were being adequately implemented. Refer to section V.C.4.a for details.  
[R]

b. R-82-02-WBN-28, Prompt Corrective Action

The PRM guidance on the timeliness of obtaining corrective action to conditions adverse to quality had not been addressed in CONST procedures.

Recommendation

QAPP 15 or 16 and QCI 1.2 should be revised to reflect the 60-day investigation and 6-month completion guidance of QAI 4 (revision 3) concerning nonconforming conditions. The Quality Control and Records Unit (QC&RU) should periodically prepare and distribute for management action the status of NCRs open after 6 months or without approved disposition after 60 days. QAB should issue a similar report for audit deficiencies open longer than 6 months. NOTE: Effective April 20, 1982 QAPP 16 was revised to incorporate completion guidance. Refer to section V.C.4.b for details.  
[R]

5. Quality Control Program

The Quality Control program was considered inadequate in the mini-management review largely due to procedure deficiencies and QA inspector training. The procedures are currently

undergoing extensive review to assure that all regulatory requirements and other commitments have been met. Training procedures have been revised to better define both practical and procedural training. When the revised requirements are implemented, the Quality Control program should comply with applicable regulatory requirements. No further recommendations resulted from this review. Refer to section V.C.5 for details.

6. Training and Qualification of Personnel (Craft)

The programs established for hiring qualified craftsmen and for providing indoctrination and training in procedures applicable to their activities were adequate. The recently established program to solicit comments or questions on procedures from the craftsmen is an excellent idea, but it was too early to determine the program effectiveness. Refer to section V.C.6 for details.

7. Records and Document Control

The records and document control program as implemented appeared to be adequate with exceptions. However, major program deficiencies existed with records management for Watts Bar which have been addressed as OEDC QA program inadequacies in section IV.A.2 and described in detail in section V.A.2.a. Minor program and implementation deficiencies were disclosed in the records and document control programs for CONST. Specific problems noted with recommendations for resolution are as follows:

a. R-82-02-WBN-29, Accountability of Records

CONST had not established adequate requirements for accountability of records or controlled documents which are removed from a retention facility.

Recommendation

Necessary accountability controls should be incorporated into the appropriate procedures/instructions for CONST. Refer to section V.C.7.a for details. [R]

b. R-82-02-WBN-30, Radiographic Film Storage

Radiographs stored at Watts Bar construction site were not stored in accordance with manufacturer's recommendations.

Recommendation

The manufacturer's recommendations should be evaluated, and any waiver of those requirements should be justified or the storage requirements of ANSI PH-1.43 should be reviewed and adopted. QCI 1.8 should be revised accordingly. Refer to section V.C.7.b for details. [R]

c. R-82-02-WBN-31, Transmittal Acknowledgements

Controlled document transmittal acknowledgements were not always returned to the QC&RU within the prescribed time limit.

Recommendation

Assurance should be made that recipients of controlled documents are aware of the importance of timely acknowledgement. Refer to section V.C.7.c for details. [R]

8. Procurement

A program for procurement was in place and was judged adequate to meet regulatory requirements. The implementation of the program was judged adequate with the following exception:

a. R-82-02-WBN-32, Inadequate Procurement Document Review

NSRS discovered a QA requirement changed by someone other than the originator, and not returned to the originator to re-enter the approval cycle, contrary to requirements. Because final procurement documents were not made or checked by the originating engineer and only cursory review was given by engineering management, it was possible for changes and errors in the procurement documents to go uncorrected. Also, originators did not always reference a prior contract or EN DES approved specification.

Recommendation

Persons working in the procurement originating and final document preparation and review should be trained in the procedures governing their work, and the final documents in particular should be checked against the originating documents and prior contracts or EN DES approved specifications. Refer to section V.C.8.a for details. [R]

9. Equipment and Facilities Control

A program for control of equipment and facilities was in place and with improvements presently being made to the program was judged adequate to meet regulatory requirements. Implementation of the program was adequate with the following exception:

a. R-82-02-WBN-33, Receipt and Warehouse Storage Control Inadequacies

Mechanical and Instrument Engineering Unit (MEU and IEU) personnel were not adequately familiar with their responsibilities under the program, and MEU personnel did not have sufficient information to protect the ion exchange material.

Recommendation

Engineering Unit personnel with responsibilities in receipt inspection, assigning warehouse storage, and in-storage inspection need to be trained in the procedure governing their work and provided with sufficient storage information to avoid environmental damage to materials. Refer to section V.C.9.a for details. [R]

10. Work Planning

The CONST program for work planning conforms to appropriate regulatory requirements with the following exception:

a. R-82-02-WBN-34, Work Package Procedure Not Under the Quality Assurance Program

The WBN procedure which describes the work planning process was not considered part of the QA program.

Recommendation

The work planning process should be included in the scope of the WBN quality assurance program. Refer to section V.C.10 for details. [R]

11. ASME Section III QA Program

The WBN ASME Section III QA program conforms to the current revision of the Nuclear Code Manual and WBN implementing procedures. This conclusion is based on observation, review of events, review of records, and discussions with personnel performing ASME Code activities. No recommendations resulted from review of this program. Refer to section V.C.11 for details.

12. Special Process Controls

The program for special process controls in the area of protective coatings at WBN appears to be adequate to meet regulatory requirements and commitments with the following exception: