



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 24 1985

MEMORANDUM FOR: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

FROM: James M. Taylor, Director
Office of Inspection and Enforcement

SUBJECT: INVOLVEMENT OF EG&G IDAHO, INC. ON BEHALF OF IE
AT WATTS BAR

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12/24
50-390
1. HRD
2. M. Williams-
Action VT

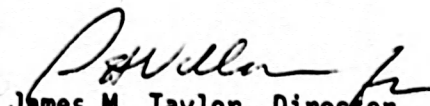
I understand that TVA is intending to use EG&G Idaho, Inc. for work at Watts Bar. IE's QA Branch has used EG&G for work at Watts Bar in the recent past and I am enclosing pertinent information for your use in determining if any conflict of interest may arise for matters under NRC review.

During the first quarter of FY 1984, IE:QAB contracted (FIN A9077) with Oak Ridge National Laboratory (ORNL) for studies on documentation of and practices in the qualification and certification of QA and QC personnel. The study of industry practices included site visits to two nuclear facilities, one of which was TVA's Watts Bar plant. The objective of the site visits was to characterize current QA and QC personnel qualification and certification practices.

Watts Bar was visited for three days in March 1984. The team consisted of the NRC Project Manager and the ORNL project staff, assisted by Mr. Larry D. Kubicek of EG&G, Idaho, Inc., who was under a separate technical assistance contract to IE:QAB. Mr. Kubicek assisted by participating in interview teams with ORNL staff during the site visit. Using the interview protocol (Enclosure 1), he participated in 17 interviews of QA auditors, QC supervisors and various QA and QC personnel.

Mr. Kubicek produced a team member report covering his observations during the site visit (Enclosure 2), which was factored by ORNL into a preliminary draft of the site visit report (Enclosure 3). Mr. Kubicek also provided written comments on the preliminary draft of the site visit report (Enclosure 4).

A final site visit report was never developed. The ORNL project was terminated in 1984.


James M. Taylor, Director
Office of Inspection and Enforcement

Enclosures:

1. QA/QC Personnel Qualification Protocol
2. Team Member Report dtd 3/22/84
3. Preliminary Draft Report on Site Visit "A"
4. Letter from Kubicek to Rayner dtd 5/16/84

QA/QC PERSONNEL QUALIFICATIONS PROTOCOL

GENERAL QUESTIONS FOR ALL PLANT PERSONNEL

- Melinda*
3/84
- G1. Does this plant have particular problems or successes?
 - G2. What do you think of TVA's new and old QA programs?
 - G3. Have attitudes to QA changed since new program was introduced?
 - G4. How have TVA changes in QA/QC programs affected
 - a. you
 - b. co-workers
 - c. viability of Watts Bar plant
 - d. TVA's nuclear program
 - G5. How good is TVA regarding QA?
 - G6. What are the attitudes of the unions toward QA/QC? (Probe for Certification and Qualification)
 - G7. What are the attitudes of the workers toward QA/QC? (Probe for Certification and Qualification)
 - G8. What are the attitudes of the management toward QA/QC? (Probe for Certification and Qualification)
 - G9. What is the attitude of your craft towards QA/QC?
 - G10. What has been the effect of continuous backfitting, having to do work over because of QA and/or changing standards and regulation..?
 - G11. Are there other impacts of the "environment of continuous change" (on morale, quality of work, enthusiasm?)
 - G12. What is the biggest problem in QA/QC implementation?
 - G13. Where does personnel qualification for QA/QC personnel fit? Is personnel qualification an important issue? Why?/Why not?
 - G14. Are you familiar with problems (QA/QC) at other plants such as Byron, Zimmer, South Texas? What do you think of them?
 - G15. Are these typical plants with typical QA problems?
 - G16. Is the N-industry as a whole damaged by the bad reputation of a few plants?

- G17. How does TVA's QA effort compare with other N-plants and utilities efforts? Why?
- G18. Is NRC doing the right things regarding QA/QC?
- G19. What should NRC be going (about QA/QC)? More/less inspection, enforcement, Better more detailed standards? More emphasis upon personnel qualifications? How can the NRC connection in QA/QC be improved?
- G20. What is the one most important thing NRC could do to improve plant quality of construction, operation?
- G21. Is QA a particular problem for nuclear as offered to non-nuclear construction and maintenance?
- G22. What do you think of 3rd party certification?
- G23. Should NRC examine and certify QA/QC personnel on a national basis as are NPP operators? Why?/Why not?
- G24. Does TVA have incentives or penalties for good or bad work?
- G25. What do the NRC site personnel do re QA/QC?
- G26. What changes in duties, focus etc. of NRC site personnel would improve things, in your opinion?
- G27. Could you suggest a method for improved monitoring of the use of unqualified/uncertified personnel? Is this a widespread problem?
- G28. Do you experience cost/schedule pressures with respect to QA? If so, which take priority?
- G29. Is QA work done immediately as a task is performed?
- G30. Is QA work ever postponed until a later date?
- G31. Ask for copies of any forms or procedures.

QA/QC PERSONNEL QUALIFICATION PROTOCOL
MANAGEMENT AND LINE ORGANIZATION

- M1. Describe your QA/QC responsibilities (probe further in
Position/Title training each category as
Years Nuclear qualifications necessary?
Experience certification
Years QA/QC experiences.
Experience
Membership in work-related or professional organizations.
- M2. What percentage of your time is occupied by QA/QC problems?
- M3. How have you organized the achievement of Level I and II QA functions within your group/section/branch?
- M4. What sort of training for Level I and II LQA functions have you organized within your group/section/branch?
- M5. Do you have adequate authority over plant schedule if QA is finding problems? Or do you face reviews and questions by higher management who must approve your decision and those of subordinates?
- M6. What sort of problems have you encountered in the transition from old to new QA/QC programs within TVA?
- M7. Does this plant have particular problems or successes?
- M8. Are managers evaluated in part on how conscientiously they implement QA?
- M9. Have you reviewed the NRC case studies of plants regarding their QA/QC?
- M10. Would more /different training of workers have reduced the amount of construction rework on this job?
- M11. How is standards development (for QA/QC) proceeding in your office?
- M12. Is QA as now organized a help or hindrance to getting the job done?
- M13. Is QA as now organized a help or hindrance to getting the job done?
- M14. (see General questions).
- M15. Who else should we talk to about PQ?

- M16. What standard was followed in the Quality Assurance program development?
- M17. Who has the ultimate responsibility for QA/QC?
- M18. Is the QA/QC program isolated such that no barriers exist to the lines of authority?
- M19. What major modifications have been performed upon the program?
- M20. Have any cost/benefit analysis been performed upon the QA program?
- M21. Does a QA training program exist: QA/QC personnel only, all unit staff
- M22. Is the training in-house or contracted?
- M23. If the training is in-house how do the training staff relate to the QA/QC operating staff - are they the same, dual roles
- M24. Is QA/QC documentation computerized?
- M25. What checks exist to assure that all QA/QC functions are performed?
- M26. Does QA/QC lead or lag planning, design, engineering, etc.?
- M27. Does utility retain total QA/QC control or do contractors retain some control?
- M28. Are QA/QC staff present at all staff meetings, admin. policy, admin. operation and etc.?
- M29. Do QA/QC staff have non - QA/QC tasks, what is the ratio of QA to total staff?
- M30. What is the work load for a QA/QC person versus a design or safety engineer?
- M31. What is the dependency of a QA/QC function, that is how dependent upon the previous step is the success of the next step being done?

QA/QC PERSONNEL QUALIFICATIONS PROTOCOL
CRAFT WORKERS AND TECHNICIANS

- C1. Describe your QA/QC responsibilities (probe further in
Position/Title training each category as
Years Nuclear qualifications necessary?
Experience certification
Years QA/QC experiences.
Experience
Membership in work-related or professional organizations.
- C2. Who checks your work? How often are QA inspections done?
- C3. Are the inspectors qualified to do their jobs?
- C4. Do the inspectors now what they're doing?
- C5. What are the requirements to become an inspector in your area? Do inspectors actually meet these requirements?
- C6. Have you had any problems with this system? Does this way of doing it work out OK?
- C7. Do you know of any industry standards that deal with QA PQ? (Can s/he name any that apply? - SNT-TC-1a
- ANSI N45.2.6
- C8. Do you know of any NRC Reg Guides that apply to your work?
- C9. What happens if you produce/discover something that doesn't meet QA requirements? What kind of follow through is there?
- C10. Have you seen (known of) QA problems around you or elsewhere on this job? -- other jobs? What kind of things? How were they resolved?
- C11. Have you every known a whistleblower? (describe the situation)
- C12. Are you involved when the auditors (TVA, NRC, etc.) come around checking things? Have you ever known of them checking on someone's qualifications to do a certain job?
- C13. What proportion of your time is spent redoing work because of QC, because of design changes, because of NRC requirements? How do you feel about doing things over?
- C14. Would more/different training of workers have helped to reduce rework?

C15. Are records kept of QA problems? What happens then?

C16. Who else should we talk to?

C17. Do you belong to any work-related organizations?

union

ASNT

Technician, lab workers

QA/QC PERSONNEL QUALIFICATIONS PROTOCOL

QA/QC STAFF

- Q1. Describe your QA/QC responsibilities (probe further in each category as necessary)
Position/Title training
Years Nuclear qualifications
Experience certification
Years QA/QC experiences.
Experience
Membership in work-related or professional organizations.
- Q2. Is QA his full-time responsibility?
- Q3. How important does individual view his job in organization?
- Q4. Can person produce manual describing responsibility?
- Q5. Can person identify who reports to him and to whom he reports on QA?
- Q6. What does he do in approving, disapproving QA inspection? -(produce forms)
- Q7. Can he describe how NRC Reg relate to his job? Chapter and user or vague?
- Q8. Can he name names as far as NRC QA is concerned?
- Q9. What support does person get from his line management?
- Q10. How well do his subordinates know their responsibilities?
- Q11. How does utility respond to whistleblowers?
- Q12. What certification or training program did you undergo?
- Q13. Do you feel that the certification process meets the job requirements?
- Q14. What were the total training hours in QA/QC?
- Q15. How was the training accomplished, classroom, ojt, etc.?
- Q16. What weak points may exist in the training program, what improvements could be made?

- Q17. Does he have any diplomas, etc. to show for his effort?
- Q18. Professional education/training not QA specific?
- Q19. Does firm have training program for QA people?
- Q20. How difficult is QA?
- Q21. What qualification does utility (or contractor) require for his position?
- Q22. Qualification for positions reporting to him?
- Q23. Qualification for position reporting to him?
- Q24. Does QA get the best of a travel or profession?
- Q25. Why did person go into QA?
- Q26. What opportunities does person have in QA; where does he move up to in organization ?
- Q27. Do you see yourself as a QA professional - or as a utility employee who happens to do QA?
- Q28. What does it take to be a good QA auditor?
- Q29. What does it take to bae a good QA manager?
- Q30. Do you serve on committees, particularly QA?
- Q31. Have you been certified by anyone to perform or manage QA?
- Q32. If so, by whom? Requirements? Was much certification legitimate?
- Q33. Should all QA positions require certification?
- Q34. Should only third party certification be used?
- Q35. How good is your firm regarding QA?
- Q36. Does this plant have particular problems or successes?

- Q37. Are managers evaluated in part on how conscientiously they implement QA? Is QA on evaluation form?
- Q38. Do you have considerable authority over plant schedule if QA is finding problems? Or do you face lots of reviews by higher - you who must approve your decisions and those of subordinates?
- Q39. Does utility set tough QA standards for its contractors?
- Q40. Does utility review QA program implementation contractors?
- Q41. Does utility impact constructors work?
- Q42. Does utility have incentives or fines for good or local work? (either for contractors or its own people)
- Q43. Are records kept on QA problems?
- Q44. Whom do you deal with in doing your work?
(individual by name)
(categories of workers)
- Q45. What authority do you have to stop work, how do you get cooperation of the "achieving organization" etc. if inadequate work found, people?
- Q46. What happens when inadequate work/records found?
- Q47. How is standards development in individual offices proceeding?
- Q48. Do you feel the existing standards and guidance on QA/QC are adequate? Why?
- Q49. If not, what modifications would you suggest? Why?
- Q50. What is the most significant (intractable) standards problem in your area?
- Q51. Have you reviewed NRC case studies of plants re QA/QC?
- Q52. Do you know many QA people around industry?
- Q53. How do their jobs compare with yours? content - difficulty

- Q54. How do thier views compare with yours?
- Q55. Does this plant have particular problems/successes? Who should we talk with for the workers/mgt view?
- Q56. Does TVA set tough stand for its contractors review QA program implementation inspection cntract work?
- Q57. Do you attend QA/QC staff meeting, group and div meetings? admin policy
- Q58. Do you have non QA tasks?
- Q59. How did you come to be in your present position?
- Q60. Could you estimate the percentage of the crafts which are competent the perform safety-related work?
- Q61. What task requires the greatest amount of re-do work?
- Q62. What task requires the least amount of re-do work?
- Q63. What area of your work do you enjoy the most, the least, and why?
- Q64. What NRC standards and guides do you most frequently deal with?
- Q65. What problems arise from the general nature of NRC documents as compared to the more specific requirements of the professional institutions?
- Q66. Are you a member of a professional society/institution?
- Q67. Do you feel that the existing standards structure is adequate?
- Q68. Do you feel that the standards structure need modification?
- Q69. How best could the standards structure be improved?
- Q70. What standards problem is most significant in your work area?
- Q71. In your opinion how could the NRC connection be improved in the QA/QC work area?
- Q72. Given that the NRC cannot regulate completely all functions of NPP construction and operation, what could you suggest as a supportive option to ensure total QA/QC compliance in a NPP unit?

- Q73. In your opinion what should be the NRC site personnel role? Why?
- Q74. Should the NRC require QA/QC personnel to be certified in a strong national framework similar to reactor operators?
- Q75. Should QA/QC personnel be integrated into some type of third party organization which is separate from the utility/contractor and report to the NRC?
- Q76. In view of the present problems in QA/QC at several units, How would you account for the accidental or deliberate use of uncertified QA/QC personnel - who is responsible, what is the root cause?
- Q77. Could you suggest a method of improved monitoring for the use of uncertified personnel?
- Q78. Based upon your own experience (not Hear-say) how widespread would you estimate this problem to be?
- Q79. Given the following list: NRC, Utility Corporate Management, Existing Standards, Union/Labor Related Environment, and Worker integrity, How would you rank on a scale of one to five, each of the above as to their impact on the QA/QC program?
- Q80. How do other workers regard QA staffers? (as colleagues trying to do their job, as bothersome gnats, as pain in the butt, as ineffective and source of jokes, to be feared and avoided, as a power to be reckoned with?)
- Q81. Do you ever experience any stigma as a QA person? If so, how do you deal with it? (if this is included in the answer to Q.1)
- Q82. What happens when inadequate work or records are found?
- Q83. What authority do you have to stop work, etc. if QA problems are found?
- Q84. How do you get the cooperation of the "achieving organization" when inadequate work is found?
- Q85. Does this plant have particular problems or successes?

- Q86. Does TVA have incentives or penalties for good or bad work?
- Q87. Do you attend staff meetings, group and division meetings, administrative policy meetings?
- Q88. Do you have non-QA tasks and responsibilities?
- Q89. Do you know many QA people around the industry?
- Q90. How do their jobs compare with yours? (content, difficulty, support by management?)
- Q91. How do their views compare with yours?
- Q92. (See general questions for all employees)
- Q93. Who else should we talk to?

TEAM MEMBER REPORT
QUALIFICATION/CERTIFICATION
OF QA/QC PERSONNEL
FIELD STUDY A

Submitted by: L. D. Kubicek

March 22, 1984

Introduction

The following information has been compiled from the interviews conducted during Field Study A. The report is divided into three sections. Section I contains discussions on specific topics or themes that emerged during the field study. Section II is a collection of specific points of interest, cogent complaints, or remarks made by individuals or groups. Section III is the author's own impressions of lessons learned and the identification of areas that should be investigated further in subsequent field studies. It is not intended that the following be a total description or characterization of the qualification/certification program for Quality Assurance (QA) and Quality Control (QC) personnel at the Field Study A project. Almost all of the information gathered and reported herein is based upon an interview process and these interviews were conducted primarily with QA and QC personnel (13 of 17). As such, only an incomplete picture of their program is given. This report is intended to serve as input to a larger field study report which will more fully characterize the findings of the total team effort. As such, this report is considered draft material and should not be circulated outside of the immediate team members working on this study.

ENCLOSURE 2

I. SPECIFIC TOPICS/THEMES

A. Third Party Certification of QA/QC Personnel

There was consensus among all personnel interviewed that third party certification of QA/QC personnel would be of marginal benefit for both non Nondestructive Examination (NDE) and NDE areas. Any benefits would be primarily to the individual in the form of status recognition and enhancement of job mobility. Benefits to the hiring company were thought to be perhaps quite small or non-existent.

All individuals stated that while paper qualifications may form a basis for initial hiring actions, it was still primarily a company responsibility (since they owned the liability) to verify the individual's qualifications through a combination of appropriate training, testing, and on-the-job evaluation. Quality control supervisory personnel were especially doubtful of the effectiveness of such a practice.

First, they related it would be almost impossible to have a third party issue certifications for the specific non NDE procedures their inspectors are required to use. The training and qualification process used in these areas are specific to the needs of this one project and cannot readily be transferred to other nuclear projects even within the same utility. Some merit was seen in the area of NDE skills certification (as opposed to procedure certification). Third party certification of skills

would give the employer a measure of confidence that the candidate did have the basic hands-on knowledge to perform the NDE technique when he was hired. They cautioned, however, that skills certification was not sufficient to be an efficient inspector at a nuclear project. Other factors such as a detailed procedure knowledge, a mature judgement honed by on-the-job experience, and an in-depth familiarity with paperwork requirements, organizational interfaces, and job safety requirements were also necessary. Verification of these qualifications could only be administered practically at the utility level. (Especially at this utility, where inspectors are required to recertify to any major procedure changes).

One QC supervisor stated, he thought it would be a dangerous practice for any third party certifications. He related a case where job shop employees had been hired to do radiography. These employees were supposedly qualified to ASNT recommended practices through their parent company, an independent testing agency. However, project QC personnel, who interpreted the results reported problems with these individuals using poor techniques which resulted in wrong film densities and improper penetrometer placements on the radiographs. In another case, an individual was hired, who appeared to be an expert in liquid penetrant, magnetic particle, and ultrasonic testing. After the individual was found having difficulty passing a UT qualification examination, it was determined the individual had been certified by his former employer. However, his interpretive skills had deteriorated since he had not used

the method for approximately a year. (The supervisor also stated that deterioration of interpretive skills occurs among radiographers).

B. Qualification of Audit Personnel

A consistent theme emerged from interviewing project management, Nuclear Steam System Supplier (NSSS) manager, and the NRC resident inspectors with respect to the performance of audit personnel. They were in agreement that the auditors had not been able to give management what they needed to assess effectiveness of the project organization or the effectiveness of the procedures which implement the QA program. Rather than evaluating effectiveness, the auditors focused on compliance type issues, i.e., to what degree are personnel complying with procedures? Little or no evaluation of whether the procedures were adequate, too encompassing, clearly written, or efficient for accomplishing a task in a quality manner was addressed. Nor was efficiency of the management structure evaluated. The corporate organization is taking action to strengthen this area by reorganizing the audit program and emphasizing that their auditors evaluate management issues. However, the audit supervisor at the project seemed unsure (author's opinion) of exactly how he was to implement this new philosophy of auditing. Perhaps, this is due to the way auditors had been qualified for their position.

The American National Standards Institute (ANSI) standard which deals with auditor qualification does not address nor highlight

the ability of a candidate to evaluate management or quality system effectiveness as a necessary requirement. Rather, the standard is toned towards auditors being qualified to assess compliance issues. Field Study A personnel had, in the past, been qualified to the requirements of this standard and it is now being recognized that this is not sufficient for what management hopes to accomplish through their audit program.

The corporate QA management now views ANSI N45.2.23 as the minimum qualifications that must be met on an industry wide basis. They are of the opinion their auditors need to be much more qualified than the ANSI standard requires and they must be experts in the areas they will be required to audit. Corporate QA management is now establishing a six-tiered qualification program which requires the candidate to meet ANSI N45.2.23 before he can move to the second tier. The follow-on tiers, which encompass additional training, testing, and hands-on experience, are designed to heighten the evaluative powers of the auditor so he can make assessments of program effectiveness.

C. Qualification of QA Personnel in General

QA personnel at all levels of the organization (both in corporate and project) generally stated that they were much smarter now about QA/QC matters than they were earlier in the project. This indicates that experience has played a major role in developing full qualifications of personnel. During the mid-70's, they related good people were hard to find because the industry had so many

nuclear plants on order. Consequently, ideally qualified personnel could not always be obtained.

In reviewing the backgrounds of QA personnel at the project most started their careers in some field other than quality assurance, such as engineering or construction. Thus, these people tended to be technically oriented when first assigned to QA jobs. They were well prepared to address technical issues but perhaps, not so well prepared to address QA (management systems) issues. This is quite understandable in that schools offering curriculum in quality assurance are not great in number. Many people who are presently in the QA profession, have received their education through less formal means such as on-the-job training, self-study, seminars, and where available, college level courses. Many have entered the profession through circumstance rather than by design. This appeared to be the case at this project in at least two cases.

Specifically, the project QA manager has an engineering degree. His career has been solely with his present employer which started with the construction of fossil plants. Later, he was a maintenance supervisor at an earlier nuclear plant, and in 1974, an assistant construction manager at the present project. When his employer implemented a program action plan for improvement of QA approximately two years ago, the QC function was split from the engineering organization, and he subsequently was named to his present position. This individual reported he had not had any appreciable formal QA training. His QA knowledge appeared to be largely derived from on-the-job experience.

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The audit supervisor has a similar history. He is a graduate electrical engineer. He started working for this employer in 1968, at one of the first nuclear plants being built, as a construction engineer doing preoperational testing. In 1973, he transferred to this project and became involved in doing audit and surveillance over construction activities and was promoted to audit supervisor in 1976. Again, his knowledge of QA appears to be largely a result of experience. This should not imply that development of qualifications through on-the-job experience is not an acceptable practice. Other professional level personnel receive much of their training in this manner. For instance, the interview with the construction engineering manager pointed out that a new graduate may know how to use the tools of an engineer, but he generally will not be familiar with the engineering control process, the governing procedures, and business interfaces. Thus, a new graduate will be first put under the direction of an experienced engineer, who can monitor and proctor his progress. As the junior engineer develops his confidence and expertise, he is given more responsibilities until finally he is just as knowledgeable as the senior man. This process generally takes years before the individual can be relied upon as fully qualified.

D. Certification Versus Qualification

This organization was judged to have a comprehensive certification qualification program for QC personnel. It included the

Robert D. Shaw

verification of personnel skills for both NDE and non NDE, but also verification of procedure knowledge even when procedures were revised. Perceptions of inspector qualifications by engineering, managerial, and staff level personnel were related to be quite good. However, crafts people and their supervision were critical of inspector qualifications (as related by other study team members). Some of the criticism seems based upon jealousy. The crafts generally have decades of experience and resent an individual with an associate degree (or less) and a few months training judging the adequacy of craft work. Other criticism was rooted in the inexperience of the inspectors. Inspectors, who do not have much experience, are not fully aware of the craft processes, terminology, nor have they had a chance to hone their judgement. This unfamiliarity is perceived by the crafts as a lack of qualification. Problems in this area were recognized not only by the crafts people but also the QC inspectors and supervisors.

The experience factor plays a major role in fully qualifying other personnel as well. The corporate training and certification supervisor pointed out that development of judgement is what ultimately makes an individual fully qualified. A candidate may study, take written exams, pass practical exams, and ultimately be certified that he has passed the qualification requirements for a certain job. However, he may not be considered fully qualified for some years by his immediate supervisor. Specifically, he mentioned reactor operators. They may be qualified and certified through a formal training program but their supervisor would not

immediately trust them to act on their own or independently handle all jobs within the plant for which they were certified until maybe four to six years after certification. The upgrading of the auditor qualification program and the informal apprenticeship program used for engineering personnel are other examples.

Thus, it appears that formal qualification/certification programs tend to be primarily rites of passage. The certification only verifies that an individual possesses the prerequisite knowledge and base level experience for entry level effectiveness. Full qualification and total effectiveness of an individual does not occur until sometime later.

II. INTERVIEW "GEMS" AND OTHER SPECIFIC POINTS OF INTEREST

- A. Most people interviewed thought the qualifications of QA/QC personnel were quite good. They thought, however, that corporate probably had the best people.
- B. According to a senior level manager, who was responsible for training programs and certification, a corporate wide evaluation is taking place. He suspected that the results will show heavy emphasis on skills in some areas and heavy emphasis on procedure in others. He did not believe there was a unified approach to training across the organization and it will take sometime before it is sorted out. Training is not a top priority in the corporate

organization now. Not many people are being hired, and in some areas overstaffing exists. New people are being hired only in the lower levels of the organization.

An emphasis now is to get the QA people as qualified or more qualified than the people they are evaluating. The QA people, they feel, must have credibility to be received well and be effective. (Author's note -- From my experience, a QA man may not be effective regardless of how well qualified he is. If the right attitudes toward QA do not exist at the senior management level, a QA professional's ability to bring about needed changes will be limited.)

- C. Approximately a year ago, according to a senior level QA manager, the corporation realized that they were aggressive in finding deficiencies but not very aggressive in getting corrective actions. Major reorganizations have now taken place and the corporate structure has been streamlined. He thought the perception by others of QA was shifting from a "gotcha" type organization to a group which is helping assure things are going right. (There were still some non QA/QC people in the project that had their doubts. They appeared hopeful that a major change was coming but had not seen much change to date. These people were generally in the construction organization and senior project management.)

- D. Inspection supervisors were of the general opinion that inspectors, who have a two year associate degree with prior nuclear experience,

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seemed to be the best hires. Inspection group managers related they would prefer candidates for an inspection supervisor that had an engineering background (associate technical degree) as opposed to an inspection background. However, the candidate's personal qualities were generally related to be a more important consideration, than education, e.g., good interpersonal skills, innovative, possessing mature judgement, and integrity.

E. Most individuals when questioned about the adequacy of the Regulatory Guides and Standards did not have any real problems with the way they were written. All pretty well related the standards contained common sense approaches and the level of detail is appropriate. Some specific items did surface though:

1. Not much benefit was seen for the establishment of level qualifications for non NDE inspectors (in fact, this project does not use them).
2. One senior level manager was of the opinion that perhaps levels should be established for auditors. One level would encompass those who were qualified to do compliance type audits and another level for those qualified to do systems evaluative or quality of management audits.
3. The audit supervisor related problems with the flexibility phrases that exist in many standards such as "as required,

as applicable, and as necessary." These phrases are open to widely varying interpretation by the industry and the NRC. Does "as applicable" mean an individual's judgement can be used in determining the extent of implementing the requirement, if at all? Or does it mean a requirement must be imposed in its entirety if a case exists where the requirement applies? (This is the same type of problem that existed with "shall, may, and should" before their meaning was clarified.)

4. One inspector for the NRC held a completely different opinion of the Regulatory Guides. He stated if they were really any good, industry would not be taking so many exceptions.
- F. The NRC residents' opinions of the project's QC people were good. They thought, however, the QA people were too QC oriented. They relate very well to hardware issues but are not oriented very well to systems issues. The QA people were perceived as not doing the assessment/corrective actions that are needed to enhance the project and corporate's effectiveness.

One individual made the statement, "Good quality assurance has been lacking in the entire nuclear industry. Results are now becoming evident with situations like Zimmer, Marble Hill, and so forth."¹ In fairness to the QA organization, however, he did

¹Quote is not exact but does convey the intended meaning.

ROUGH DRAFT

not believe that the right attitude towards QA had existed in senior management until recently, and this attitude pervaded down through the organization limiting the effectiveness of the QA organization.

- G. The training program has a 90 day minimum period which must be met to certify an individual in non NDE. This requirement is to allow a candidate's on-the-job performance to be evaluated by his peers and his supervision, and provides a measure of confidence that the candidate is ready for certification. Acceleration of certification can be done in less than 90 days if the candidate's qualification circumstances warrant and the process is approved by management.

The basic non NDE qualification/certification procedure is as follows:

1. Candidate is given an orientation by his supervisor.
2. Candidate reads and studies procedures on his own.
3. Procedures are discussed with candidate with respect to interpretation and to develop an in-depth understanding of their contents.
4. Candidate is assigned to an experienced inspector for in-field skill development.

5. The candidate's progress is documented on a personnel progress record.
 6. When supervision determines candidate is ready, an application is submitted to the Procedures and Training Group to arrange for an examination.
 7. The candidate is tested and upon successfully passing, the records are sent to the vault and the certification listing is updated.
 8. Retraining is then accomplished on a group basis if procedure requirements change. Certifications are upgraded accordingly.
- H. The inspectors generally liked the highly structured qualification/certification program for the non NDE areas. It caused upgrade of the inspection procedures and resulted in much more uniform examinations by the inspectors.
- I. The inspectors thought that while the acceptance standards were clear in their own mind, the standards were not all that clear to the crafts. The inspectors were of the opinion that craft qualification was too skills oriented. Their qualification program should also encompass acceptance standards.
- J. Visual inspection standards cause the most problem with respect to interpretation. Difficulties are experienced getting crafts, QC, and engineering to agree in some cases.

- K. A contractor site manager related an interesting perspective on the qualifications of inspectors. From his previous experience in ship building, the inspectors were "graybeards" and recognized as experts. They had been in the business a long time, made decisive judgments on acceptability or rejection, and their interpretations were not questioned. The nuclear industry has focused on young inspectors. Some of these are inexperienced and not fully qualified to interpret questionable areas which occasionally occur. Until they develop a broad experience base, they need to consult with their peers and sometimes even a Level III. This has led to questioning by the crafts of the inspector's qualifications. He stated, this project had the "wiskered" types but could benefit from more of them.

III. OWN IMPRESSIONS AND AREAS FOR FUTURE INVESTIGATIONS

- A. It appears there has been a slow maturation process going on in the corporate organization and on this project in its attitudes towards and understanding of QA not unlike what was seen at other utilities, who participated in the case studies program.

Attitudes and approaches towards QA/QC in the early days of Field Study A's nuclear construction closely paralleled the practices used on fossil plants. Engineers were largely responsible for the quality of the systems they were responsible for engineering. They performed the QC function. Later, the QC function was split into a separate organization to obtain the needed independence

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from the engineers to ensure independence from cost and schedule pressures.

There seems to be an awareness now that the Regulatory Guides and standards are practical and the corporate organization is now committing to more of them for their future operations. Commitment in the early days was not extensive. There also seems to be an understanding that the guides and standards may contain only the minimal requirements for good control.

Recognition of the benefits of a good QA program seems also to be emerging. Well qualified QA people are now in the corporate staff and changes are in progress to streamline and improve the QA organization and QA/QC processes within the company. Procedures have been made more uniform on a corporate wide basis. Upper level procedures set the tone of the project procedures. This was not always the case. Projects in earlier years tended to be unique unto themselves with respect to procedures and organization.

The audit process is now seen to be a much more powerful tool than it was previously. More authority and responsibility for assessing the effectiveness management systems is being given the audit group. Corporate is also moving towards upgrading the qualifications of their auditors.

This does not mean, in the author's opinion, that the project has had a total change in attitude and acceptance of QA. The

attitudes will be slow to change. Most of the personnel, at least in supervisory and management ranks, have spent their entire working careers with this one "corporation." The policies and practices which worked so well on fossil plants are not easily forgotten and some times difficult to overcome. Typical of some of these old attitudes that will die slowly were verbalized by a senior construction manager who said "Some inspectors seem to inspect to reject and not to accept. I would like to see them use more judgement in their inspections."² He then related they should be able to accept fillet welds that were slightly oversize or weld undercut that was slightly outside the acceptance criteria or other out-of-tolerance conditions that would not hurt product serviceability.

Overall, there has been an enlightenment within this "corporation" on how to make QA more effective, especially at the corporate level. Many changes have happened and are happening for the betterment of QA. Previously, the QA personnel filled the role that senior management expected them to fill; basically compliance verification. Now QA is expected to take on a significantly different role -- QA systems effectiveness assessment. How successful QA will be in this new role will depend not only on the qualifications of the individuals, but the enlightenment of senior management.

²Quote is not exact but sufficient to convey the intended meaning.

B. The informal on-the-job training apprenticeship of new QC inspectors was seen to be a valuable aid in establishing baseline qualifications for inspectors. The apprenticeship, however, went beyond the individuals point of certification. As stated by many interviewees, an individual does not become fully qualified until perhaps years have passed. The question that arises now is how much experience and on-the-job training must an individual have before becoming fully qualified recognizing that the value added by experience follows a law of diminishing returns? At one extreme, it may be advanced that an individual is sufficiently qualified if he knows the tools of the trade and can perform the job adequately or recognize when he should seek a superior's guidance. At the other extreme, he would be in the expert category. An individual who is looked upon as knowing all. The answer lies somewhere along this spectrum.

C. Items for Future Study

1. What experience levels should candidates for certification have? At what point does development of their judgement from on-the-job experience make them adequately qualified?
2. Would recognition of a management level auditor versus a compliance auditor be beneficial?
3. Establishment of utility attitudes towards QA as an organization and a philosophy. (Incorrect attitudes will make a QA

organization ineffective regardless of personnel qualifications.)

4. Skills qualification versus procedure qualification should be investigated more fully.
5. What are the qualifications of individuals holding QA positions? What kind of formal training do they have? How did they pick up on QA as a career? Do they hold any professional licenses or certifications?
6. How decisive are QC personnel in rendering acceptance/rejection decisions? Can newly qualified personnel address nearly all questionable areas or do they frequently seek help?
7. Are interpretation disputes between crafts and QA/QC organizations on acceptance/rejection criteria really based on the criteria or is it due to a hold over of fossil attitudes? (It is close enough even though it does not meet the criteria.)
8. Assess the qualifications of QA/QC personnel during the mid-70's when nuclear construction was at its peak to what exists now in a particular utility. Also, include NRC resident inspectors.
9. How uniform are interpretations of the Regulatory Guides and standards dealing with personnel qualifications between the utilities to be visited? What exceptions are being taken and for what reasons?