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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

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Before Administrative Judges:

James L. Kelley, Chairman
Dr. Richard F. Foster
Dr. Paul W. Purdom

SERVED JUL 8 1984
SERVED JUL 2 1984

In the Matter of
DUKE POWER COMPANY, et al.
(Catawba Nuclear Station,
Units 1 and 2)

Docket Nos. 50-413
50-414

ASLBP No. 81-463-06 OL

PARTIAL INITIAL DECISION

June 22, 1984

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

84 JUN 25 10:12

Before Administrative Judges:

James L. Kelley, Chairman
Dr. Richard F. Foster
Dr. Paul W. Purdom

SERVED JUN 21 1984

SERVED JUL 2 1984

In the Matter of
DUKE POWER COMPANY, et al.
(Catawba Nuclear Station,
Units 1 and 2)

Docket Nos. 50-413
50-414
ASLBP No. 81-463-06 OL

PARTIAL INITIAL DECISION

Appearances

J. Michael McGarry, III, Anne W. Cottingham, and Mark S. Calvert,
Washington, D.C., and Albert V. Carr, Jr., and Ronald L. Gibson,
Charlotte, North Carolina, for the Applicants, Duke Power Company,
et al.

Robert Guild, Columbia, South Carolina, and John Clewett, Washington,
D.C., for the Intervenor, Palmetto Alliance.

Jesse L. Riley, Charlotte, North Carolina, for the Intervenor, Carolina
Environmental Study Group.

George E. Johnson and Bradley Jones for the Nuclear Regulatory
Commission Staff.

Richard P. Wilson for the State of South Carolina.

SCOPE OF DECISION

Duke Power Company ("Duke"), North Carolina Municipal Power Agency Number 1, North Carolina Electric Membership Corporation and Saluda River Electric Cooperative (the "Applicants") are the joint owners and applicants for operating licenses for Units 1 and 2 of the Catawba Nuclear Station. Duke is the lead applicant and has exclusive responsibility for the design, construction and operation of the facility.

This proceeding was contested with respect to a broad quality assurance contention, two relatively narrow technical contentions, and numerous emergency planning contentions. This Licensing Board now decides the quality assurance contention (with certain reservations) and the technical contention concerning embrittlement of the reactor pressure vessel in the Applicants' favor. We decide the other technical contention, concerning meteorology and accident analyses, against the Staff and the Applicants and in favor of the Intervenors.¹ Notwithstanding adverse findings on certain subsidiary quality assurance issues and our decision unfavorable to the Staff and Applicants on one

¹ The Board heard a third technical contention concerning safety aspects of spent fuel storage. The Intervenors elected not to file any proposed findings of fact on that contention, Palmetto Contention 16, although directed by the Board to do so. Order of December 30, 1983. We cautioned the parties in our Order that failure to file timely findings could result in our treating the contention as uncontested. Palmetto Contention 16 is dismissed. See 10 C.F.R. 2.754(b) and 2.760a.

technical issue, we find that, subject to the resolution of certain unresolved issues over which we are retaining jurisdiction (see p. 272, below), the reasonable assurances requisite to authorization of a low power operating license are present. We authorize the Director of Nuclear Reactor Regulation to issue such a license, on condition that the unresolved issues are first resolved in favor of the Applicants. A separate Licensing Board will decide the emergency planning contentions at a later date.

BACKGROUND AND SUMMARY

I. FACTUAL AND PROCEDURAL BACKGROUND

A. The Facility

The Catawba facility is located on the shore of Lake Wylie in York County, South Carolina, approximately 10 miles southwest of the Charlotte, North Carolina city limits. The facility contains two pressurized water nuclear reactors, designed to operate at core power levels up to 3411 thermal megawatts, with a net electrical output of 1145 megawatts per unit.

B. The Parties

Permits to construct the facility were issued, following hearings, in 1975. Duke Power Co. (Catawba Nuclear Station), 1 NRC 626 (1975). In June 1981, the Commission published in the Federal Register (46 Fed. Reg. 32974) a notice of receipt of an application for operating licenses

for the Catawba Facility. In response to that notice, petitions to intervene were filed by Palmetto Alliance (Palmetto), Carolina Environmental Study Group (CESG), Charlotte-Mecklenburg Environmental Coalition (CMEC), Safe Energy Alliance (SEA), and the State of South Carolina. The Board subsequently admitted Palmetto, CESG, and CMEC as parties to the proceeding.² The petition of the State of South Carolina to intervene as an interested state, pursuant to 10 C.F.R. § 2.715(c), was also granted.

C. The Contentions

The intervening parties filed a total of fifty-two different contentions, some of which were sponsored by two parties. The Applicants and NRC Staff separately opposed most of these contentions. The Board initially admitted twenty-five contentions subject to certain specified conditions, and admitted one contention unconditionally. 15 NRC 575-583. At the request of the Applicants and the Staff, we referred to the Appeal Board certain questions relating to standards for admission of contentions. 15 NRC 1746. Following the Appeal Board's decision (16 NRC 460), we reconsidered our initial conditional-admission rulings and admitted unconditionally, in whole or in part, eleven of the twenty-five contentions previously admitted on a conditional basis.

² The SEA petition was denied because SEA did not file contentions in support of its initial petition and failed to appear at the January
(Footnote Continued)

Several important documents, including the Staff's Draft Environmental Impact Statement ("DES") and the off-site emergency plans, first became available following the Board's initial rulings on contentions. The Board issued a series of rulings on contentions lodged against the DES, their effect being admission of three such contentions and rejection of twenty others. The net result was that the Board considered seventy-five contentions (exclusive of emergency planning contentions), rejecting sixty-two and admitting thirteen, at least for discovery purposes.³

(Footnote Continued)

1982 prehearing conference. SEA did indicate that its interests would be represented by CMEC. Memorandum and Order of March 5, 1982, 15 NRC 566, 568.

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In addition, the Board has considered several late contentions filed after the evidentiary hearing relating to the back-up diesel generators, financial qualifications, certain postulated hydrogen accidents and control room design. We rejected the Intervenor's initial diesel generator contentions based upon our balancing of the five "lateness" factors. Tr. 12,541-50. Order of April 13, 1984. This Board raised a diesel generator contention sua sponte, but that contention was found by the Commission to be inappropriate for sua sponte treatment. Order of June 8, 1984. As to the Intervenor's June 21, 1984 motions on diesel generator contentions, see p. 272, below, n.50. All of the remaining late contentions are now, for various reasons, rejected. The Commission's Statement of Policy of June 7, 1984 requires rejection of the financial qualifications contention. We reject the hydrogen accident and control room design contentions essentially for the reasons advanced by the Staff. See Staff Response dated May 2, 1984. Briefly, the hydrogen accidents are rejected because final Commission action on a generic rule addressing the same concerns is expected before the anticipated date of full power operation of Catawba. As to the control room design contentions, the Intervenor has failed to show good cause for their lateness or that they could make a substantial contribution to resolution of those issues.

Toward the close of discovery, the Applicants and Staff filed motions for sanctions against Palmetto seeking dismissal of several contentions for failure to meet discovery obligations. This motion was granted in part and two contentions were dismissed. 17 NRC 1121. In June 1983, CMEC and the Applicants submitted a stipulation to settle CMEC's four contentions. The Board approved the stipulation and dismissed CMEC as a party to the proceeding.

After discovery on the remaining contentions was completed, the Applicants and Staff filed motions for summary disposition on all the remaining contentions. The Board granted several of those motions in whole or in part, leaving parts of four contentions for hearing:

- Palmetto Contention 6, relating to quality assurance (QA);
- Palmetto Contention 16, relating to the storage of spent fuel;
- CESG Contention 18 (also Palmetto Contention 44), relating to the embrittlement of reactor pressure vessels; and
- Joint Contention 17, relating to assessment of adverse meteorology in accident analyses.

The texts of these contentions are set forth in our discussion of each contention.

D. The Hearings

Hearings were conducted in Rock Hill, S.C., and Charlotte, N.C. for forty-five days, running continuously from October 4, 1983 to December

16, 1983 (with a recess week for Thanksgiving) and resuming on January 30 and 31, 1984. All parties were represented by counsel, presented evidence, and cross-examined witnesses. The Board heard testimony from 85 witnesses called by the parties - 68 by the Applicants, 4 by the Intervenors, and 13 by the Staff. In addition, we called 4 Board witnesses (see discussion of the in camera witnesses below). The transcript -- most of it devoted to cross-examination -- exceeds 14,000 pages; over 280 exhibits were admitted into evidence. Subject to certain narrow exceptions, the record was closed on December 16, 1983.⁴ Thereafter, each party submitted extensive proposed findings of fact and conclusions of law.

E. Further Comments on Certain Procedural Rulings

The Board rendered scores of procedural rulings during the hearing, assigning brief reasons for most, and providing more detailed explanations of complex or unusual rulings. In the main, we believe that those procedural rulings were adequately addressed on the record and we have nothing to add here. There are a few matters, however, on which some further comment is warranted.

⁴ Tr. 11,909-10. Five in camera issues were carried over to the January 30-31, 1984 hearings. The record was closed as to those remaining matters on January 31, 1984. Tr. 12,418-19.

1. Time Limits on Questioning Witnesses

The Board did not initially impose any time limits on questioning of witnesses; counsel for the various parties were allowed such time as they thought necessary. However, after several days of hearings it became apparent that some system of time limits would be necessary -- particularly on cross-examination -- to enable the case to progress at a reasonable rate. The Board began to impose ad hoc limits on questioning time -- e.g., finish cross-examination of the current panel by noon tomorrow -- and called for comment from the parties on appropriate time limit guidelines for the rest of the case. Tr. 2814-16; 2839-43. The Applicants and NRC Staff favored Board imposition of time limits on all questioning. Tr. 3300-27. Palmetto Alliance, while seemingly conceding that the case should be heard in an approximate time frame (Tr. 3334), nevertheless opposed any time limits on particular witnesses as "arbitrary and capricious." Tr. 3331.

Following extended discussion of the matter, the Board adopted ground rules to govern questioning time for the remainder of the hearing. Tr. 3744-52. At that time, several panels of Applicant, Intervenor and Staff witnesses remained to be heard. Based on our experience in the hearing to that point and the length and complexity of the prefiled testimony, we allocated two hearing days for cross-examination of each panel and about one-half day for questions by the other parties and the Board. Recognizing that counsel might wish to spend more time cross-examining one panel than another, we authorized them to transfer time among panels simply on notice to the Board --

e.g., three days for Panel X but only one day for Panel Y. Tr. 3750. We also authorized counsel to apply for additional time where that appeared to be justified. Id. These rules worked smoothly for the remaining panels of Applicant and Staff witnesses. In fact, as Counsel for Palmetto Alliance noted, he finished his cross-examination of panels on or before his two-day allocations expired. Tr. 5716.

The administration of fair and effective time limits proved somewhat more difficult with the welding inspector and first line supervisor witnesses. The list of people in these categories was long -- thirty-five names -- and all parties agreed that some of them represented important witnesses. The Board initially thought that we might usefully spend about six days on these witnesses, with three days for the few most important witnesses, and another three days for many of the rest. Tr. 3747-48, 5707. Under that approach, we might have spent an average of two or three hours each for all questioning of the "important" witnesses, and less on the others.

As matters developed, the parties stipulated to a list of nine "important" witnesses (from among the thirty-five names), six of whom were considered more "important" than the other three. Tr. 5707-16. We actually spent about six days (November 3, 4, 8-11) in questioning those six witnesses, most of it on cross-examination by Palmetto Alliance.⁵

⁵ For example, Palmetto was allocated about four hours each for cross-examination of Inspectors Bryant (Tr. 6086, et seq.) and
(Footnote Continued)

We then spent about three more hearing days (November 28-30, December 1) on nine more welding inspectors/supervisors, for a total of nine days on that category of witness.

We had recognized that it would be more difficult to establish fixed times in advance for questioning the welding inspector/supervisors than had been the case with the panels, chiefly because the number and complexity of their concerns varied widely. Tr. 3747. We proceeded largely in an ad hoc fashion, setting a tentative time limit when a witness began, but granting extensions when warranted. Tr. 6265, 6588, 6781-82. In a few instances, Palmetto "borrowed" time from one witness to use on another. E.g., Tr. 9028. On the whole, the system worked reasonably well.

Essentially the same time limit ground rules were followed for the remainder of the case, which included Staff witnesses on Contention 6, witnesses for all parties on the technical issues, and the Board's in camera witnesses. The Board tended to establish somewhat shorter time limits toward the end of the case, particularly on technical witnesses and witnesses on the in camera concerns. This was justified in the case of the technical witnesses because the issues were relatively narrow and positions were fully set forth in pre-filed testimony. Similarly, the

(Footnote Continued)

Rockholt. Tr. 6184, et seq. Supervisor Beau Ross was on the stand for two days, with about one day devoted to Palmetto cross-examination. Tr. 6585-6824, 6947-7091. Between them Messrs. Ross and Bryant had expressed about three-quarters of the total concerns of the welding inspectors.

in camera concerns were relatively narrow and specific (see p. 209, et seq. below), in contrast to the broad scope of Contention 6.

Palmetto Alliance questioned our authority to set any time limits on cross-examination. Such authority is recognized in the federal district courts. See MCI Communications Corp. v. American Telephone and Telegraph Co., 85 F.R.D. 28 (N.D. Ill. 1979), aff'd. 708 F.2d 1081, 1170-73 (C.A. 7, 1983). We believe that time limit authority for Licensing Boards is fairly inferable from the federal cases, the NRC Rules of Practice (which include authority to "prevent repetitious or cumulative cross-examination" (10 CFR 2.757(c)) and to "regulate the course of the hearing" (10 CFR 2.718(e)), and from the Commission's Statement of Policy on Conduct of Licensing Proceedings, 13 NRC 452 (1981). The whole thrust of that Statement is toward fair but timely hearings and Boards are explicitly directed to "set and adhere to reasonable schedules." A Licensing Board can hardly be expected to adhere to a "reasonable schedule" if the time for cross-examination, the most time-consuming part of the process, is beyond its control.

Boards can make reasonable estimates about how long it should take to question particular panels or witnesses, so long as reasonable flexibility is incorporated into the ground rules. We believe that our rules allowing a party to transfer allocated time among witnesses and to seek more time as circumstances might warrant were an adequate protection against arbitrary limits. Furthermore, our experience with time limits in this case indicated that a cross-examiner under some time pressure to get his questions asked tended to present a more

effective cross-examination than one whose questioning is limited only by his stamina and imagination.

2. Genesis of the In Camera Proceeding

As part of the evidentiary hearing on Palmetto's Contention 6, the broad quality assurance contention, the Board called several former Duke employees to testify in camera as Board witnesses. This, of course, represented a departure from the normal hearing practice, where witnesses are called by one of the parties and the subjects of their testimony usually have been explored in discovery. The in camera proceeding grew out of the following circumstances.

In early 1983, months before the evidentiary hearing, Palmetto had moved for various kinds of relief to counteract a "chilling effect" that certain actions of Duke had allegedly had on the willingness of employees at Catawba to cooperate with Palmetto. Among other things, Palmetto asked the Board to write a letter to the employees about their rights to communicate with Intervenors and the NRC, and to sponsor informational meetings involving the Board, Palmetto and the employees. The Board granted some relief, but denied these particular requests. Based on the pleadings then before us, we acknowledged that some "chill" on employee cooperation probably had occurred. We concluded, however, that an evidentiary hearing on "chilling" and related issues, with the expenditure of time and resources that would involve, was not warranted at that time. 17 NRC 674.

Shortly after the evidentiary hearing began, Palmetto renewed its motion for the same relief, its counsel contending that there existed "an atmosphere of oppression and a chill upon the potential cooperation of workers at the Catawba Plant that prevents their cooperation with this Licensing Boardi" Tr. 1738. In addition to the existing record, Palmetto cited statements from the prefiled testimony of one of its witnesses (Tr. 1742-43) and two of the Applicants' witnesses indicating that an atmosphere of harassment and intimidation might exist at Catawba. Tr. 1745-46. Palmetto asked the Board to hold an in camera hearing on whether workers at Catawba had been deterred from coming forward with evidence of a quality assurance breakdown. The Applicants and NRC Staff opposed the motion. Tr. 1764-94.

The Board found itself confronted with a dilemma. On the one hand, the scheduled evidentiary hearing was just getting underway and promised to occupy the Board and parties fully for many weeks. As we saw it, to scrap the established hearing schedule in favor of an impromptu and lengthy hearing on an alleged "chill" at Catawba would be quite costly in party and Board time and effort. Tr. 2466-67, 2474, 2609-10. We also expected to receive at least some evidence on the "chill" question from the scheduled witnesses. On the other hand, we thought it necessary to take some appropriate action to ensure that "reluctance [of workers] to report safety violations or deficiencies" is not a "serious or pervasive problem" at Catawba. See Union Electric Co. (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 366 (1983).

In these circumstances, we again denied the particular forms of relief sought by Palmetto, partly for lack of an adequate evidentiary basis. Tr. 2610. In the alternative, however, we issued a public notice inviting present or former Duke employees at Catawba having personal knowledge of defects in construction or quality assurance to submit a confidential statement to the Board, indicating that such statements might lead to an in camera hearing. The full text of the notice is set forth in the margin.⁶ We directed Duke to post the notice

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UNITED STATES

NUCLEAR REGULATORY COMMISSION

NOTICE

The Atomic Safety and Licensing Board is presently holding a hearing concerning quality assurance procedures and the quality of construction of the Catawba nuclear facility, particularly in the area of welding inspection. The parties in the case are Duke Power Company, the NRC Staff, and Palmetto Alliance, an intervenor group. Any present or former employee at Catawba who has personal knowledge about significant defects in construction or in quality assurance procedures at Catawba may submit on a confidential basis to the Board alone a statement which provides the following information:

1. The person's name and telephone number and/or address.
2. A brief description of the concern.
3. A brief explanation of why the individual desires his concern to be expressed in closed, rather than public, hearings.

The Board will review any statements it receives and then decide, in consultation with counsel for the parties to the case, whether and how to conduct a closed hearing in which the identities of the witnesses would be kept confidential. The Duke Power Company's attorney and
(Footnote Continued)

prominently at the site. Tr. 2481, 2603. Area media also publicized its terms. Persons wishing to submit statements to the Board were given about nine days to do so. In issuing the notice as a prophylactic measure, we made it clear that we were making no findings,

(Footnote Continued)

possibly another representative of the company would attend the closed hearing, as well as representatives of the NRC Staff and Palmetto Alliance. However, they would be ordered not to disclose the identities of the witnesses. The prospective witnesses should realize that under this procedure, their identities would be substantially protected from any further disclosure, but complete protection from such disclosure would not be guaranteed.

Confidential statements must be filed with the Board by the deadline date of October 21, 1983. Statements may be delivered to the Board in a sealed envelope at the Office of the Clerk in the Federal Courtroom in Rock Hill at Old Post Office Building, Second Floor, Caldwell and Main Streets, Rock Hill, South Carolina, or to the Ramada Inn in Rock Hill (at I-77 and 21 North) where the Board is staying. Statements may be delivered personally or by an intermediary.

October 12, 1983

Rock Hill, S.C.

THE ATOMIC SAFETY AND

LICENSING BOARD

/s/ James L. Kelley
James L. Kelley, Chairman

/s/ Richard F. Foster
Richard F. Foster, Member

/s/ Paul W. Purdom
Paul W. Purdom, Member

one way or the other, on whether a "chill" on employee cooperation existed at Catawba. Tr. 2609-10.

Three former Duke employees came forward in response to the notice on a confidential basis. One of the three, Mr. Howard S. Nunn, Jr., later waived confidentiality and testified in public session. A fourth former employee, Mr. Harry Langley, came forward publicly; as a matter of convenience, we also addressed his concerns largely under the in camera procedures. The particular concerns voiced by the in camera witnesses are discussed below. The further procedural history of the in camera proceeding is, we believe, adequately reflected in the record.⁷ We add a few words, however, on the question of discovery.

3. Request for Formal Discovery

Immediately prior to the evidentiary hearing on the in camera issues, Palmetto made a belated request for postponement and formal discovery on those issues (I.C. Tr. 534-42), which the Board denied. The principal bases for that ruling are set forth in the record. Tr. 11,217-21. We add the following points to provide a fuller statement of our views.

First, contrary to its apparent claim (I. C. Tr. 534), Palmetto was not automatically entitled to formal discovery on the in camera concerns

⁷ A helpful summary of that history is set forth at pp. 2-5 of the NRC Staff's January 5, 1984 Opposition to Palmetto's Motion for Directed Certification of Board Ruling Denying Further Discovery.

as a matter of right under the Rules of Practice. Under 10 C.F.R. § 2.740(b)(1), discovery is based only on an admitted contention. Discovery begins after the first prehearing conference and concludes before the final prehearing conference, except upon leave of the Board for good cause shown. The in camera concerns were not themselves individual "contentions;" they were merely examples of matters that fell within the broad scope of Contention 6. A brief chronology will place this aspect of the matter in perspective. Discovery on Contention 6 began in December 1982 (16 NRC 1795, 1810) and closed in May, 1983, subject to an extension the Board granted to allow Palmetto until mid-July to conduct depositions concerning quality assurance concerns in welding. 17 NRC 1121. The final prehearing conference on Contention 6 was held on September 12, 1983 and hearings began on October 4, 1983. The in camera concerns were first expressed on November 8-10, 1983. Palmetto's motion for still more discovery on Contention 6, based on the in camera concerns, was not made until December 13, 1983, three days before we largely closed the record on that Contention.

As this chronological outline suggests, it would be impractical to recognize formal discovery rights based on a broad range of employee concerns that surface late in the case, as they did here. At least if the full panoply of discovery devices were to be allowed -- depositions, interrogatories, motions to compel, answers, etc. -- it might take several additional months to complete the proceeding. This would mean, in turn, that the Commission's policy of attempting to complete operating license proceedings before the Applicant's anticipated fuel

load date probably could not be implemented in some cases, including this case.⁸ In our judgment, such a delay should not usually be necessary for a "fair and thorough hearing process", and certainly was not necessary in this case. See Statement of Policy on Conduct of Licensing Proceeding, 13 NRC 452, 453 (1981).

More importantly, except in unusual circumstances not presented here, formal discovery on particular quality assurance concerns raised by individual employees is not necessary for an adequate exploration of the concern. This is because such concerns, if they are to assist the Board's broader assessment of quality assurance, must be particularized and based on personal knowledge. For example, an employee might report that a particular weld on a particular pipe in a safety system is defective. The Applicants and Staff can then investigate the concern and present responding evidence, as they did in this case, and the Intervenors and the Board can question the witnesses effectively, as was done here, without prior formal discovery. To be sure, if the employee's concern were to be substantiated, it may also be necessary to consider whether the defect has generic ramifications for other systems. However, a Board would not normally look to employee witnesses to raise generic concerns beyond their personal knowledge of the facts.⁹ It is

⁸ When this issue was before us in December 1983, the anticipated fuel load date for Catawba was May 1, 1984.

⁹ For example, we focused carefully on the particular welding
(Footnote Continued)

the broader generic concerns -- not individual pipes and concrete pours -- on which prehearing discovery may be necessary.

II. SUMMARY OF DECISIONS ON QUALITY ASSURANCE ISSUES

This section summarizes the detailed findings of fact in the following section on the most significant issues presented by Palmetto Alliance Contention 6 concerning quality assurance. It is intended to provide a relatively brief narrative description, essentially an overview, of how those issues have been decided, and why. Our findings on the two relatively narrow technical issues -- relating to pressure vessel integrity and meteorological conditions -- are brief and require no summary.

A. Regulatory Standards

Palmetto Contention 6, as revised by the Board, reads as follows:

Because of systematic deficiencies in plant construction and company pressure to approve faulty workmanship, no reasonable assurance exists that the plant can operate without endangering the health and safety of the public.

(Footnote Continued)

concerns of former employee Howard S. Nunn, an experienced welder. But we did not pursue Mr. Nunn's broader, nonspecific concerns about defective steel in the facility. Mr. Nunn is neither an engineer nor an metallurgist. Nunn, Tr. 12,180, 12,183.

In our Order admitting this contention we noted that it "concerns alleged 'corner cutting'" and that its thrust was ". . . primarily toward alleging company attitudes and practices; proof of this contention . . . involv[es] specific instances of misfeasance" 16 NRC 1791, 1795 (1982).

This broad quality assurance ("QA") contention potentially implicates several different regulatory standards. In the first place, conduct like that described in Contention 6 would violate the Applicants' own QA program, a detailed program Duke was required to develop, adopt and adhere to by the NRC's basic quality assurance regulation, 10 CFR Part 50, Appendix B. Moreover, some conduct within the scope of Contention 6 might also violate one or more provisions of Appendix B itself. However, in the context of an operating license proceeding like this one, proof that conduct has occurred that violates a licensee's QA program, or Appendix B, or both -- whether deliberate or negligent -- does not necessarily mean that the license application must be denied. The most detailed guidance on that question is provided by the Appeal Board's Callaway decision. Union Electric Co. (Callaway Plant), ALAB-740, 18 NRC 343 (1983). There the Appeal Board stated that (Id. at 346).

In any project even remotely approaching in magnitude and complexity the erection of a nuclear power plant, there inevitably will be some construction defects tied to quality assurance lapses. It would therefore be totally unreasonable to hinge the grant of an NRC operating license upon a demonstration of error-free construction. Nor is such a result mandated by either the Atomic Energy Act of 1954, as amended, or the Commission's implementing regulations. What they require is simply a finding of reasonable assurance that,

as built, the facility can and will be operated without endangering the public health and safety. . . . Thus, in examining claims of quality assurance deficiencies, one must look to the implication of those deficiencies in terms of safe plant operation.

Obviously, this inquiry necessitates careful consideration of whether all ascertained construction errors have been cured. Even if this is established to be the case, however, there may remain a question whether there has been a breakdown in quality assurance procedures of sufficient dimensions to raise legitimate doubt as to the overall integrity of the facility and its safety-related structures and components. A demonstration of a pervasive failure to carry out the quality assurance program might well stand in the way of the requisite safety finding.

In the light of this guidance, we have scrutinized the Contention 6 record to determine whether it reflects a "pervasive failure" or "breakdown" of the QA program at Catawba, such that the requisite reasonable assurance finding cannot be made. Although, as one would expect, we find violations of the QA program and Appendix B, we find no pervasive failure or breakdown. On the contrary, we find that, on the whole, the Duke QA program at Catawba worked well.

B. Welding Inspector Concerns

1. Background

In July 1981, Duke informed the welding inspectors and certain other categories of its employees that their pay would be reduced, based upon a reanalysis of applicable qualifications. During the Fall of 1981, certain welding inspectors who were appealing the pay reduction began to express concerns to management about safety issues. Duke's primary response was to establish several task forces to investigate the

concerns and make recommendations to senior management. The validity and extent of these welding inspector concerns and the adequacy of Duke's investigations and corrective measures were the principal focus of the hearing on Contention 6.

The welding inspectors who expressed concerns performed a visual inspection function, in contrast to other types of inspectors who used liquid penetrant, magnetic particle, radiographic and ultrasonic examination techniques. Visual inspection is usually not the only inspection of a safety-related weld. Many safety-related welds are also inspected by one or more NDE techniques.

Detailed quality assurance procedures establish the parts of construction processes that are to be inspected, and when. For example, for certain classes of welding, 'hold points' are established so that required in-process inspections can be performed. Inspectors determine acceptability by referring to acceptance standards established in QA Procedures and Design Specifications.

When an inspector discovers a discrepancy, he may use one of several corrective methods, depending on the circumstances. Thus, where "hold points" have been established, the inspector makes the welder aware of the deficiency, the deficiency is corrected to the inspector's satisfaction, and the inspector signs off on the item. Under this method, no documentation is required, other than the inspector's sign-off.

Another method used by quality assurance inspectors to require corrective action involves the use of deficiency reports. In the

welding area until mid-1982 the principal report form used to document deviations from procedures was the 'Nonconforming Item Report', commonly referred to as an 'NCI'. Generally speaking, the inspector describes the discrepancy on the form and the form is processed for further evaluation. The resolution is then reassigned to the appropriate construction department for engineering evaluation, which is in turn approved by quality assurance engineers. Typical resolutions of an NCI might be to require corrective action on the hardware involved, or to require further testing, or to accept the hardware as is. Since most of the welding inspector concerns stem from the period prior to 1982, much of the testimony focuses on the origination of NCIs, the reviews for validity by QA supervision, and the resolutions established after engineering evaluations by the construction and quality assurance departments.

The first Duke task force to consider the welding inspectors' concerns was constituted in December 1981 to determine whether significant problems existed and, if so, to estimate their size and scope. It brought to management attention many of the inspectors' concerns and made several constructive recommendations that were to be implemented later on. Its creation evidenced the fact that Duke management was taking the inspectors' concerns seriously. And it led to the creation of two additional task forces, to which we turn next.

In January 1981, Duke established the "Technical Task Force" to investigate all of the technical concerns of the Catawba welding inspectors and to take or recommend any necessary corrective action.

The task force was composed of five senior engineers from four different departments, including QA and Construction.

The Technical Task Force followed a formal plan of six major phases: (1) data collection and review; (2) technical evaluation; (3) development of results and recommendations; (4) management review and implementation of recommendations; (5) inspector feedback; and (6) final report. It first sought to obtain all the concerns of the welding inspectors, in writing. Although some inspectors may not have felt free to state all their concerns, the Board nevertheless concluded that virtually all of the significant concerns were conveyed to the task force.

The Technical Task Force then undertook an analysis of each welding inspector's technical concern, in the following format: each of the handwritten concerns, coded by inspector, was attached to a form entitled "Technical Evaluation - Individual Concern", in which the concern is stated, the technical evaluation is documented, and recommendations are made; a separate form called "Verification - Individual Concern", accompanies each evaluation, and is signed by a different evaluator; the technical evaluations identify whether the concern had a specific basis, e.g., an NCI number; whether a criterion (procedure) was actually or potentially violated; and whether an actual or potential technical inadequacy existed.

The adequacy of the Task Force's individual technical evaluations is summarized below. Suffice it to note here that the Technical Task Force did not classify any of the concerns as actual technical

inadequacies. However, there were "potential technical inadequacies" associated with 24 concerns. Follow-up on these was left to the QA, construction or Design Engineering Departments.

In addition to the individual technical evaluations, the Technical Task Force reached these overall conclusions: (1) problems were arising from the "interface" between inspectors, their supervisors and craft personnel; (2) procedure interpretation and implementation was a major area of concern; (3) procedural changes could alleviate some of the concerns. These conclusions led to a number of general policy and specific action recommendations which were assigned to various departments for implementation. Except for some disagreements on evaluations of particular technical concerns, we find that the Technical Task Force and the implementation of its recommendations were appropriate responses to technical aspects of the welding inspectors' concerns.

In February 1982, Duke appointed a "Non-technical" Task Force to review "non-technical" concerns that had been raised by the Catawba welding inspectors. The Task Force conducted a paper review (as distinguished from personal interviews) of each of the welding inspectors concerns and compiled a list of non-technical concerns. Although a sharp distinction could not always be made, generally speaking a concern dealing with administrative or personnel matters was considered "non-technical." The Task Force then engaged in a limited amount of information gathering, including interviews with a few inspectors. The Task Force concluded that several areas needed

management attention, including communications, channeling employee concerns to management, and the inspector's role in relation to craft. Its report to management included several recommendations for corrective action: training supervisors in communication skills, explaining to inspectors their role and responsibilities, recourse procedures for both technical concerns and incidents of harassment.

Palmetto Alliance alleges that "no serious effort was made [by the Non-Technical Task Force] to determine the factual validity of any of the non-technical concerns." The Board largely agrees. That Task Force never set out to investigate the underlying facts of concerns, but only what the concerns were, whether valid or not. In other words, the concerns were taken as given.

Nevertheless, the Board believes that the Task Force's approach was valid, at least up to a point. For example, if many inspectors express concerns that reflect a lack of understanding about their roles, recommendations for additional training can be developed without performing a detailed investigation of the underlying facts of individual concerns. We believe, however, that the Non-Technical Task Force should have probed more deeply into harassment concerns (and perhaps other concerns) than it did. Harassment has been a problem at Catawba. A thorough investigation of harassment concerns might have produced needed remedial action in addition to a new recourse procedure, such as a widely disseminated message from management that harassment would not be tolerated, and that stiffer sanctions would be imposed, if necessary.

2. Technical Concerns/Construction Deficiencies

The Applicants, in seeking to meet their burden of proof with respect to the technical concerns of the welding inspectors, relied primarily on the evaluations of their Technical Task Force. Intervenors also focused on the work of the Task Force in an attempt to show that Duke's QA program had been circumvented and consequently that unknown numbers of defects exist at Catawba. As a result, numerous individual concerns were the subject of extensive questioning which represents most of the record on technical concerns.

Although the technical concerns evaluated by the Technical Task Force are but a very small sample of all deficiencies reported by all quality assurance inspectors during construction of the Catawba plant, we regard this sample as representing "worst case" situations in respect to potentially uncorrected deficiencies. As noted above, several procedures are available to the inspectors for dealing with construction deficiencies, but the Nonconforming Item Report (NCI) is used for situations that are not readily correctable and warrant special attention by QA management. Over 17,000 NCI's had been processed by the end of 1983, and most of the welding inspector technical concerns involved an NCI. In view of the nature of the concerns submitted by the welding inspectors, it seems unlikely that other uncorrected deficiencies of comparable or greater significance would not have surfaced as concerns.

Palmetto asserts that our field of view is too narrow; that the Technical Task Force constrained the submissions and that crafts other

than welding had equal or greater problems. We find nothing in the record to support that assertion. Moreover, welding is a procedure that appears to be especially susceptible to nonconformances.

We looked carefully at the record on the technical concerns for evidence that Duke condoned substandard workmanship, discouraged the detection or documentation of faulty work, or left deficiencies warranting correction unrepaired. Palmetto placed special emphasis on instances where inspectors were told not to write an NCI and where second-level supervisors "verbally voided" NCI's before they were entered into the system. They would have us find that such actions were attempts by Duke management to circumvent the QA system in deference to the construction organization and cost and scheduling pressures.

In a few cases the evidence can be interpreted as supporting the Intervenor's hypothesis. However, the number of instances where this occurred is so small in relation to the total volume of work and NCI's processed that it cannot be viewed as pervasive or having had any significant impact on the regular functioning of the QA program.

The record shows clearly that, prior to 1982, the welding inspectors used NCI's to document some situations that could have been resolved more simply through other QA procedures. The NRC Staff noted this and recommended that Duke restrict the use of NCI's -- which are routed to engineers for review -- so that the engineers could devote more attention to problems actually needing technical evaluation. Duke's efforts to reduce the use of NCI forms were not adequately explained to the welding inspectors. They interpreted those efforts as

violations of QA procedures for use of NCI's, and as further evidence of lack of management support for their work. The Technical Task Force recognized this and other communications problems between the welding inspectors and their second-level management and took appropriate actions.

Although several of the welding inspectors and at least one first line supervisor perceived a lack of support from middle management, they continued to do their jobs. The record shows that they were highly conscientious and reported all construction flaws and deviations from procedures which they found. Several of their concerns came about because they did not recognize any "grey zone" in the way procedures were to be followed. For example, if an inspector were to write an NCI because a procedure had not been strictly followed, he might not understand why QA management could judge the weld to be "acceptable as is" from an engineering standpoint. Some inspectors tended to require higher quality work than called for by standards or design specifications in order to ensure that no bad work was passed over. Intervenors made no attempt to question whether some inspectors might not have performed their work well. Rather, the inspectors were held up as models in an effort to show that lack of support by middle management was part of an effort to circumvent the inspectors' conscientious efforts.

Following Duke's Technical Task Force investigation of concerns, the NRC Staff conducted its own in-depth study. The Staff concluded that despite the pressures felt by the welding inspectors, they did not

allow significant deviations from requirements to take place. Palmetto tried to impeach the Staff's findings by implying that the NRC inspectors were collaborating with Duke management to the detriment of the welding inspectors. No evidence was presented to support those allegations and we find them to be without merit.

All of the welding inspectors witnesses believed that the hardware deficiencies they had found had been or were being evaluated and corrected, so that there would be no unsafe condition at Catawba. Several of the inspectors had high praise for the quality of the welding.

Initial review of the concerns by the Technical Task Force revealed no "actual" technical inadequacies. However, indepth investigation of the "potential" technical inadequacies turned up several items that required correction. Follow up on two of the concerns resulted in the reinspection of thousands of socket and nozzle welds and the addition of more weld metal to certain welds found to be undersized.

Palmetto reasons that there must be a large number of "bad welds" in the Catawba plant. The argument seems to be that any deviation from a written procedure results in a "technical inadequacy" or "bad weld" and thus a violation of 10 C.F.R. 50, App. B Criteria. Duke's Technical Task Force is criticized for not acknowledging more technical inadequacies and the Staff is criticized for not citing Duke for more violations of Appendix B. Although we agree that the Technical Task Force should have acknowledged more violations of procedures, we largely disagree with Palmetto's reasoning. QA and Construction procedures are

intended to prevent bad welds or to assure that significant deficiencies are detected and repaired. Failure to follow procedures strictly does not automatically result in a "bad" weld. Such a concept ignores much of the work of the QA organization, redundant inspections of safety-related systems, and final testing before release to operations.

We reached the following conclusions on the key contested issues involving construction deficiencies:

1. Duke did not deliberately condone substandard workmanship nor attempt to circumvent its QA program.

2. In two cases, inspectors were improperly instructed to "sign-off" on work that was suspect. There is no associated evidence that the intent was to approve faulty work, however.

3. In several cases there was disagreement between an inspector who filed a concern and a higher level inspector about the significance of an imperfection. The higher level inspector may not have always been right, but there is no evidence of a proclivity to approve substandard workmanship.

4. Although there were a few minor deviations from material traceability procedures, there is no evidence that improper materials were actually installed.

5. Preventing inspectors from writing NCI's, including so-called "verbal voiding", was not so extensive that it could have significantly affected the quality of construction. In many cases, the "voiding" was an understandable attempt to confine NCI's to situations requiring engineering evaluations.

6. In a few situations there is evidence that construction personnel attempted to expedite work by circumventing QC inspector decisions, but these were isolated cases. Construction foremen occasionally pressured welders to complete a job, but we find no widespread effort to cut corners in order to meet cost and time schedules.¹⁰

7. All the welding inspectors and first line supervisors who testified appeared very conscientious, were not dissuaded by any perceived lack of management support on technical concerns, and were satisfied that the plant was built safely.

8. The record indicates very few situations where Duke failed to take reasonably prompt action to correct confirmed deficiencies.

¹⁰ This conclusion is subject to the outcome of the investigation triggered by the "foreman override" concerns raised by Welder B. See pp. 236-238, below.

As the Appeal Board pointed out in Callaway, we do not expect that a project of the size and complexity of Catawba will be constructed without some lapses in construction and quality assurance procedures. The question is whether such lapses were of such a magnitude and so pervasive that the safe operation of the plant may have been compromised. The Board concludes that no such compromise occurred at Catawba.

3. Concerns About Retaliation. Some welding inspectors claimed that they were discouraged from taking safety concerns to the NRC. In particular, Mr. Davison, the head of Quality Assurance at Catawba, met with welding inspectors in pairs to urge them to bring concerns to the company. Some inspectors interpreted this action as intimidating reprisal for going to the NRC, but others did not. There was a similar lack of clarity in certain statements made by Mr. Owen, a company Vice President, concerning whether inspectors were free to take their concerns to the NRC.

Understandably, the company prefers workers to bring problems to it first. Presumably, this approach would offer the opportunity for the speediest resolution. However, where there is lack of trust, no impediments to access to, or retaliation for direct contact with, the NRC should be permitted. The record suggests that the Applicants felt uncomfortable with complaints being made directly to the NRC. While the company urged its employees to bring problems to its management, some

employees did contact NRC and there was no clear evidence of retribution.

The Applicants' policy statement fails to clearly define the Company's position and workers' rights to take safety concerns to the NRC without fear of subsequent retaliation. The Board is directing that it be revised. In this regard, we note some ambiguity in NRC statements of policy, particularly NRC Form 3. This form is inadequate for its purpose and should be revised. Until that is done, it should come as no surprise that individual licensee policies are ambiguous and employees are left in the dark.

We heard testimony from a few witnesses about instances where welding inspectors interpreted instructions to mean they should "ease off" or "slack up" on inspections, with the implication that otherwise there would be retaliation. We found on examination, however, that these instances involved problems with communication and interpretation of procedures.

The low performance rating of Mr. Gary E. "Beau" Ross by his supervisor, Mr. Art Allum, was explored extensively. We summarize the evidence briefly here. Mr. Ross was the supervisor of many of the inspectors who had raised safety concerns, and he himself had raised many concerns. Mr. Ross had received competent or better ratings until the concerns were submitted, after which he received two consecutive mediocre ratings -- "2" on a scale of 1 to 5.

Mr. Allum testified that he rated Ross low primarily because Ross would not exercise his supervisory responsibilities, but referred his

inspectors to others, and for not accepting explanations for management decisions. Mr. Ross, for his part, felt that his inspectors were entitled to go above him for answers and that he was following prescribed procedures.

There was an interim evaluation in November 1982 by Mr. Allum which was not communicated to Mr. Ross for three months, but which stated Mr. Ross might not be continued as a supervisor without improvement. The delay was contrary to Duke policy. In response to Board questions to nearly all the welding inspector and supervisor witnesses, Mr. Ross was rated by them at a "4" or higher. There were some internal inconsistencies in Mr. Allum's ratings of Mr. Ross. We also looked at other pertinent circumstances. In 1981, Mr. Davison had confidentially recommended transfer of Ross as part of the solution to welding inspector concerns. Ross had declined transfer. In 1983 Mr. Grier, in discussing Mr. Ross' rating with him, also brought up the question of the forthcoming hearing before this Board, an incident we viewed in context as an improper attempt to influence Ross' testimony. We note also a difference in handling Mr. Ross' ratings and actions taken against certain craft foremen in incidents involving harassment of welding inspectors. The foremen were made to understand they might be fired, but no record was made. An elaborate written record was made against Ross which could have justified firing him, but he was not dealt with completely openly.

The preponderance of the extensive evidence leads us to find that Mr. Ross' low rating was unfair and in retaliation for his involvement

in raising safety concerns, either directly or by supporting his inspectors.

4. Harassment of Welding Inspectors. We received testimony on several incidents of alleged harassment of welding inspectors. The company's policy statement on harassment is primarily aimed at discriminatory practices involving sex, race, etc.; it does not deal specifically with the type of harassment reviewed here. For the purpose of evaluating issues in this case, our concept of harassment is any action taken by another employee or superior intended to modify the behavior of an inspector so as to impede the proper performance of the assigned task. Harassment may involve use or threat of physical force or violence or more subtle action or speech intended to intimidate, embarrass, or ridicule. An effective harassment policy has to be applied to actions and conduct offsite, as well as onsite. A few examples will illustrate the concept.

Welding inspector Reep took possession of welding rods he found some distance from prone welder Jones, as a basis for writing an NCI. Alerted by another worker, Jones took the rods back from Reep. Reep completed his inspection and took the same rods from Jones' pouch. Jones forcibly took them away from Reep. Reep filed harassment charges. The charges were not upheld even though the QA Department supported Reep. Construction management disagreed because Reep did not need the rods to write an NCI. Jones was given a violation of procedures citation and counseled on unprofessional conduct. We think this

incident was handled properly. It was not a case of harassment, but a personal confrontation, brought about in part by the inspector's poor judgment.

Welding inspector Jackson noticed pipe fitter Fox using a grinding disc on stainless steel that was not marked with red paint, as required. Instead, the disc was marked with a Magic Marker. Jackson believed the marks had been added as he approached, decided to write an NCI, and took possession of the disc. When Jackson showed the disc to Fox's supervisor, McKenzie, McKenzie put the disc in a shirt pocket. And when Jackson tried to retrieve it, McKenzie threatened to "knock his eyes out." Jackson filed an NCI report for the section of pipe Fox had been working on. The next day Jackson put a red NCI tag on a section of pipe, but it turned out to be the wrong section. Shortly thereafter, McKenzie abusively told Jackson of his mistake. Jackson filed a harassment charge for verbal abuse.

Applicants' review found no harassment but both Jackson and McKenzie were counseled on professional conduct. McKenzie was told a repetition could jeopardize his job and his crew was verbally reprimanded about ridiculing inspectors.

The Board views this as a case of harassment. The actions taken against the foreman and crew were appropriate, but they did not go far enough. McKenzie should have been formally cited for harassment and the citation should have been publicized on site.

Welding inspector supervisor Deaton rejected an iron worker's fit-up. On the way home, the iron worker pointed a rifle at Deaton from

a passing car with an exchange of words. The next day the iron worker's job was terminated at his own request. The Company was hesitant to fire him outright because the incident occurred offsite.

We are concerned about failure to take the more direct action of firing the worker only because the event happened offsite. An effective QA program cannot tolerate offsite harassment of inspectors.

Welding Inspector Harris was planning to write an NCI on an improperly preheated tack weld when the foreman, Mr. Mullinax, threatened to knock his teeth out if it didn't leave his men alone. Mr. Mullinax was orally reprimanded. This is a serious case of harassment involving a threat of physical violence. As in the McKenzie case, the reprimand should have been in writing and publicized on site.

We found that in the most serious harassment cases the Company took some appropriate actions to discourage repetition. However, looking at the group of cases as a whole, the actions were not as severe as they might have been, they were not publicized, and the harassment victim was not always made aware of the action taken. Thus, the inspectors involved often concluded that they were not being supported. To their credit, this did not prevent the inspectors from doing their job. In order to put this issue in perspective, we note that the cases of serious harassment were relatively few in number.

C. Concerns Raised by Messrs. McAfee and Hoopingarner.

William R. McAfee and Nolan R. Hoopingarner II are former employees of Duke at the Catawba site. Mr. McAfee worked in several different

jobs from March 1977 until March 1979, when he resigned. Mr. Hoopingarner worked at Catawba as a builder and rodbuster from 1977 until September 1980, when he was fired. Both McAfee and Hoopingarner are members of Palmetto Alliance and Palmetto refers to them as its "original whistle blowers" (Palmetto Proposed Findings, p. 80). Both appeared as Palmetto witnesses.

Mr. McAfee described several incidents which he thought represented safety concerns. These included certain concrete pouring practices and an incident where water had been allowed to condense or leak into a control room and onto certain control equipment. These matters were scrutinized at the hearing and the resulting record reflects that the Applicants had acted appropriately under the circumstances. Although Mr. McAfee impressed us as a forthright witness, we believe that his limited perspective on the matters in question did not produce a comprehensive picture.

Mr. Hoopingarner's experience as a Duke employee at Catawba was, to say the least, unusual, primarily because of his unusual and disruptive behavior on the job. Mr. Hoopingarner took it upon himself to report to his superiors, the NRC, or both every "wrong" he could uncover at Catawba, whether within or without his area of assigned activity. In the process, he made indiscriminate charges of "wrongdoing" against his fellow workers, superiors and an NRC inspector. Duke showed remarkable self-restraint in allowing Mr. Hoopingarner to carry on in this fashion for as long as they did. Finally, Duke fired Mr. Hoopingarner, ostensibly because of a series of unexcused absences.

The Palmetto claim that Mr. Hoopingarner was fired because of his attempt to raise safety issues was fully reviewed at the hearing. We find that his firing was not related to that factor, but that it was legitimately based on Mr. Hoopingarner's unusual and disruptive behavior at the site. Mr. Hoopingarner's various safety concerns were also reviewed at the hearing, particularly his concern about possible water damage to the emergency diesel generators. The record reflects that his concerns were unfounded or that adequate corrective action had been taken.

Notwithstanding our essential rejection of Mr. Hoopingarner's testimony, we do not question his sincerity as a witness. We came to believe, however, that Mr. Hoopingarner's perspective had been distorted by his self-righteousness and poor judgment.

D. Concerns Raised by the In Camera Witnesses.

Howard S. Nunn was the most important of the four in camera witnesses. Mr. Nunn, a former Duke Welder, initially accepted the Board's invitation to testify in camera, but subsequently elected to testify publicly. Mr. Nunn raised eight concerns, four of which were struck in response to motions by the Applicants and Staff. The remaining concerns included laminations in containment plate, accuracy of radiographs, and "foreman overrides." Mr. Nunn was a candid and cooperative witness. He is a skilled welder, but has no relevant expertise aside from welding.

Mr. Nunn had considerable difficulty making a satisfactory weld where laminations had been encountered in working on containment plate. He questioned the structural integrity of the plate. Laminations are very thin planes caused by folding of gases and residues in the steel as ingots are rolled into plate. The Applicants and Staff proved that the Catawba steel plate was fabricated to ASME requirements, which permit some laminations. Others are repairable. The structural integrity of the containment is not compromised by these laminations because the dominant stresses are parallel to the surface of the laminations. Mr. Nunn's testimony showed he had the skill to overcome the difficulties encountered in welding over laminations.

Mr. Nunn was also concerned about the accuracy of radiographs because he could not always find flaws in the metal at spots indicated on the radiograph, and new radiographs made after repairs would reveal flaws not previously detected. Testimony by Applicant and Staff witnesses noted that the angle of the shot could influence detection of flaws not previously noted. There are also possible problems in matching tracers on the pipe to locate defects. Other welders sometimes experienced these problems, but for the most part did not question the accuracy of radiographs. The record reflects no cause for concern about radiographs.

Mr. Nunn cited several instances which he claimed were examples of "foreman override." For example, Mr. Nunn claimed he had been pressured to make a weld without proper paperwork. He also testified that a fellow welder had been instructed to finish a weld with an inappropriate

rod, that the weld was subsequently rejected, and the welder had been required to retest to regain his certification. In the course of the Staff's January 1983 investigation of the "foreman override" issue, another welder made allegations similar to Mr. Nunn's. At the time this decision was issued, further investigations by the Staff and the Applicants were ongoing. As described more fully below (pp. 237-238), we are holding the record open and retaining jurisdiction over this aspect of the "foreman override" concerns.

The concerns of the other three witnesses who testified in the in camera portion of the hearing were also reviewed. No significant safety issues were presented by the developed record.

FINDINGS OF FACT ON QUALITY ASSURANCE
-- CONTENTION 6

I. Welding Inspector Concerns

A. Background

1. Introduction and Summary. In July 1981, Duke informed the welding inspectors in its Quality Assurance Department that their pay would be reduced, based upon a reanalysis of applicable qualifications. During the Fall of 1981, certain welding inspectors who were appealing the pay reduction began to express concerns about other issues, which had been developing over time, including technical issues. In December, Duke appointed a task force to look into the inspector concerns. The task force report suggested the possible presence of problems and thereafter all the welding inspectors were asked to submit any concerns in writing. Twenty-three inspectors expressed concerns, some involving personnel relations matters -- categorized by Duke as "non-technical" concerns -- and others involving the safety or adequacy of hardware or work procedures -- referred to as "technical" concerns. In early 1982, Duke appointed two additional task forces to investigate the technical and non-technical concerns, respectively. The validity and extent of these welding inspector concerns and the adequacy of Duke's investigations and corrective measures were the principal focus of the hearing on Contention 6. Van Doorn Testimony, Staff Ex. 7, pp. 5-9.

2. The attempted division of inspector concerns into "technical" and "non-technical" categories was useful for some purposes, but there was no bright line marking the division. Most technical concerns had non-technical aspects, and vice versa. Furthermore, as stated by a consultant to Duke, apart from the "technical-non-technical" dichotomy

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The primary concern of the inspectors was that they did not have the support of their supervision and management.... [I]nspectors were required to identify failure to follow procedures and when they did this, a technical evaluation by their supervisors accepted the work, but nothing was done to correct the generic problem of violations of procedures....The rationale or justification for resolution of NCI's was not communicated to the inspectors. Zwissler Testimony, pp. 12-13, App. Ex. 13.¹¹

We also agree with the following Staff perspective on the welding inspector concerns, namely ---

Whether seen as a technical or non-technical matter, the concerns appear to stem from differing understandings by the inspectors on the one hand and their management on the other as to the function of the QC inspector, and the way in which deviations from procedures were to be handled.
Staff PFF 93.

¹¹ Mr. Zwissler was the subject of an extensive voir dire examination by Palmetto directed toward whether he could conduct an objective evaluation of the Duke task force reviews. Tr. 3240-55; 3345-3410; 3415-16. Having reviewed the task force efforts ourselves in detail, we have no occasion to rely on Mr. Zwissler's evaluations of them and therefore no occasion to determine the impact of Palmetto's voir dire. However, we quote from Mr. Zwissler here because he has aptly summarized basic aspects of the inspectors' concerns.

3. The Welding Inspector's Role. The welding inspectors who expressed concerns performed a visual inspection function, in contrast to other types of inspectors who used liquid penetrant, magnetic particle, radiographic and ultrasonic examination techniques (also referred to as non-destructive examination (NDE) techniques). See, e.g., App. Exs. 28-32, 56-59. Visual inspection is usually not the only inspection of a safety-related weld. As reflected in the discussion of specific concerns, many safety-related welds are also inspected by one or more NDE techniques.

4. The NRC Staff has included in its Proposed Findings 97-103 an accurate and helpful summary of the standards and procedural tools available to the welding inspector in carrying out his function. We adopt these proposed Staff findings verbatim in the following seven paragraphs.

5. "Detailed quality assurance procedures establish the specific aspects of various construction processes that are to be inspected, and when they should be inspected. For certain classes of welding, 'hold points' are established so that required in-process inspections can be performed. A hold point is a point at which work must be inspected before it can continue. When hold points are established, generally process control travelers, which follow the work, are used to indicate the inspections required and the inspector's acceptance. Testimony of Larry R. Davison, App.. Ex.. 14, pp. 21-22."

6. "Inspectors determine acceptability by referring to acceptance standards established in QA Procedures and Design Specifications. Id.

Examples of these are QA Procedures H-4 and H-5, which control the identification of piping materials and structural steel materials, and L-80, which is the Visual Workmanship Standard for Welds. Id. at 33. When an inspector discovers a discrepancy, he may use one of four basic corrective methods available, depending on the circumstances. Id. at 23."

7. "The first, the 'hold point' method, consists of an inspector making the craft aware of a deficiency, the deficiency being corrected to the satisfaction of the inspector, and the inspector signing off the item. In this method, the item is not signed off until all necessary action has been completed, and the inspector is satisfied. No documentation of such action is required. Id."

8. "The second is the 'process control' method, whereby the inspector may document the repair on the inspection report itself. Id. Procedure M-4, 'Visual Inspection and NDE Welds (ASME III)', applies to all Class A, B, and C welding at Duke, and these welds and the inspections thereof are recorded in Form M-4A, 'Weld Process Control Sheet'. Duke QA Program Procedures, App. Ex. 6. Any defects detected in a final visual inspection would be resolved on this form. The Process Control Form serves both as a documentation of the work and the inspection of that work. App. Ex. 14, Davison, p. 23."

9. "The third method may be referred to as the 'deficiency report form' method. In the welding inspection area, until mid-1982, the principal vehicle used to document deviations from construction or quality assurance procedures was the 'Nonconforming Item Report' (Form

Q-1A), commonly referred to as an 'NCI'. Shropshire, Tr. 5010; Grier, Tr. 3033-34. Generally speaking, the inspector describes the discrepancy on the Q-1A form, and after a review for clarity and completeness within the Quality Assurance Department, the form is processed for further evaluation. Depending on the problem, the resolution is then reassigned to the appropriate department (in many cases involved here, resolutions were assigned to the Construction Department's technical support group) for engineering evaluation, which is in turn approved by quality assurance engineers. Following this resolution process, the Q-1A is returned to the field, perhaps to the same inspector for disposition. If the resolution is that the item is acceptable, the form would so indicate and require removal of the Q-1B tag -- which would normally have been affixed to the nonconforming weld to indicate that no further work on that weld was permitted. App. Ex. 2, Grier, pp. 18-22; App. Ex. 14, Davison, pp. 24-30."

10. "Another form, the 'Discrepancy Report Form', commonly referred to as the R-2A, is a method of documenting discrepancies, similar to the NCI method. This form entails a somewhat less involved review than the Q-1A. App. Ex. 14, Davison, pp. 23-24. However, this method was not in common use in the welding inspection area prior to 1982. Shropshire, Tr. 5007-11; Grier, Tr. 3033-34. As a result of recent procedural changes, the R-2A has replaced the Q-1A as the common method of documenting discrepancies. Grier, Tr. 2130-32."

11. "Since most of the welding inspector concerns stem from the period prior to 1982, much of the testimony focuses on the origination

of NCIs, the reviews for validity by OC supervision, and the resolutions or dispositions established after engineering evaluations by the construction and quality assurance departments."

12. Origins of the Inspectors' Concerns -- the Pay Reclassification. As the Staff points out (PFF 104-105) there were indications of problems that would later surface as welding inspector concerns in the 1979-1981 time frame. These included some lack of understanding by welding and other inspectors about processing NCI's (Testimony of Maxwell, Staff Ex. 6, p. 6), and a volume of NCI's so large as to threaten the quality of NCI evaluations. Testimony of Van Doorn, Staff Ex. 7, Attach. 25. However, the expression of these "welding inspector concerns," as we are using the phrase, was triggered by the July 1981 announcement of a reduction in their pay.

13. The pay reduction resulted from a company-wide review of position analyses based on characteristics and levels of ability thought to be required for a particular job and a point system for different characteristics and levels. Pursuant to that review, the position of "welding Inspector A" was reduced from Pay Grade 11 to Grade 10. Among the factors leading to the reduction was the determination that welding inspectors should no longer be required to have either two years of welding or welding inspection experience. Testimony of Grier, App. Ex. 2, pp. 44-45; Tr. 2978-80, 2986-89. Other inspector positions were also reclassified. Some -- like the Mechanical Inspector A position -- were

upgraded; others -- like the Film Reader position -- were downgraded. Grier Testimony, p. 45.

14. Mr. Warren Owen, Executive Vice President, Engineering and Construction and the senior Duke official to appear as a witness, testified that the pay reclassifications were made to achieve internal equity and to maintain external competitiveness. Tr. 2317. This explanation is reasonable and fully consistent with the record.

15. Palmetto asks us to find that the pay reclassification was in response to "scheduling and cost pressures" and for the purpose of undermining the welding inspection effort. PFF 151, 153. But they cite nothing in the record in support of these propositions in those proposed findings, and we know of no support for them. There is no nexus in the record between the matters referred to in Palmetto's proposed findings 154-160 and the pay reclassification.

16. Palmetto also contends that there were "clear connections" between the mediocre rating of Catawba in the so-called "SALP Report" and subsequent management treatment of the welding inspectors, including their pay reclassification. PFF 162. The SALP report is discussed in greater detail below at pp. 61-63. Palmetto's thesis seems to be that after Catawba's QA welding program was criticized in SALP the response of management was not to improve welding QA but to attempt to intimidate and suppress the welding inspectors to the point that future QA welding deficiencies would not be detected. This farfetched thesis is not supported by the record. Furthermore, even if one were to assume that the pay reclassification was somehow intended as retaliation against the

welding inspectors because welding came in for criticism in the SALP Report, that would leave unexplained Duke's failure to retaliate against workers in other areas that were also criticized in SALP -- e.g. concrete placement, design, electrical control. See NUREG-0834, NRC Licensee Assessments Appendix B (1981).

17. Many of the welding inspectors at Catawba apparently felt that the reduction of their pay was inequitable, based on their comparative assessment of their own qualifications with the qualifications of craft welders. Addis, Tr. 2360; Addis Testimony, App. Ex. 8, pp. 8-9. During the months following the pay reclassification, forty-five welding inspectors from four Duke nuclear sites pursued the company recourse procedure over the pay issue. Twenty-nine inspectors -- twelve from Catawba -- pursued the matter to the final step, to the company president, by whom the classification was upheld. Id. at p. 5.

18. In November 1981, during the recourse process, the welding inspectors were individually interviewed by Duke's Director of Employee Relations, Ms. Addis, to ensure that the views of both sides on the pay issue were understood by all involved. Id. at 8. During those interviews, some of the Catawba inspectors voiced concerns that the quality of work at Catawba had been adversely affected by some management practices and work relationships. These concerns were referred to as "work quality" concerns to distinguish them from pay recourse concerns. Id. at 9.

19. In early December, 1981, Ms. Addis wrote a memorandum to Mr. Owen summarizing the work quality concerns that had been conveyed to her

by Catawba inspectors. Addis memorandum attached as Tab 3 to Addis Testimony. Mr. Owen informed Mr. Lee, Duke President, of these developments and they decided to appoint a task force to look into the work quality concerns. Owen Testimony, App. Ex. 1, p. 14, Palm. Ex. 7. Such a task force, composed of three Duke employees (and later known as "Task Force I"), was constituted on December 10, 1981. Palm. Ex. 8.

20. Summary of Task Force Activities and Results -- Task Force I.

The record reflects some lack of clarity in the mission of Task Force I -- whether it was to undertake a comprehensive investigation of the welding inspectors' concerns or whether it was merely to determine the existence and scope of possible problems. The Task Force Charter spoke of "the necessary investigation to completely understand the allegations made by the inspectors interviewed at Catawba." Attachment 2 of McMeeken Testimony, p. 3, App. Ex. 10. Similarly, the Task Force I conclusions were cast in unequivocal terms. Among other things, the task force concluded that "the QA/QC Program at Catawba is working as intended and there is no reason to believe that unacceptable craftsmanship and unsafe conditions exist at the plant." The principal problems they found were "communications problems." Report by the Task Force on QC Inspection, dated December 29, 1981.

21. With the benefit of hindsight and the resulting appreciation we have gained concerning the complexity of some of the inspectors concerns, it is apparent that Task Force I could not have performed a comprehensive review of those concerns. Their work was begun and

completed in about two weeks. McMeeken, Tr. 3279-80. Many of the welding inspector concerns had not yet emerged and only sixteen welding inspectors were interviewed. Task Force Report, Attachment 6. Apparently the Task Force relied largely on interviewing and performed little or no inspection of hardware or records review.

22. Testimony at the hearing described Task Force I as more of a preliminary problem identification effort than a comprehensive investigation. Thus Mr. Owen said that he "wanted a judgment by experienced people to determine whether a problem existed and, if so, its magnitude and potential scope." Their report made it clear to him "that there were technical concerns which should be investigated." Owen Testimony, App. Ex. 1, p. 14. See McMeeken, Tr. 3272, 3279, 3295.

23. We view the Task Force I effort in a similar light. It brought to management attention many of the inspectors' concerns and made several constructive recommendations that were to be implemented later on. See Task Force Report, pp. 4, 7, 10-11. Its creation evidenced the fact that Duke management was taking the inspectors' concerns seriously. And it led to the creation of two additional task forces, to which we turn next. However, in light of its limited investigations and mandate, we attach little weight to the Task Force I conclusions about the state of the QA program at Catawba.

24. The Technical Task Force. In January 1981, Mr. Owen established the "Technical Task Force" to investigate all of the technical concerns of the Catawba welding inspectors and to take or

recommend any necessary corrective action. Owen Testimony, App. Ex. 1, pp. 14-15. Cobb Testimony, App. Ex. 11, p. 5. The task force was composed of five senior engineers from four different departments, including QA and Construction.

25. The Technical Task Force developed and followed a formal plan, consisting of six major phases: (1) data collection and review; (2) technical evaluation; (3) development of results and recommendations; (4) management review and implementation of recommendations; (5) inspector feedback; and (6) final report. Cobb Testimony, p. 7, and Attachment 2 .

26. The task force first sought to obtain all of the concerns of the welding inspectors, in writing. A meeting was held for that purpose in mid-January 1982 of the welding inspectors, their supervisors, and Mr. Davison, Project Quality Assurance Manager at Catawba. Ross, Tr. 6651-52. As Mr. Beau Ross, first line supervisor of welding inspectors who voiced most of the concerns, described the meeting:

"[I]t was just a matter of writing down any concerns, any specifics; the more specifics the better because it would help resolve the problems: specific weld numbers, specific joints, NCIs, whatever ... as much details as possible so that they could be resolved. It was pretty open as far as just saying, hey, if you got problems, let's lay them on the table." Tr. 6655.

There were some indications that some of the welding inspectors may not have felt free to express all of their concerns at the meeting. Testimony of Burr, App. Ex. 29, p. 15. Ross, Tr. 6656-62. We find, however, that the task force did make a good faith effort to elicit all

such concerns and that is all that can reasonably be expected. We note also that the numerous welding inspectors we heard testify were not, generally speaking, at all reticent. Considering also that many generic concerns were expressed by several inspectors, we conclude that virtually all of the significant concerns were conveyed to the task force.

27. The scope of the Technical Task Force analysis is indicated by the Staff's PFF 118, as follows:

Volume II of the report contains each of the handwritten concerns coded by inspector, attached to a form entitled "Technical Evaluation - Individual Concern", in which the concern is stated, the technical evaluation is documented, and recommendations are made. A separate form called "Verification - Individual Concern", accompanies each evaluation, and is signed by a different evaluator. The technical evaluations identify whether the concern had a specific basis, e.g., an NCI number; whether a criterion (procedure) was actually or potentially violated; and whether an actual or potential technical inadequacy existed. App.. Ex.. 11, Cobb, Attachment 5.

In general, this analytical approach was appropriate for the concerns involved. The adequacy of many of the task force's individual technical evaluations is addressed at pp. 68-125, below.

28. The Technical Task Force did not classify any of the concerns it reviewed as actual technical inadequacies. However, there were "potential technical inadequacies" associated with 24 concerns. Follow-up on these was left to the QA, construction or Design Engineering Departments. Cobb Testimony, p. 13; Attachment 4, ¶ 5.4.

29. The Chairman of the Technical Task Force testified that the task force "reviewed with each involved inspector the evaluation of his specific concerns." These sessions were to ensure that the concern was

properly interpreted, but not to obtain the inspector's concurrence with the technical evaluation. Cobb Testimony, p. 14. Although some inspector witnesses could not recall these post-evaluation discussions, we find that the task force made efforts to conduct such discussions and that most inspectors probably participated in them.

30. In addition to the individual technical evaluations, the Technical Task Force reached these overall conclusions: (1) problems were arising from the "interface" between inspectors, their supervisors and craft personnel; (2) procedure interpretation and implementation was a major area of concern; (3) procedural changes could alleviate some of the concerns. These conclusions led to a number of recommendations of both a policy nature and specific action recommendations. Cobb Testimony, p. 11-12.

31. Implementation of the Technical Task Force recommendations was the responsibility of the Quality Assurance Department. That Department developed a Management Implementation Plan with specific implementation objectives designed to carry out the task force's more general recommendations. Specific individuals in various departments were assigned to carry out particular actions. Grier Testimony, pp. 49-50. The Management Implementation Plan is Attachment 3 to Mr. Grier's testimony.

32. Subject to certain findings hereafter on evaluations of particular technical concerns, we find that the Technical Task Force and the implementation of its recommendations were an appropriate response to "technical" aspects of the welding inspectors' concerns.

33. The Non-Technical Task Force. On February 22, 1982, the Corporate QA Manager, Mr. Grier, appointed Mr. Alexander, then Personnel Manager at the McGuire site, as chairman of a "non-technical" task force to review "non-technical" concerns that had been raised by the Catawba welding inspectors. The Non-Technical Task Force had one other member, an Employee Relations Supervisor from the Construction Department. Alexander Testimony, pp. 2-3, App. Ex. 12.

34. The task force conducted a paper review (as distinguished from personal interviews) of each of the welding inspectors concerns and compiled a list of non-technical concerns. If a concern dealt with administrative or personnel matters, it was considered "non-technical." Each of the concerns was then placed in a matrix under one of the following categories: qualifications, technical support, NCI resolutions, communication, management support, inspector responsibilities, directing craft, adherence to procedures, and harassment. Id., pp. 3-4.

35. The task force then engaged in a limited amount of "information gathering." To that end, it reviewed the documents previously submitted by the welding inspectors. Mr. Alexander testified that: "Where there was not enough information for us to understand the concern and to make recommendations, we interviewed the inspectors to obtain the additional information so that the concerns could be addressed". Id. at 4. The record is not crystal clear on this point, but it appears that the task force met with at least three inspectors prior to its evaluation work in order to obtain additional information

about non-technical concerns. See Bryant, Tr. 6036-37; Jackson, Tr. 8888; Ross, Tr. 6675-76. Cf. Crisp, Tr. 8377-78.

36. On the basis of the information thus developed, the task force found that several areas needed management attention, including communications, channeling employee concerns to management and the inspector's role in relation to craft. Alexander Testimony, p. 5.

37. The Non-Technical Task Force Report of March 24, 1982 included the following recommendations for corrective action: training Supervisors in communication skills; explaining to inspectors their role and responsibilities; recourse procedures for both personal and technical concerns; harassment recourse; employee forum to provide an informal meeting where employees could meet with Management and ask questions; and the "team work" concept to draw the department closer together. These recommendations were implemented shortly thereafter through a Management Implementation Plan. Id. pp. 6-8.

38. The task force findings were communicated to the welding inspectors in a group meeting. In addition, Mr. Alexander testified that he then "began individual meetings to review with inspectors and their supervisor their concerns." There is very little in the record to corroborate this statement, except possibly in the case of Mr. Ross. Tr. 6676-78. Other inspectors who recalled meeting with one of the Non-Technical Task Force members were apparently referring to earlier information gathering meetings. See Bryant, Tr. 6036-37; Godfrey, Tr. 8291; Crisp, Tr. 8377-78. We find that the resolution of particular

concerns was not communicated to the inspector involved on an individual basis.

39. Palmetto sought at various points in the hearing to impeach the work of the Non-Technical Task Force. In its Proposed Findings of Fact Nos. 181-187, Palmetto attacks this task force as "a sham in both form and substance." Unfortunately, Palmetto's proposed findings on this subject lack supporting citations to the transcript. Thus, we would be justified in disregarding Palmetto's proposed findings in this area altogether. Order of Dec. 30, 1983, p. 2. We note, however, that certain of Palmetto's criticisms have some validity.

40. The task force work was done under time pressure, in about one month. Alexander, Tr. 3173-74. The work was done by only two people, apparently working part time. The Chairman of the task force assumed a new position in the Quality Assurance Department during the task force work. Id., Tr. 3141-42. This put him in the position of reviewing concerns involving senior QA officials. Id., Tr. 3158-62. While we do not conclude that the Chairman's objectivity was in fact compromised by these circumstances, it would have been preferable for this work to have been carried out by people outside the QA Department. See Id. at 3182-83.

41. Palmetto PFF 185 states in part --

It is apparent from review of this plan and the testimony of Alexander that no serious investigation of the inspectors programmatic allegations was ever conducted. It is clear that the principal, if not exclusive, source of quoted data, "was the original hand written concerns of the inspectors themselves." No serious effort was made to determine the factual validity of any of the non-technical concerns....

The Board agrees. Although the Task Force Report and its Chairman did not say this explicitly, it is apparent that they were not investigating the underlying facts of concerns, but only what the concerns were, whether valid or not. Alexander, Tr. 3169. As Mr. Alexander put it, the task force investigation was "as comprehensive as we felt like it needed to be in order to evaluate and make recommendations on the concerns." Tr. 3180. In other words, the concerns were taken as given.

42. The task force approach was valid, up to a point. For example, if many inspectors express concerns that reflect lack of a clear understanding about their roles, a reviewer can develop recommendations for additional training without performing a detailed investigation about the underlying facts of individual concerns. Similarly, if there are concerns about harassment, one can recommend a recourse procedure -- as the Non-Technical Task Force did -- without investigating individual instances. As the Staff points out (PFF 127) Supervisor Beau Ross subsequently testified that the result of implementation of such a harassment recourse procedure was that "a lot of doors were opened to take care of situations that had occurred in the past." Ross, Tr. 6964.

43. We believe, however, that the Non-Technical Task Force should have probed more deeply into harassment concerns (and perhaps other concerns) than it did. As discussed in more detail in part ID below, harassment has been a problem at Catawba. A thorough investigation of harassment concerns might have produced needed remedial action in addition to the recourse procedure, such as a widely disseminated

message from management that it would not be tolerated, and stiffer sanctions imposed, if necessary.

44. The SALP Report. Palmetto introduced as an exhibit NUREG-0834, NRC Licensee Assessments, a "Systematic Assessment of Licensee Performance" (1981) (commonly called the "SALP Report") performed by the Staff on all reactor licensees based on data from the 1979-1980 time frame. Using a variety of criteria, the Staff ranked all licensee facilities as either "above average," "average," or "below average." Of the forty-three sites where construction was then in progress, thirty-six were rated "average" and seven, including Catawba, were rated "below average." The SALP report had the following criticisms of Catawba:

The Catawba facility displayed evidence of weaknesses in the area of quality assurance, including management and training.

Quality assurance weaknesses were characterized by instances of inadequate design reviews, procedures not issued, specifications and commitments not translated into procedures, and audit programs not established. There were numerous items of noncompliance involving failure to follow procedures for activities involving welding, concrete placement, design, quality control inspections, records control, and electrical equipment installation.

Catawba received a relatively large number of items of noncompliance when compared with other power reactor facilities under construction. Most of these items of noncompliance were attributed to weakness in the licensee's quality assurance and management overview process. Appendix B-1.

45. Palmetto points to the SALP report as part of the "history of QA failure at Catawba" and as a "comprehensive evaluation," the product

of a "lengthy evaluative process." We are urged to accord the SALP report substantial weight adverse to the Applicants. PFF 4-15.

46. The 1981 SALP Report is evidence adverse to the Applicants, but it is not entitled to very much weight, for several reasons:

(a) A "below average" rating "does not imply that a facility must be shut down or that construction of a facility must be interrupted." NUREG-0834, p. 3.

(b) The authors of the SALP Report -- the Staff -- apparently no longer support the "below average" rating. They now support the Applicants' QA program without significant reservation.

(c) This Board and the parties, through the hearing process, have performed a far more thorough and critical review of the Catawba QA program than the Staff SALP review. Compare Palmetto Ex. 5 with the record on Contention 6.

(d) Applicants' witnesses testified without contradiction that SALP give weight to numbers of violations without giving corresponding weight to levels of construction activity. Owen Testimony, p. 19, App. Ex. 1; Grier Testimony, p. 36, App. Ex. 9. Such activity was at a high level at Catawba at the time. It appears significant in this regard that the same SALP Report gave higher marks to other Duke facilities -- "above average" for Oconee and McGuire 1 and "average" for Cherokee and

McGuire 2. Furthermore, 1981 SALP did not take into account the Applicants' corrective actions. Owen Testimony, p. 19, App. Ex. 1.

47. Palmetto invites us to compare Catawba with the "subsequent histories" of other plants that received a "below average" rating in 1981 SALP. The factors bearing on such a comparison would be so diverse as to render it virtually useless. Moreover, even to attempt a sufficiently in depth comparison of the sort suggested would have drawn us far into collateral issues.

48. The evidence adverse to the Applicants fairly derivable from 1981 SALP is far outweighed by other favorable evidence in the record.

49. Independence of the Quality Assurance Organization.¹²

Palmetto sought to show in various ways that the QA function at Catawba was not sufficiently independent from the construction function. Part

¹² Immediately preceding its proposed findings on this topic, Palmetto addresses a February 1981 NRC Report as evidence of "continuing QA failure." We give no detailed consideration to Palmetto's PFFs 16-20 on this subject because, once again, Palmetto provides no citations to the record. In any event, PFFs 16-17 are concerned primarily with training, an area we repeatedly held to be outside the scope of Contention 6. See e.g., Order of Aug. 26, 1983, p. 9.

The Applicants point out that Palmetto is apparently referring to NRC Staff Inspection Report 50-413, 414/81-02, which was Attachment 25 to Mr. Van Doorn's Testimony (Staff Ex. 7). Suffice it to say that the violations for which Duke was cited in that report were relatively minor and that Duke's subsequent engineering reviews of some 11,000 NCI's was considered to be a satisfactory response. Bryant, Tr. 9815; Van Doorn, Tr. 9815.

of this effort focused on historical changes in the QA organization. The legality of the QA organizational structure, per se, was not in issue. That structure had been litigated and approved at the construction permit stage. See Duke Power Co. (Catawba Nuclear Station) 1 NRC 626, 646-650 (1975). However, the Board permitted some cross-examination relevant to the issue of QA independence as it bears on a major thrust of Contention 6 -- company pressure to approve faulty workmanship. See Tr. 1928-34.

50. Palmetto refers us to various Atomic Energy Commission Staff positions in the 1973 SER for the Catawba construction permit. PFFs 24-30. Apart from their remoteness in time, it appears that these positions were either satisfied by the Applicant or superseded by the CP Licensing Board decision.

51. Prior to the Catawba CP, the Vice President for Engineering and Construction was also the Corporation Quality Assurance Manager. The Appeal Board in the McGuire case directed that a separate QA Manager be appointed within one year. This condition was met by the appointment of Mr. James Wells in 1974, a job he held until 1982. Wells Testimony, pp. 1-2. App. Ex. 9. Palmetto seeks to discredit Mr. Well's performance through innuendo, but it fails to cite any substantial evidence to support its thesis, and we know of none in the record. PFFs 33-34. We also reject the related claim that Duke did not take seriously its obligation to establish an independent QA program. PFF 35.

52. Palmetto points to the fact that the same high-level executive, Mr. Owen, has supervisory responsibility over both

Construction and QA. The record also reflects, however, that the Construction and QA Departments are headed by separate independent managers who report to Mr. Owen. Owen Testimony, pp. 3-4, App. Ex. 1. Grier Testimony, pp. 8-9, App. Ex. 2. We agree with the Applicants that Palmetto "appears to advocate some kind of complete organizational independence of the QA function." App. Reply, p. 22. Such a concept is inconsistent with Criterion I of Appendix B, which provides that "the Applicant shall be responsible" for QA. The Applicants are correct in observing that "responsibility for construction and all other activities [including welding QA] necessarily come together at some level of management." App. Reply, p. 23. Indeed, partly because the QA and construction responsibilities are vested in the same entity, lines of communication are shorter and resources for corrective action can be mobilized more quickly.

53. The only organizational feature of the QA program which was raised at the hearing that gives us any real concern is the fact that until 1981 the QC inspectors were located "administratively" in the Construction Department but were subject to the "functional" control of QA. In 1981, the QC inspectors were transferred from construction to the QA Department, which assumed control of them for all purposes. Owen, Tr. 1941-1942.

54. The "administrative" control exercised by construction over QC inspectors included personnel matters, such as timekeeping and payroll. Palm. Ex. 1, pp. 2-3. In addition, it included authority to hire and fire and, apparently, at least indirect authority to schedule daily

work. Owen, Tr. 1938-40. The "functional" control exercised by QA included technical and policy direction, training and certification of inspectors, and establishment of QA procedures. Palm. Ex. 1, pp. 2-3; Owen Tr. 1939; Grier, Tr. 2296.

55. Mr. Owen testified that the QC inspectors were left under construction "administratively" primarily to coordinate their availability with ongoing construction. Tr. 1943. The 1981 decision to move the inspectors to QA for all purposes was to provide greater career opportunities. Owen, Tr. 1944.

56. Palmetto claims that "the evidence of actual interaction between inspectors and their management ... demonstrates ... that the Construction Department directed their work in all significant respects." PFF 31. Palmetto cites no specific "evidence of actual interaction" in support.

57. Palmetto also claims that the power to control the QA inspectors was inherent in Construction's power to hire, fire, set schedules, etc. As a matter of practical experience, we think there is some merit in this claim. Furthermore, we believe that the QA function at Catawba would have been performed somewhat more independently if the present organizational structure had obtained throughout construction. We also believe, however, that the effect of the functional - administrative dichotomy on inspector performance cannot be quantified but probably was not very great. In any event, that very dichotomy had at least the implied blessing of this agency in the CP proceeding. 1 NRC 649, 650. In these circumstances, absent a showing that safety was

compromised, a showing not made here, we can only regret that the dichotomy was not abolished earlier than it was.

B. Construction Deficiencies

1. Introduction. Contention 6 is concerned with systematic deficiencies and company pressure to approve faulty workmanship. The technical concerns expressed by the welding inspectors constitute a major part of the evidence about the extent and significance of alleged faulty workmanship. Applicants created the Technical Task Force to look into these technical concerns and their report has been of substantial help to this Board by providing added detail of where and when certain events occurred and the specific systems involved. The Task Force report also identified some of the QA and construction procedures (CP's) that might have been violated. Further, if there was doubt as to whether a construction defect had gone uncorrected, the Task Force initiated follow up inspections, tests, or rework, as necessary. We looked critically at what the Task Force had to say about the disposition of each concern and their recommendations for avoiding recurrence. We stress, however, that this Technical Task Force report is not the principal foundation upon which we build our own findings. In many cases, we felt that the report curiously avoided acknowledgement when the welding inspectors were correct and used circuitous reasoning to justify the actions of Duke supervision. For some examples, see paragraphs 33, 34 and 69, below.

2. Each of the parties has summarized the technical concerns in their proposed findings. Each presents the material in a different way, but all focus heavily on the Technical Task Force. None of the formats used by the parties suits the Board's needs, particularly since we are

not inclined to give special weight to the findings of the Task Force. Consequently, we have thoroughly reexamined the pertinent testimony and exhibits, as well as the proposed findings, and have organized this material in a way that relates more directly to the language of Contention 6. Our format considers the technical concerns expressed by the welding inspectors and their supervisors in relation to:

- a) Whether substandard workmanship was condoned by Duke;
- b) Whether detection or documentation of faulty work was inhibited or discouraged; and
- c) Whether construction deficiencies warranting correction were adequately repaired.

3. The Final Report of the Technical Task Force (App. Ex. 11, Att. 5) records and evaluates 130 concerns submitted by 15 welding inspectors. First-line supervisor Ross submitted 64 of these concerns and one of his inspectors, Mr. Bryant, submitted 30 of them. The Ross concerns duplicated 15 concerns submitted by others. The Board and parties heard and cross-examined 9 of those submitting concerns. These nine witnesses were responsible for about 90 percent of the technical concerns, but not all of their concerns were subject to cross-examination.

4. Was Substandard Workmanship Condoned by Duke? Our consideration of whether substandard workmanship was condoned divides the inspectors' concerns into four categories: (a) Supervisors directing welding inspectors to "sign-off" or not to NCI conditions the inspectors believed rejectable; (b) Resolution of NCI's by permitting

the hardware to be "used as is;" (c) Acceptance of material not bearing proper identification; and (d) additional concerns about welding quality.

5. Sign-off or no NCI. Welding inspectors submitted eight concerns in this category that were subjected to cross-examination.

6. Concern D-22.¹³ On June 15, 1981, Inspector Bryant identified lack of fusion in a portion of a weld which had previously been accepted. Rather than have Bryant document the non-conformance, second-line supervisor Baldwin ordered a liquid penetrant test. The test showed no rejectable condition (Baldwin, Tr. 4416-22, 4424-27), so Bryant was instructed to accept the weld. Under these circumstances, resolving the suspected deficiency without an NCI or similar documentation is not in accord with Applicants' procedures as described by Project Quality Assurance Manager L. R. Davison. (App. Ex. 14, p. 25.) Condoning of substandard work is not evident, however.

7. Concern D-24. On July 10, 1981, inspector Bryant noted a pinhole in the root of a socket weld associated with the 1A diesel generator. Supervisor Baldwin told the inspector that pinhole indications were not a basis for rejection since the applicable procedure, L-80, did not so specify. (Bryant, Tr. 6139.) The Staff concluded that documentation of this condition was advisable, even if

¹³ For reference purposes we adopt the code (e.g., D-22) used by the Technical Task Force in their report (App. Ex. 11, Att. 5) and abbreviate citations to this report, e.g. (TTF D-22).

not required by the letter of the procedure. (PFF 167.)^{13a} We agree with the Staff.

8. Concern D-30. Inspector Bryant was unable to visually inspect the results of grinding on the inside of a six-inch pipe some seven feet from the open end. The grinding was associated with repair of a defect and was done with a grinder mounted on a long rod. (Ross, Tr. 6804-18.) Supervisor Baldwin instructed Bryant to sign off on the visual inspection even though the repair could not be seen.

9. A year or more later Bryant included the incident among his written concerns and it was investigated by the Technical Task Force. Ultrasonic testing carried out for the Task Force showed that the wall thickness of the pipe did not meet minimum specifications (Ross, Tr. 6807), so NCI No. 13955 was issued. More metal was added to the outside of the pipe to compensate for that ground away on the inside.

10. Sign off on a visual inspection that cannot be made is a violation of Applicants' procedure M-4. In this case (D-30), the fault lies most heavily with the supervisor who issued the instruction to sign off rather than with the inspector who sought his guidance. The Staff (PFF 168) holds that a violation of Appendix B, Criterion XVI would have existed except for the corrective actions that belatedly resulted from the Technical Task Force evaluation. The record provides no plausible explanation for the supervisor's action in this case.

11. Concern Q-1. On February 27, 1981, inspector Rockholt could not confirm the material identification of a plate installed on the floor of the spent fuel pool decontamination pit of Unit 2. Presumably

^{13a} In some instances, we cite a proposed finding rather than to the record. We intend thereby to incorporate the record citations in the Finding.

the identifying markings were on the underside of the plate. Supervisor Baldwin instructed Rockholt to accept the material rather than initiate an NCI because the unique configuration of the plate matched the place where it was installed. (App. Ex. 31, Att. A.) Some ten months later (December, 1981) and after investigation of this concern (but prior to the establishment of the Technical Task Force), inspector Rockholt was asked to initiate NCI No. 13627 (Palmetto Ex. 89) on the nonvisible material identification marking (Rockholt, Tr.6278-81). The NCI was then resolved on the basis of the unique shape of the plate and tests which confirmed that it was stainless steel.

12. This instruction to sign off does not relate to quality of work, but rather to material traceability. Whether Applicants' QA Procedure H-5 concerning material verification was violated or not is questionable. Applicants' belated decision to issue an NCI indicates that Mr. Rockholt should have been allowed to write one in the first place.

13. Concern R-58 (I-1). On August 28, 1981, inspector Gantt looked up a 3-inch pipe with the aid of a flashlight and saw what appeared to be oxidation and excessive penetration of a weld some 8 to 10 feet from the open end. Lead inspector Bryant and first-line supervisor Ross also looked in the pipe and concurred with Gantt. Rather than initiating an NCI, foreman Ross consulted supervisor Baldwin -- a practice that Baldwin had imposed at that time. Baldwin ruled against writing an NCI because the weld in question was too far from the end of the pipe for a valid visual inspection (Gantt, Tr. 8454). The Technical Task Force

evaluation of this concern records that three independent reviews of radiographic tests were made (QA, QC, and ANI) and none of the reviewers had concerns about excess penetration. (TTF R-58). The record does not show whether or not supervisor Baldwin had the radiographic test results when he decided against an NCI.

14. Although the weld in this 3-inch pipe was clearly too far away for approval based on a visual inspection, we question the propriety of ignoring a suspected deficiency because it is beyond the prescribed viewing distance. The favorable radiographic evaluations provide a valid reason for acceptance of the weld, but documenting these observations on an NCI would have been preferable.

15. Concern R-59 (D-28). On September 4, 1981, inspector Bryant noted a black film on the inside of a 3-inch stainless steel pipe. Supervisor Baldwin, after consulting QA engineer Shropshire, said the condition was O.K. and Bryant signed off on the hold point. Design Engineering subsequently (February 26, 1982) confirmed that the pipe did not need to be cleaned. Inspector Bryant believed that accepting the pipe with the black stain violated Applicants' Procedure M-24. The Technical Task Force believed that the inspector violated QA Procedure M-4 for signing off on a condition he viewed as rejectable. (TTF D-28.) We find no evidence here of substandard workmanship being condoned either by the inspector or by QA supervision.

16. Concern V-2. Inspector Harris was not satisfied that the finish grinding of welds on pipe supports for reactor Unit 2 met the requirements of the specified construction procedure. Inspectors had

rejected the work a number of times and craft wanted to complete the job. Foreman Ross and Supervisor Baldwin first suggested that Harris sign off; but when Harris showed them the work and the specifications, they agreed with Harris that he should not sign off (Harris, Tr. 9028-34). The record does not indicate whether Harris ever did sign off, but the Technical Task Force directed that a Level III inspector determine whether or not the welds were acceptable. The evidence in this incident indicates that the inspector was steadfast in requiring high quality craft work and that QA supervision did not override his opinion.

17. Concern L-1. Inspector Jackson noted a craft foreman in the turbine building helping a female welder with a weld on nonsafety-related pipe. Jackson believed the extent of the work performed by the foreman, who was a certified welder, warranted having his stencil number on the weld where only the female welder's stencil was applied. Jackson wrote a CP-49a violation report which was resolved by Bill Sams of Technical Support with the instruction to Jackson to "accept as is" (Jackson, Tr. 8890-92). Jackson signed off (Jackson, Tr. 8893).

18. We concur with the Technical Task Force evaluation that coaching of welders should be done on training pieces and temporary piping, not production work. Nevertheless, the foreman's apparent intent was to produce better quality work -- not the condoning of substandard craftsmanship. Further, the quality of the portion of the weld done by the foreman was superior to that done by the welder

(Jackson, Tr. 8913). We do not agree with Palmetto Alliance (PFF 522) that the circumstances warrant escalation of the incident to the level of falsification of records and QA procedure violation.

19. Essentially all of the cases described above represent situations where the second-line QA supervisor (usually Baldwin) had to decide whether to let a condition remain "as is" or to have a nonconformance or similar report issued. In these cases the decision was to "accept as is." (Welding inspectors would not likely have voiced a concern in cases where the supervisor favored an NCI.)

20. In four cases (D-24, D-30, Q-1, and I-1) Baldwin relied upon the precise language of QA procedures to justify decisions not to issue NCI's. (See descriptions of concerns, above.) Except for Case D-30 (grinding on the inside of a 6-inch pipe) subsequent testing or technical evaluations confirmed the acceptable quality of the work.

21. It is evident that supervisor Baldwin was sometimes reluctant to approve the use of the NCI procedure. However, we find no clear evidence that this restricting of NCI use and the instructions to "sign off" were associated with deliberate condoning of substandard workmanship.

22. Resolution of NCIs by Permitting "use as is." Welding inspectors submitted 6 written concerns to the Technical Task Force which we place in this category.

23. Concern C-4. On August 6, 1981, inspector Burr was able to inspect visually the inside of a weld after an adjacent section of the pipe was cut out. He saw what he believed to be a crater crack in the

weld root and originated NCI 12420. A Level III inspector approved the weld based on his visual inspection and reevaluation of radiographs (Palmetto Ex. 86) (Burr, Tr. 5912-14). Although Burr questioned the resolution of the NCI by the Level III inspector (App. Ex. 29, Att. A), we find no reason to believe that the Q-1A Procedure was abused or that a substandard weld was approved.

24. Concern D-27. Under circumstances similar to C-4, supra, inspector Bryant originated NCI 12329 because he believed a weld root was defective. A Level III inspector, after looking at the weld and examining the radiographs, concluded that the weld met ASME standards. Bryant was dissatisfied with the resolution and maintained that QA procedure L-80 was violated (Bryant, Tr. 6141). This Board commends Bryant's desire to assure that welds meet both visual and radiographic inspections, but we find no evidence that the NCI was improperly resolved. The record does not support Palmetto's assertion that, "...supervision bowed to construction to override the results of one inspection tool in favor of accepting rejected work" (PFF 401).

25. Concern C-3. On the second shift of September 3, 1981, inspector Burr visually inspected the inside (root) of a weld on a Class-B pipe system that could then be seen because of rework nearby. Burr found some lack of fusion and documented the problem on NCI No. 12682. The NCI was left for processing the next morning (Burr, Tr. 5851-56). The NCI was processed through Baldwin and Atkins of the QA Department, but the disposition of "Acceptable as is" was made by two welding technical support representatives of the Construction Department

(Palmetto Ex. 85). Atkins of QA approved this resolution on September 18, 1981, the Q1B tags were removed (by inspector Crisp), and the rework finished (Tr. 5858-59).

26. A few days later on the night shift, the ANI inspector and NRC inspector Van Doorn contacted Mr. Burr and had him show them the questionable weld.¹⁴ Since the pipe was now reclosed, the defect on the inside was not visible but Burr marked the area of concern. The marked area was cut out and a repair made (Bur, Tr. 5850).

27. The Technical Task Force recognized that the overruling of the QA inspector's decision by Construction Technical Support was a violation of ANSI Standard N45.2.6 and 10 C.F.R. Part 50, App. B (App. PFF 103b). NRC issued violation 50-413, 414/81-24-02 (Staff Ex. 7, p. 45). This Board finds that Concern C-3 does constitute an occurrence of condoning substandard workmanship. Although this weld was soon repaired, the correction was made as a result of covert communications with the ANI and NRC inspectors and their follow up action.

28. Concern D-19. On a final visual inspection Bryant found that a fillet had been added to the inside of a weld on a penetration to the Unit 2 reactor. The fillet had been added to correct insufficient penetration of the root pass and was not in agreement with design

¹⁴ The record does not show how the ANI and NRC inspectors became aware of this suspected defect. Burr, however, became sufficiently concerned that he might be blamed for the NRC involvement that he talked with Van Doorn about protection from retribution (Burr, Tr. 5868-69).

drawings (Bryant, Tr. 6125). He issued NCI 11534 which apparently was overruled (Staff PFF 190). When the Technical Task Force investigated Concern D-19, they found the excess reinforcement to be a "potential violation" of procedures. A new NCI was issued to resolve the "potential inadequacy" (App. PFF 117b).

29. Although Applicants' procedures were apparently violated, the quality of the weld was not in question and we find no intent to condone substandard work.

30. Concern D-17. Inspector Bryant noted pitting in a pipe that was deep enough to violate the minimum wall thickness specified in Construction Procedure 107. He initiated NCI 11309. At first, Bryant questioned the resolution of the NCI which was "use as is." Later he was satisfied with the explanation that, although manufacturing tolerances were not met, Duke's design engineering group had determined that the pitted pipe was strong enough for the system where it was installed. We find no irregularity here.

31. Concern D-15(R-62). In the course of a final visual inspection on a carbon steel pipe for a diesel generator, inspector Bryant found what he believed to be a fine crack on a root pass (Bryant, Tr. 6118). Foreman Ross concurred that there was a hairline crack running from the piping material through the root pass into a 90° elbow (Ross, Tr. 6738). Such a crack would be a violation of Duke Procedure L-80 and NCI No. 13053 was originated for resolution.

32. The Level III inspector, accompanied by Design Engineering, saw only a gouge from handling on the pipe. Both Bryant and Ross disagreed

with the interpretation that no crack existed. A liquid penetrant test was performed to resolve the NCI and this resulted in what the Applicants call ". . . some light grinding to remove this defect" (App. PFF 107a). Ross testified that, "(w)hen the NDE was performed they had to chase it and get deeper and deeper and finally they scrapped the piece . . . because they couldn't get the indication out." Tr. 6738. The Technical Task Force supports the interpretation of the Level III inspector.

33. In view of Ross's observations that ". . . there were some [handling] marks inside the pipe," and the crack was just a fine hair line (Tr. 6739), we believe that Bryant and the Level III inspector may have been looking at different things. In any event we see no evidence here of intent to approve faulty workmanship. The defect was reported on an NCI; a liquid penetrant test confirmed the defect, and the fault was repaired. Palmetto proposes that support of the Level III inspector by the Technical Task Force is a ". . . transparent attempt to explain away a crack in a fashion that makes no logical sense . . ." (Palmetto PFF 334). There is some justification for Palmetto's position. The evidence strongly suggests that a very fine crack was present. The Task Force's willing acceptance of the Level III inspector's contrary conclusion is difficult to understand.

34. Half of the cases discussed above where NCI's were resolved with "use as is" involved an investigation by the Level III inspector, John Cavendar. These follow up investigations included either radiographic testing or liquid penetrant tests in addition to visual

observations. In evaluating each of these concerns (C-4, D-27 and D-15), the Technical Task Force pointed out that a part of the NCI resolution process is to use the higher level expertise of the Level III inspector to decide the significance of questionable defect indications -- "make the tough calls." We find this to be a reasonable procedure so long as the Level III inspector is properly qualified. Mr. Cavendar appeared later in the hearings as a member of panels concerned with the in camera witnesses. His resume is Attachment F to App. Ex. 95. There is no evidence that Mr. Cavendar's decisions to "use as is" were biased by construction or a proclivity to approve substandard workmanship.

35. Procedure violations were properly identified for Concerns D-19 (adding weld to the inside of a penetration) and D-17 (pitting in a pipe) but in each case investigations showed that the required quality was not compromised. Again we find no evidence that "use as is" characterizes the condoning of substandard workmanship.

36. Concern C-3, where ANI and NRC stepped in to assure repair of a deficient weld approved by representatives of the Construction Department, is disturbing. The record does not indicate that any other NCI's were resolved in this manner, however, and we conclude that C-3 is an isolated case. We find no pattern of action by Duke supervisors to approve substandard workmanship through a "use as is" resolution of NCIs.

37. Use of Material Without Proper Identification. Welding inspectors submitted 9 written concerns to the Technical Task Force which we place in this category. One of them (Q-1) deals with a

stainless steel plate installed on the floor of the Unit 2 decontamination pit and is described in paragraph 11, above. The other 8 are described here, but 3 of them are also concerns about verbal voiding of NCIs, and are also discussed below in our Section on documentation at ¶ 88.

38. Concern D-5. While making a final visual inspection of the cable tray support system in the Auxiliary Building, inspector Bryant found no material identification on angle iron. The design drawings specified A-36 materials to be used (Bryant, Tr. 6100). Bryant believed that this lack of identification constituted a violation of QA procedure H-E, and construction procedure CP-23 (Bryant, Tr. 6103). He filled out a Q-1A form (NCI) for resolution of the problem, but discussed the matter with Sr. QA Engineer L. R. Davison before obtaining a serial number. Without investigating the type of material used, Davison ruled that craft should be allowed to mark the identification number of the material and that there was no need for an NCI (Bryant, Tr. 6102). Later, Davison explained that his decision was based upon A-36 being the lowest grade material on site (Bryant, Tr. 6105-06).

39. We find that the inspector was conscientious in his work. The Sr. QA Engineer, however, was rather cavalier in his decision to have craft mark the material without positive identification. Since A-36 grade is said to be the lowest on site, there is no evidence of condoning the use of inferior material. We deal with verbal voiding of the NCI in the next section.

40. Concern J-1 (R-28). In September 1980, inspector Harris found different material identification numbers at the ends of a 1-inch stainless steel pipe (App. Ex. 56, Att. 1). One of the numbers matched that of the released piping material log (Godfrey, Tr. 8257); the other did not. This pipe was of Class B quality but in this case was installed in a Class E (nonsafety-related) system. Harris initiated NCI 9085 (Palmetto Ex. 113) to resolve the question of two different heat numbers. The resolution was "accept as is."

41. Inspector Godfrey was told to remove the NCI tags from the pipe and thus clear NCI 9085. When removing the tags, Godfrey found yet a third heat number and he called this to the attention of foreman Ross and supervisor Davison. Davison told Godfrey to remove the Q-1B tags and that NCI resolutions were not Godfrey's responsibility. (App. Ex. 56, Att. 1.)

42. Godfrey believed that having invalid heat numbers on the pipe constituted a violation of procedure H-4. The Technical Task Force evaluation in March of 1982 states that Class E piping does not require heat number identification and, thus, NCI 9085 is invalid.

43. Godfrey elaborated on the J-1 concern in his prefiled testimony. (App. Ex. 56, p. 5.) He postulated that some of the mismarked pipe in the Class E system might be cut out and later reused in a Class B system. Should it fail while in Class B service, the erroneous heat number would make accident evaluation difficult.

44. This Board finds nothing in this convoluted concern to indicate that any substandard material was involved or that needed traceability

had been lost. Rather, this concern comes about because material and procedures designed for very high quality systems were used for a non-safety-related system. Further, we are persuaded that the possibility of reusing mismarked pipe is too remote to be of concern. (App. Ex. 14, p. 10).

45. Palmetto harps on Davison's quick dismissal of Godfrey's concern about the third heat number. (Palmetto PFF 471 and 473.) Since heat numbers were not required on Class E piping and since the basic question of conflicting numbers on this piece of pipe had already been through the NCI process, we see no reason why Davison needed to recycle the NCI.

46. Concern E-1. On February 12, 1980, Mr. Cauthen was inspecting a fit and found a piece of 3/4-inch pipe with a heat number which was not listed in the Released Piping Material Log. (Cauthen, Tr. 6417, App. Ex. 33.) Cauthen told the fitter that he was going to NCI the pipe. While Cauthen was initiating the NCI, foreman Ed McKenzie had the nonconforming pipe cut out and the fit remade. Cauthen "wanted to NCI Mr. McKenzie for doing away with my bad fit" (TTF E-1). NCI No. 7696 shows that the offending heat number was 455633 while the correct number was 455663. Both numbers appeared on a longer piece of pipe from which the fitted pipe was cut. Neither marking was stamped at the factory. Resolution of the NCI was to scrap both the larger piece and the removed piece of pipe (App. Ex. 33).

47. The Technical Task Force evaluation finds that the inspector did not need to originate an NCI. Rather, he could have rejected the

"hold point" under procedure M-4 or he could have used QA Procedure R-2. Cauthen acknowledges that the M-4 holdpoint or R-2 could have been used but states ". . . at the time this happened we were instructed to nonconform it" (Tr. 6571).

48. Palmetto views the conduct of McKenzie and his crew as ". . . obstructing the enforcement of Quality Assurance procedures at Catawba," and berates the Technical Task Force for its failure to address ". . . this misconduct by craft supervision" (PFF 482). Palmetto's position is overly harsh. We view McKenzie's actions as expedient and in violation of the intent of Duke's Q-1 procedure. There is no evidence, however, of corner-cutting on the quality of work.

49. Concern J-2 (R-27). In August of 1980, inspector Godfrey noted that a pipe fitting had the identification numbers: SA105 and A105. Such numbers are stenciled on the pipe by the manufacturer (Godfrey, Tr. 8234). Godfrey did not know that these numbers are interchangeable and initiated NCI No. 9358. Davison, as Senior Engineer, voided the NCI because he knew that there was no conflict between the two numbers.

50. There is no evidence here of any procedural violations nor any attempt to use improperly identified materials.

51. Concern J-3. When making a fit-up inspection, Mr. Godfrey found no NDE piece mark on a reducer. The Released Piping Material Log (RPML) showed such a number, and failure to verify it on the material is a violation of QA procedures M-4 and H-4 (TTF J-3). Godfrey initiated NCI No. 10,187 and the resolution was to use "as is". The Technical Task Force observed that an NDE piece mark is only required where there

is a need for tracing to NDE records, specifically radiographs. This case did not require such traceability and placing the number on the RPML created unnecessary confusion.

52. This concern was not subjected to cross-examination, but its evaluation by the Technical Task Force does not indicate a procedural breakdown that might compromise construction quality. Rather, the problem arose from the application of stringent material traceability procedures in a case where they were not needed.

53. Concern Q-1. This concern involves a plate installed on the floor of the decontamination pit with the identifying markings on the underside. It is described in paragraphs 11 - 12, above, in relation to acceptance without an NCI. We find it questionable whether Duke's Procedure H-5 had been violated since the size, shape and material of the plate assures that it is the piece intended for the specific place where it was installed. We find no evidence of substandard workmanship here, other than failure to transfer the identification number to the exposed side of the plate.

54. Concern Q-2. On February 26, 1981, inspector Rockholt observed craft cutting steel angle without first transferring the material identification, A-36, to the pieces being cut. Rockholt viewed this as a clear violation of CP-23 and QA procedure H-5. An NCI was written but verbally voided by supervisor Baldwin because material identification is not required on nonsafety-related applications (App. Ex. 31, Att. A). The Technical Task Force scored this case as only a potential violation because ". . . no actual unacceptable installation resulted" (TTF Q-2).

55. One purpose of the material identification procedures is to assure that inferior material is not inadvertently installed in safety-related systems which require high quality materials. We note in Concern D-5 (paragraph 38, above) that A-36 angle without proper marking was used in cable tray supports and that A-36 is the lowest grade material on site. The record does not show where the angle iron of Concern Q-2 was actually installed (Rockholt, Tr. 6341). Consequently we find that there was an actual procedural breakdown in this case which was exacerbated by the verbal voiding of the NCI.

56. Concern Q-3. On February 25, 1981 inspector Rockholt observed craft cutting Class B pipe without transferring traceability information. As in Concern Q-2, above, Rockholt believed this violated procedures CP-96 and H-4 (App. Ex. 31, Att. A) and initiated an NCI. The NCI was rejected by foreman Deaton (possibly on instructions from supervisor Baldwin) (Rockholt, Tr. 6338). The Technical Task Force did not consider this a procedural violation because the high grade (Class B) pipe was to be used in a nonsafety-related (Class G) application. Rockholt thought the procedure may have been changed after he wrote the NCI. The change would have eliminated the need for transferring markings if the intended use is nonsafety related (Rockholt, Tr. 6337).

57. Whether or not material traceability procedures were violated in this case hinges upon when the instruction was issued to take use of the pipe into account. The record is not clear on this point. Here, we are less concerned with the potential for misuse of inferior material

since the high grade Class B pipe ". . . would probably be suitable anywhere it was used" (Rockholt, Tr. 6337-38).

58. Intervenors did not cross-examine Mr. Rockholt about concerns Q-2 and Q-3, but the Staff did. In its proposed Findings of Fact, Palmetto is critical of both the verbal voiding of the NCI's and of the Technical Task Force resolutions of these concerns which fault the inspector for applying QA procedures where the nonsafety use of the material did not require them (Palmetto PFF 439 and 446). Palmetto's position has merit. There was no question in the inspector's mind about the applicability of the procedures (Rockholt, Tr. 6337), and the Task Force's implied criticism of the inspector is misplaced.

59. Concern E-5 (R-5). Inspector Cauthen's concerns included the control of welding rods. Duke's procedure H-3 requires verification of filler material traceability prior to acceptance of the weld and that welders have control of their consumables (App. PFF 111a). Cauthen had a general concern about welders not maintaining close control of their filler material and the casual discarding of only partially consumed rods. He cites some specific examples (TTF E-5). Rather than initiate NCI's on discarded filler material, inspectors were told to ". . . put a red tag on it . . . and turn it in to the QA office" (Cauthen, Tr. 6458). Follow up, if any, on the "red-tagged" rods is not clear. Other concerns about uncontrolled welding rods include the Reep-Jones harassment incident (described at pp. 163-166, below) and a 1979 incident where a utility foreman refused to give rods to inspector Childers (TTF R-5).

60. The Technical Task Force scores both the Cauthen and Childers incidents as actual violations of procedure H-3 and makes firm recommendations for improved control of filler material. Palmetto impugns Duke's lack of documentation and corrective action (Palmetto PFF 459). This Board agrees with the Technical Task force that craft needs to tighten up on the control of welding rods. This may have already happened since Cauthen stated that he had not found any filler material lately (Tr. 6463).

61. The only evidence that points to the use of the wrong filler material by welders was in response to a Board question. A welder may have both carbon and stainless filler material in his possession at the same time and inadvertently pull out the wrong kind (Reep, Tr. 8698). Preventing this possibility is at least as important as the control of discarded rods. Applicants are directed to upgrade their procedures accordingly.

62. In none of the concerns about material identification and traceability that we heard is there evidence that inferior material might have been installed. We do find, however, that both QA supervision and the Technical Task Force were inclined to downplay the importance of procedures designed to assure traceability. For the most part, the inspectors' concerns about lack of support in this area appear justified.

63. Additional Concerns about Weld Quality. We direct our attention here to the response of Duke management when faulty workmanship was clearly evident. The half dozen cases that we discuss

in this section represent but a tiny fraction of the many thousands of cases in which welding inspectors have rejected work at a holdpoint or originated an NCI or other form which documents a problem. The cases reviewed here are only those which the inspectors viewed as sufficiently troublesome to warrant expressing as a concern to the Technical Task Force or in their testimony to this Board. Further, we consider only those concerns which the Intervenors or Staff included in their Proposed Findings of Fact.

64. Concern D-3. Inspector Bryant found a weld on structural steel of the cable tray system in the auxiliary building that had been made with paint and foreign contaminants in the weld zone and rejectable defects on the root side (Bryant, Tr. 6095). Bryant decided the situation could not be corrected easily in the field, so he wrote an NCI which was approved by foreman Robert Supervisor Davison, a Level III inspector at the time, concluded that since the design drawing called for only a partial penetration weld and since the weld exceeded design specifications, no inspection of the root area was required. The NCI was voided by Davison without a serial number or filing (Bryant, Tr. 6096).

65. Bryant believes there was a violation of QA PL-80 (visual inspection) (Bryant, Tr. 6098). The Technical Task Force and the Staff agreed with Davison's evaluation and saw no violation of procedures -- except for verbal voiding of the NCI (TTF D-3, Staff PFF 162). Palmetto is disturbed that the Technical Task Force did not address the "paint

and foreign contaminant" aspect and only "alluded" to the problem of verbal voiding.

66. Applicants' position is based on the judgment of Level III inspectors (originally Davison and later Van Malssen for the Technical Task Force) that the weld was in excess of design requirements and therefore defects in the root were of no consequence. There is no evidence in the record, however, to indicate that either Davison or Van Malssen ever looked at the weld. They decided the weld was acceptable based on what Bryant described as a rejectable condition. In this instance we find Duke management's attitude toward potential faulty workmanship illaudable. The Task Force did recognize the problem of verbal voiding of the NCI and we deal with that in the following section.

67. Concern D-9 (R-25). On August 20, 1980 Inspector Bryant made random inspections of safety-related piping in the "exterior doghouse." Bryant required one welder to remove some minor defects and while he waited for this repair he watched a second welder working on another joint. The second welder was ". . . not cleaning his weld of slag before putting the next pass on" (Bryant, Tr. 6112). Bryant considered welding over the uncleaned slag a violation of Procedure L-300 and wrote NCI 9264. The resolution of this NCI did not satisfy Bryant or his foreman Ross. "It didn't really address the fact that they had welded over [the slag]" (Ross, Tr. 6724). A second NCI (No. 9266) was then written by Bryant which also identified a problem of "weaving too wide." This brought supervisor Davison to the job site.

68. Davison inspected the weld and, in front of craft, questioned the source of the slag and the need for originating an NCI in view of the "insignificance" of the amount of slag (Bryant, Tr. 6114). (The Board notes that at this time Davison was a Level III inspector at Catawba but no mention is made that he was acting in that capacity on this occasion.) Bryant and Ross resented the questioning of Bryant's judgment in front of craft (Bryant, Tr. 6116). Ross also commented that, "(t)hey were all kind of snickering a little bit [at Davison] because they knew slag don't move" (Tr. 6724).

69. Resolution of the second NCI was to grind back the width of the weaving and to rework the weld (Bryant, Tr. 6115). The Technical Task Force agreed that there was a violation of L-300 but pointed out that an unacceptable amount of slag would ultimately have shown on radiographic testing and been rejected. Excessive weave width was not a technical inadequacy because this weld was not subject to impact testing.

70. The inspector's concern focused on recognition and acceptance by management (Davison) that Procedure L-300 had been violated. Applicants focus on the ultimate acceptability of the weld (App. PFF 102f). The Staff only mentions the comment by the Technical Task Force about the inspector's ability (Staff PFF 220). Palmetto avows that this incident reflects Davison's disrespect for his inspectors and deferral to the cost and scheduling interests of construction (Palmetto PFF 325). There is nothing in the record to support any relationship to cost and scheduling considerations.

71. This Board finds that Davison, as a Level III inspector, was qualified to make the judgement that the slag and wide weaving were insignificant problems. Nevertheless, his attitude toward faulty workmanship was, in this case, not conducive to the production of high quality welds.

72. Concern D-31. This concern was not subject to any cross-examination, but the Technical Task Force found an actual violation of Procedure Q-1. The Staff's finding (PFF 161) reads as follows: "In this case, the inspector, Mr. Bryant, another inspector and his supervisor detected a bad 'root pass,' but Mr. Baldwin found it to be adequate and invalidated the NCI. The weld was corrected and the repair documented, although the record is not clear exactly how this came about."

73. The Staff cites concern D-31 as an example of verbal voiding of NCI's (PFF 159), but the voiding is apparently documented on NCI No. 13,028 (not introduced as an exhibit). The evidence is not sufficient for us to make a finding relative to Duke Management's attitude toward the bad root pass, other than to note that it was repaired.

74. Concern D-20 (R-44). In May of 1981, inspector Bryant was called to inspect a weld which attached an iron clip to a structural beam. The welder had not adhered to the design drawing and had welded a part of the clip to the flange of the beam. Welding across the flange of a beam is not permitted by Construction Procedure CP-22 unless Design provides special authorization (Bryant, Tr. 6128). Since no special authorization had been provided in this case, construction initiated a

Problem Resolution Form CP-22A No. 6 (TTF D-20 Attachment) which documents that the weld was ground out and the flange repaired.

75. Although the CP-22A states that, "(p)er Design Engineering conversation, weld repair is acceptable . . .," foreman Ross was dissatisfied because no signature of a responsible individual in Design was required (Ross, Tr. 6968). Ross believed that Form R-3A, normally used when Design approval is needed, would have been the proper form. Form R-3A is also used for deviations from design drawings rather than a Q-1A (NCI) (Ross, Tr. 6731).

76. The Technical Task Force found that this situation was handled properly (TTF D-20, R-44). Bryant and Ross believed there was a violation of CP-22 when the weld was first made and that the Task Force should have acknowledged this (Bryant, Tr. 6129 and Ross, Tr. 6968). They were satisfied with the repair, but disagreed that an authorizing signature by Design was not needed (Ross, Tr. 6969). The Staff cites this concern only in reference to the disagreement between Bryant and the Technical Task Force (PFF 218, 219).

77. Intervenors interpret this event as indicative of Duke's ". . . disrespect for the separation of design from construction functions, and second, the common disrespect for the performance of the quality control inspection effort." PFF 362. We find no basis at all for such an interpretation. Although the least burdensome correction form (CP-22A) was selected for use, construction sought the verbal guidance of Design before implementing the repair. Further, neither Bryant nor Ross allude to any disrespect for the quality control effort. Their concerns in

this case were confined to the Technical Task Force scoring of criteria violated as "none" and the verbal vs. written approval of Design.

78. We find nothing wrong with Duke's attitude and actions in this case. QA inspectors were called in at appropriate times and were satisfied with what was done and the final condition. Design was consulted about removal of the weld and repair of the beam using established procedures. Use of Form CP-22A, which does not require a signature from Design, accomplished the same result as would have happened if an R-3A or NCI had been initiated.

79. Concern E-3. While in the lower part of the reactor building, inspector Cauthen noticed a grinder in a 4-inch stainless steel pipe which had been fitted with tack welds (Cauthen, Tr. 6441-44). This was a Class E or F (nonsafety-related) system which did not require a fit up inspection (Cauthen, Tr. 6443). The welding had been done without a purge and the inside did not look good, so Cauthen instructed the welder to "cut it out and refit it and call me back." (Cauthen, Tr. 6441).

80. Cauthen believed this was a violation of L-200 (Tr. 6444) but did not initiate an NCI because it was craft foreman Ed McKenzie's crew and "...they would have cut them out before I got back with an NCI anyway." (App. Ex. 32, Att. A-3.) The Technical Task Force observed that purging to prevent oxide formation is only required if the inside of the pipe is not accessible. If accessible, as here, the oxide can be ground away. Thus, an NCI would not have been appropriate. No Technical inadequacy exists since the fit was removed and rewelded (TTF E-3).

81. In this case there was no specific contact with QA or craft management. There was, however, Cauthen's belief that Ed McKenzie's crew would correct the faulty work before he could obtain a red tag for it. Cauthen denied any aspect of game playing with McKenzie's crew (Tr. 6553). In response to a Board question on his relationship to welding crews other than McKenzie, Cauthen replied, "(i)f I had problems with them, I'd go to the foreman, and it wouldn't take him but a minute and he would be down on that fitter. If I had problems, he would straighten it out" (Tr. 6554).

82. Palmetto thinks McKenzie and his crew intentionally circumvented Quality Assurance Procedures for documentation of nonconforming conditions (PFF 492). Concern E-3 shows no such attitude. Cauthen made no effort to write an NCI and the Technical Task Force found that one would not have been appropriate. Rather, Cauthen asked craft to cut out the fit and remake it. This was done although the Technical Task Force later found that such action was not necessary under the circumstances. We find no evidence here that Duke management's attitude and actions were inappropriate. Further, Cauthen's comments about craft foreman other than McKenzie indicate a very positive attitude toward correcting faulty work.

83. In his prefiled testimony, inspector Cauthen identified four incidents which gave rise to his concerns about welds in the plant (App. Ex. 32, p. 4). Two of these, (welds receiving only final visual checks and his discovery of some defects on M-4I inspections) are discussed at

pp. 149 below. The other two involve welder qualifications and are discussed here.

84. Cauthen learned that a particular welder had made a large number of bad welds on a Class C system in the Auxiliary Building. He assumed the defects were caused by bad root passes and were found by random radiographic testing since they would have otherwise been caught immediately by the "adequate" visual inspections (Cauthen, Tr. 6530-31, 6544). The welder was fired for doing the bad work and the welds were repaired.

85. We find nothing awry with Duke's handling of this matter. The bad welds were apparently found by a redundant inspection system, the welder was fired and the welds repaired.

86. Cauthen observed another welder ". . . having a lot of trouble on his root passes" and questioned that he was qualified for a stainless steel certificate (App. Ex. 32, p. 4). Cauthen "stayed right with him" and two co-welders helped him do the weld correctly (Cauthen, Tr. 6532). Cauthen doubted that the welder's supervisor was aware of the problem and was uncertain whether he had told QA supervision about it. Cauthen advised the welder to practice (id.).

87. This concern is of little relevance to this case. Perhaps the welder should not have been certified, but we cannot make such a finding on Mr. Cauthen's opinion alone. Neither can we speculate about what Duke might have done if the inspector had reported his concern to management.

88. Did Duke Management Discourage the Detection and Documentation of Substandard Workmanship? Our consideration of whether Duke deliberately avoided recognition of substandard welding focuses particularly on the verbal voiding of NCIs. This practice was probed extensively in cross-examination and there is substantial evidence about the circumstances for some cases. Palmetto would have us conclude that, ". . . the practice of 'verbal voiding' of NCIs is simply the clearest example of a pervasive circumvention by quality assurance management of the critical documentation requirements reflected in the specific provisions of Duke's own quality assurance program . . ." (Palmetto PFF 57). Before turning to the evidence underlying our contrary finding, we discuss the purpose of the Q-1 Procedure and how it was used at Catawba.

89. As we describe above at IB ¶ 7-10, Duke has several QA procedures that are intended to assure compliance with 10 CFR 50 Appendix B. These include:

Hold Points - The inspector must be satisfied with a craftsman's work before he signs off.

Process Control - The inspection report itself provides the means to document a repair.

Deficiency Report Form - (R-2A) used to document minor discrepancies where technical personnel in construction prescribe the corrective action but QA must approve the corrected work.

Nonconforming Item Report - (Q-1A or NCI) used when the discrepancy is more significant and not readily handled by one of the above methods.

(App. Ex. 2, Grier, pp. 18-20; App. Ex. 14, Davison, p. 23.)

The Q-1 Procedure is to be used when a discrepancy:

- i) requires design evaluation,
- ii) represents a manufacturing deficiency,
- iii) requires extensive rework,
- iv) represents a bypass of the inspection holdpoint, or
- v) is discovered during other than a preplanned activity.

(Id.)

During construction thousands of variation notices and other process control forms have been issued, more than 17,000 R-2As have been written, and more than 17,000 NCIs have been initiated (Van Dooran, Tr. 9777-79).

90. Palmetto asserts that Q-1 is "(t)he primary quality assurance procedure used by quality control inspectors at the Catawba facility in the performance of their inspection duties . . ." and that ". . . the Q-1 Procedure is the primary "measure" and "procedure" established for use at Catawba and employed in practice to meet [10 CFR 50 Appendix B, QA Criterion XV]" (PFF 43). Applicants disagree, pointing to the eight volumes of QA procedures in evidence and the other methods of resolving nonconformances described above (App. Reply to Intervenors and Staff PFF, pp. 50-51). We concur with Applicants.

91. We adopt the Staff's explanation of "verbal voiding" which is to ". . . turn back the partially completed form with an oral explanation, rather than a written one, and not placing the Q-1A form in the QA vault" (PFF 143).

92. "In verbal voiding, the real issue is documentation, rather than whether the discrepancy involved is a valid one or not. Since under Duke's Procedure Q-1, a Q-1A or NCI cannot be disposed of once it is serialized, the legitimacy of verbal voiding hinges upon whether the NCI was serialized, or whether improper efforts were made to prevent serialization of NCIs" (Staff PFF 149). Thus, there are two questions about verbal voiding for us to resolve: i) is it a violation of the Q-1 Procedure? and ii) has it been used deliberately to circumvent a documentation requirement?

93. The cardinal point relative to the Q-1 Procedure is whether or not it was proper for unserialized NCIs to be ruled invalid and not forwarded to technically responsible reviewers for resolution or for preservation in the "vault." Palmetto introduced the Q-1 Procedure and its successive revisions into the record as Exhibit 59. We note several changes in this procedure during the construction period of Catawba.

94. In 1975, when construction began, Revision 11 was in place. It states (Section 4.1) that a ". . . person discovering a nonconforming item...shall initiate Form Q-1A . . ., obtain a serial number and have the Q-1A entered on the Status Log Sheet The report shall then be reviewed for completeness and correctness by the responsible Senior Engineer . . . who shall sign the report, mark initial distribution, and submit it to the Project Quality Assurance Staff for assignment of resolution responsibility" (Palmetto Ex. 59). This revision makes no mention of reviewing NCIs to determine their validity.

95. Revision 12, issued in June of 1978, contained substantial changes, including a much revised Form Q-1A. "Specific Instructions" for completing each space on the form were given in Section 5. Instruction 5.1 states that the person discovering the nonconforming item shall complete spaces 1 through 11. No mention is made of obtaining a serial number.

The instruction for Space 15 reads:

The Senior QA Engineer shall review the information recorded for clarity, completeness, and proper content and shall sign and date to indicate his acceptance. If a report is determined to be nonvalid, it shall be filed and no further action taken. He shall forward each valid report to a Document Controller.

The instruction for Space 16 reads:

A sequential serial number assigned by Document Control shall be recorded on form Q-1A

We find it clear that Revision 12 (1978) provided for the Senior QA Engineer to determine whether an NCI was valid or not and to "file" it if he found it invalid. Only valid NCIs were to be forwarded to the Document Controller and the serial number was assigned by Document Control after they were received from the Senior QA Engineer.

96. Revision 13, issued in May, 1980, did not change the instructions relating to numbering or validity. However, Revision 14, issued in January of 1981, added a sentence to the first instruction in Section 5.1 which read:

The serial number, block 16, may be completed at this time.

The Revision 12 language for blocks 15 and 16 was not changed.

97. Revision 15, issued in April of 1981, made minor modifications to the Q-1A form, including deletion of the numbers on the blocks (e.g., "16" for the Serial No. space). Related adjustments in the text resulted in Instruction 5.1.1b reading: "Serial No. - This block may be completed at this time." A significant revision was made in the initial review of the NCIs. The prior instruction for the Senior QA Engineer at Space 15 was now assigned to the Project QA Engineer under Instruction 5.1.4. Sequential serial numbering by Document Control was retained under Instruction 5.1.5. Significantly, Instruction 5.1.2 was added ahead of these steps and reads:

"The Senior Engineer shall complete the following steps:"

- "6. Review the information recorded for clarity, completeness, and validity, have needed corrections or additions made by the originator; and sign and date for "Technical Review." If a report is determined to be nonvalid, this shall be explained in the description of item space The report shall be forwarded to the Project QA Engineer for review."

Revision 16 (January 1982) and 17 (June 1982) did not significantly alter the parts we focus on. In Section 5.1.2 the words "appropriate individual" replaced "Senior Engineer."

98. Revision 18, issued on March 11, 1983, reflected recommendations of the Technical Task Force. Specific Instruction 5.1.6 clearly states that, "(t)he originator shall obtain a sequential serial number . . ." and there is no longer mention of the Project QA Engineer forwarding valid reports to Document Control for assignment of a number. Instruction 5.1.7c states that:

If a report is determined unnecessary the reason shall be explained on the report and a copy provided to the originator [by an individual designated by the Project QA Manager] The report shall be filed and no further action under this procedure is needed.

99. How this portion of the Q-1 Procedure was followed at Catawba is described by the Staff (PFF 151, 152) and we adopt parts of their findings with modifications. L. R. Davison was QC Senior Engineer from 1974 until February 1981, and was responsible for the initial determination of the validity of NCIs initiated by the QC group. The vast majority of these had serial numbers when he received them for review. (App. Ex. 14 Davison, pp. 26-28; Davison, Tr. 4830). If a serial number had been assigned and he determined the NCI to be nonvalid, he would either explain on the form why it was not valid or sign it and send it on to QA with a note to assign it to him for resolution because he knew what the resolution should be (Davison, Tr. 4955). If the Q-1A form did not have a serial number and Davison determined that the matter was not appropriate for an NCI, ". . . then that piece of paper was not kept." (Id.) When Davison left the site in February 1981, for a job at corporate headquarters, C. R. Baldwin took over the technical review function and handled NCIs in like manner (Baldwin, Tr. 4458-59).

100. On April 27, 1981, supervisor Baldwin instructed the QC inspectors to avoid Q-1As as much as possible and not to get a serial number before he reviewed the NCI (Ross, Tr. 6745). Foreman Ross, who kept notes on events that concerned him and his crew, testified that

most of the verbal voiding occurred in a short period of time following Baldwin's instruction. The practice ceased when Rev. 18 to the Q-1 procedure was implemented (Tr. 6984).

101. We find that Baldwin's instruction to "see me" before serializing an NCI foreclosed the originator's option stated in the Q-1 procedure that he "may" get the number. We address the significance of this foreclosure below. After Revision 15 was issued in April, 1981, a more apparent violation of the Q-1 procedure occurred when proposed NCIs were discarded by Baldwin rather than being forwarded to the project QA engineer for review and filing. Applicants side step this feature in their Reply to Proposed Findings of Fact . . . of Intervenors (p. 55). We turn now to the question of whether the verbal voiding was used with an intent of circumventing documentation requirements.

102. Baldwin's instruction of April 27, 1981 follows close on the heels of NRC Inspection Report 81-02 transmitted to Duke on April 10, 1981 (Staff Ex. 7 Att. 25). An NRC inspection team had noted the large number of NCIs then being written (nearly 300 per month) and stated:

The subjects covered by these NCI's ranged from relatively minor documentation problems through major problems with safety-related hardware. This large volume of all types of problems being handled in the same manner was pointed out to licensee management as a possible contributor to the reason why generic items and/or trends were apparently going unnoticed.

(Id., p. 21; Tr. 9848.)

We find Baldwin's instruction of April 27, 1981 to be one of Duke's reactions to this inspection report.

103. If verbal voiding was used intentionally to reduce the volume of NCIs then being generated, then the percentage of NCIs originated which were discarded by verbal voiding would need to be substantial. This Board extensively probed whether there had been such a relationship. Mr. Davison, as the QC senior engineer from 1974 until February 1981, was the individual in a position to accomplish most of the verbal voiding (Staff PFF 151). Davison estimated that during this time he verbally voided no more than 20 NCIs a year (Tr. 4956). This would be on the order of one percent of those originated. Individual inspectors confirmed that verbal voiding was not widespread. Rockholt estimated 30 to 35 of his NCIs were voided over a six-year period. "A drop in the bucket" (Tr. 6365-66). Bryant estimated 5 out of 200 in a six-year period (Tr. 6162). Several inspectors said they had not had any NCIs verbally voided. Cauthen (Tr. 6560-61), Jackson (Tr. 8916), Burr (Tr. 5894), Crisp (Tr. 8402), Deaton (Tr. 5823).

104. Palmetto proposes that we find the record inadequate to know how extensive the voiding of NCIs was beyond the welding field (PFF 60). Mr. McAfee is cited as an example of a person in the electrical discipline who was discouraged from documenting deficiencies on NCIs (Id. and PFF 73). We make no such finding. Davison's estimate of 20 verbally voided NCIs a year included all disciplines--not just welding (Davison, Tr. 4963). That estimate is consistent with the testimony of the welding inspectors we heard.

105. We find that verbal voiding was infrequent and experienced by only a few inspectors. So few NCIs were handled in this manner in

relation to the number originated that it could not have served to conceal faulty workmanship or significantly diminish the number of nonconformances that were documented.

106. We heard testimony about 9 concerns of the welding inspectors that involved verbal voiding. Seven of these were submitted by Bryant and two by Rockholt.

107. Concern D-3. This concern of inspector Bryant is described in ¶ 64 above. Davison verbally voided the NCI concerned with foreign material in the weld zone and defects on the root side because he concluded that the weld exceeded design specifications. The Technical Task Force supported Davison's decision that the NCI was invalid, but criticized his discarding the NCI instead of seeing that it was properly filed (TTF D-3). Palmetto is critical of the Technical Task Force for not investigating the full extent of Davison's verbal voiding (PFF 289). This Board concurs that a questionable weld of this type should have been documented. We also agree with Palmetto that the Technical Task Force should have looked into Davison's verbal voiding practices. In any event, the Board and parties have done so.

108. Concern D-5. This concern of inspector Bryant is described in ¶ 38 above. It involves angle iron with no material identification. Davison decided to let craft mark the material rather than processing the NCI. We see this case as an example of situations that could well have been resolved short of the Q-1 procedure. Once initiated, the NCI should have been properly filed.

109. Concern D-7. Inspector Bryant found that a process control form (M-49A) had identification numbers for two welders, but the welders had not put their stencils on the welds. Bryant recognized that this violated procedures that called for welders to identify their welds. Before writing an NCI, Bryant conferred with supervisor Baldwin, who contacted QA Technical Support. A decision was made to either strike the welder identification on the M-49A, or to have the welders put their stencil numbers on the work (TTF D-7). No NCI was to be written. Bryant was dissatisfied with the solution because he thought positive identification of the welders could not be made and procedure violations had occurred that should be documented with an NCI (Bryant, Tr. 6109-10). The Technical Task Force thought the situation could have been handled by Bryant simply contacting the craft foreman or using procedure R-2. Palmetto asserts that "[t]his incident reflects significant failures of implementation of the Quality Assurance Program at Catawba." There is nothing in the record to support such an assertion.

110. In the D-7 case, Bryant was thwarted from writing an NCI but the resolution was still made by QA technical support. The missing part is documentation, but in view of the type of nonconformance, we find no evidence of intent to avoid documentation.

111. Concern D-12 (R-29). On September 5, 1980, supervisor Baldwin verbally voided an NCI written by inspector Bryant about the absence of a welder's stencil mark on a temporary weld. There was no cross-examination about this concern and Intervenors do not offer a

proposed finding about it. The Technical Task Force supported Baldwin's decision that the NCI was invalid because Procedure M-4 specifies only that a welder initial the M-4J form for temporary welds. They were, however, critical of Baldwin's discarding the NCI and specifically recommended a requirement that NCIs be assigned a number before submission for technical review (TTF D-12, R-29).

112. The Staff's finding was that the temporary weld did not require a stencil mark (PFF 162). We find the Task Force evaluation and the Applicants version (PFF 120a) obtuse. Bryant points to Procedure I-1 which requires a welder to identify his welds. Albeit, this is another case which scarcely warranted use of the Q-1 procedure. We note that this incident occurred some six months before NRC advised Duke about the overuse of NCIs.

113. Concern D-18. On April 2, 1981, inspector Bryant made a final visual inspection on small valves being attached to sockets with fillet welds. The process control form (M-4A) called for a 0.205 fillet but, because of the size and shape of the valve, only a 0.171 fillet could be attained. Bryant wrote an NCI but Baldwin discarded it and directed Bryant to let technical support correct the problem (Bryant, Tr. 6123). The Staff simply notes that a valid but correctable weld size problem was identified (PFF 162). The Technical Task Force recognized an actual violation of Procedure M-4A, supported Baldwin's decision to refer the problem to technical support, and emphasized the need for technical support to research possible associated deficiencies and document their findings. The Task Force classified this incident as a "potential"

technical inadequacy and recommended follow up to assure the welds in question are properly sized (TTF D-18). Palmetto condemns the verbal voiding, assumes there was a judgement to accept the smaller sized weld, and, without explanation, finds the observations of the Task Force "incredible." (PFF 347 (sic), p. 193.)

114. We find nothing in the record as to whether Bryant ever referred this discrepancy to technical support, or what their decision was if he did. The Staff should verify that Duke followed through on the recommendations of their Technical Task Force that the welds were investigated to assure their size is proper. In contrast to Palmetto, we find the observations of the Task Force quite credible, but this is clearly a situation where an NCI was justified and the verbal voiding was especially improper. We note that it occurred very soon after the NRC team inspection and exit interview (Staff Ex. 7, Att. 25).

115. D-23 (R-50). On June 18, 1981 inspector Bryant observed that a weld on a steam generator blow down tank was welded downhill. On Duke projects only uphill welding is specified and welders receive qualification only for the uphill direction. Thus, downhill welding is prohibited (TTF D-23). Bryant wanted to issue an NCI, but the craft foreman told him that supervisor Baldwin had approved craft repair of the weld rather than an NCI. Ross contacted Baldwin and confirmed that this was Baldwin's decision. Bryant testified that Baldwin ". . . allowed the craft to overweld over top of previous weld" (Tr. 6135), but Ross was not positive this had happened because welding over top is not proper (Tr. 6735).

116. The Technical Task Force classified this incident as a potential violation of procedures L-200 and L-300, and observed that downhill welding is prohibited on Duke projects. They also stated that "[t]he practice of not initiating proper notification (Q-1, R-2) of an obvious violation of the welding program is not acceptable" (TFF D-23, R-50). Their recommendations included: "Assure welds in question have passed the required inspections." After the Task Force review, Ross was assigned to investigate the final weld. It was welded uphill, but Ross could not determine whether it was a new weld or welded over the original (Ross, Tr. 6736-37). The NRC Senior Resident Inspector, Mr. Van Doorn, investigated the inspector's concerns after the Technical Task Force finished. Van Doorn classified the downhill welding as a code violation (Staff Ex. 7, p. 42).¹⁵ The Staff explains that the nonconformance was not the weld but the qualifications of the welder and accepting the weld without documenting the problem was clearly inadequate corrective action (PFF 175). In response to questioning by Mr. Wilson of the State of South Carolina, Ross testified that properly applied, a downhill weld should be as strong as an uphill weld (Tr. 6976-77).

117. Palmetto terms this incidence of verbal voiding ". . . a clear subversion of Quality Assurance criteria for Quality Control inspections

¹⁵ 10 CFR 50.55a specifies certain codes, such as those developed by the American Society of Mechanical Engineers, which apply to water-cooled nuclear power facilities.

and the documentation of non-conforming items" (PFF 384). Applicants admit that this deviation from procedures should have been documented under O-1 or R-2, but point out that the incident did not involve a technical deficiency. (App. Reply to PFF of Intervenor, p. 159.) This Board views Baldwin's improper verbal voiding as an inept effort to reduce the number of NCIs processed.

118. Our paramount concern about this incident is Ross' perception that Baldwin favored craft over QC. In response to cross-examination by the Staff, Ross states:

. . . if [craft] felt like the inspector was wrong, they would contact me. If they felt like the inspector was right, they would contact Charles [Baldwin] because they knew if I felt like the inspector was right, I was going to back him up. And they knew Charles had more of a tendency to go along with what they wanted to do. . . . [A]t that particular time [that] was pretty much common practice. It got to be a big headache Tr. 6958.

119. Concern D-25. Inspector Bryant was dissatisfied with certain hanger welds because of excessive undercut, trapped slag, base metal encroachment and arc strikes. Under the applicable procedure, L-80, inspectors normally pointed out such defects to craft and they were corrected. In this case craft's attempt to make the correction under L-80 had been rejected three times by the inspector. On this fourth inspection Bryant wrote an NCI. Supervisor Baldwin verbally voided the NCI because the weld could ". . . be corrected on the spot" under L-80 (Bryant, Tr. 6140). Subsequently another inspector approved the weld but later the weld in question was removed, rendering moot any question of technical inadequacy (App. PFF 103g).

120. The Staff and the Technical Task Force conclude that an NCI was not appropriate for this situation (Staff PFF 218). We adopt the Staff's finding. Palmetto's allotted time for cross-examination of Bryant expired without questioning on this particular concern (Tr. 6136). They do, however, propose the finding of a particular welder repetitively performing rejectable work (PFF 393). We do not disagree. Of greater weight here is the persistence of the QC inspector in assuring that the final product was acceptable.

121. Q-2 and Q-3 are concerns of inspector Rockholt about the traceability of material. We describe them above in paragraphs 54 - 56. Q-2 involved a proposed NCI on angle iron which was verbally voided by Baldwin. Q-3 involved an NCI on high grade pipe which was voided by foreman Deaton, possibly on instructions from Baldwin. Both of these cases could have been resolved short of using Procedure Q-1. Nevertheless, supervision chose to discard the NCIs rather than preserve some documentation of the potential procedural violations. We find this behavior unsatisfactory but see no deliberate attempt to degrade the QC program.

122. Verbal voiding, discussed above in relation to nine of the concerns, is but one means of avoiding the processing of an NCI. Many of the concerns described in paragraphs 6 - 16, above, involved instructions from Baldwin not to write an NCI (D-22, D-24, Q-1, R-58) or to sign off on a holdpoint (D-30, E-23, V-2). We see no difference between verbal voiding of an NCI (where the form is discarded prior to serializing) and an instruction not to write one in the first place. In

addition to the inspector concerns just described, we consider three others as possible evidence of discouraging the detection and documentation of substandard workmanship.

123. Concern C-2. In August 1981, inspector Burr discovered that a repair on piping involved welding on base metal outside of the original weld area. Such repair requires special procedures to control cleanliness and also a liquid penetrant test. This had not been done. Burr tried for three weeks to convince OC supervision that a procedure violation was involved. Finally he was allowed to write NCI 12459 (TTF C-2). A second procedural violation occurred when craft removed the Q-1B tag prematurely and began further work on the pipe.

124. Mr. Burr was not cross-examined on this concern, but it is a part of his prefiled testimony (App. Ex. 29, Att. A-2). It is also included in the prefiled testimony of Staff witness Van Doorn since it later became the subject of an NRC violation (Staff Ex. 7, p. 43).

125. Applicants point out that radiographic examination showed that the weld was sound so the base metal must have been sufficiently clean. Further, they revised procedure F-9 to describe base metal repairs more clearly (App. PFF 99t). Be that as it may, we focus here on evidence that the documentation of substandard work was discouraged. Applicants offer no explanation as to why Mr. Burr had to press this issue for three weeks before he was allowed to write the NCI nor, for that matter, why he needed permission at all. We find that Burr was indeed discouraged from documenting this procedural violation.

126. Concern D-4 (R-6). Inspector Bryant could not verify the throat dimension of an attachment weld and wrote NCI No. 7514. Bryant attached a note to the NCI pointing out that the welding symbol on the drawing was incorrect for the partial penetration weld called for. Davison made Bryant remove the note before he would approve the Q-1A form. Ross interceded and Davison rewrote the NCI for Bryant to sign. Ross felt Davison should have allowed Bryant to leave his note attached to the NCI the first time and was concerned about Davison trying to discourage Bryant from writing NCIs by requiring extra information and sketches (TTF D-4 R-6). Resolution of the inadequacy was not by repair of the weld, but by correcting the design drawings.

127. There was no cross-examination on this particular concern and Intervenors make no proposed finding on it. The Staff, however, includes it in its proposed findings (PFF 135, 136, and 159), perhaps because the weld symbol problem had been picked up during a routine NRC inspection and violation 80-16-01 issued. This violation was because the weld symbol did not meet code requirements.

128. The Technical Task Force noted there was an actual violation of AWS A2.4, that Procedure R-3 provides a mechanism for correcting drawings, and that the symbol had been corrected on the drawings. We observe that Ross' original note about Bryant's difficulty with Davison on the weld symbol is dated January 18, 1980 and that Duke's response to NRC Deficiency No. 80-16-01 is dated September 9, 1980 (Staff Ex. 7, Att. 30).

129. We find that there was an attempt to discourage identification of the weld symbol problem on NCI 7514. There is nothing in the record to explain why Davison wanted to do this.

130. Concern E-3. This concern of inspector Cauthen is described above in ¶ 79. Rather than initiate an NCI, Cauthen had a welder in McKenzie's crew replace a weld made without a purge because ". . . they would have cut them out before I got back with an NCI anyway." As we stated in ¶ 79, we find no evidence here that craft was attempting to discourage the writing of NCIs or, as Palmetto would have it, intentionally circumventing procedures for documentation of nonconforming conditions (PFF 492).

131. Of the 20 concerns we review above for evidence of discouraging the initiation of NCIs, we find 5 cases (Concerns D-18, D-23, C-2, D-4 and D-30) where a good reason for questioning the need for using the Q-1 procedure is wanting. Two of these (C-2 and D-4) were significant enough to be cited as NRC violations. Most of the others should have been documented, but not necessarily as NCIs.

132. Although good reasons were not evident for not allowing NCIs in these five cases this does not demonstrate that Duke management was attempting to circumvent the QA program. The Technical Task Force made a reasonable effort to have the welding inspectors write down all of their concerns (see IA ¶ 26, above) and, except for the few late additions included in their prefiled testimony (e.g., App. Ex. 32, p. 3), we are persuaded that they did so. These five cases were among the concerns given priority attention by Intervenors and the Staff

during the hearing. We doubt that there were other cases of equal or greater significance in the welding area which were not brought to our attention. Further, the inspectors themselves considered verbal voiding to be "a drop in the bucket" in relation to the more than 17,000 NCIs written at Catawba as of the time of hearing. (see paragraphs 103, 104 and 89 above).

133. While we disagree with Intervenors' position that Duke intentionally suppressed NCIs in order to circumvent documentation of faulty workmanship, discouraging the initiation of NCI's, for whatever reason, was disheartening to the inspectors who were personally involved. However, this appeared to have little or no effect on how these inspectors subsequently did their job. (See, for example, Concern C-2 described above in 123 where Burr persisted for three weeks in order to have an NCI processed).

134. We agree with the Staff that verbal voiding was a prominent inspector concern mainly after mid-1981 when Duke tried to restrict use of NCIs to matters truly requiring engineering evaluation (PFF 155).

135. Duke management recognized that some of the discrepancies then being written as NCIs could be handled adequately by use of the R-2 procedure or process control (Grier, Tr. 2583, Owen, Tr. 2584). The R-2 procedure had been little used by the welding inspectors and foreman Ross believed that R-2 was not an applicable procedure because it was not specifically listed in the QC process control procedures, as was Q-1 (Ross, Tr. 6952). Ross continued to resist the use of R-2 until it was

finally written into their procedures in 1982 (Ross, Tr. 6952-53).¹⁶ For the twelve-month period beginning August 1982, use of the R-2 procedure in welding at Catawba resulted in a 45% reduction in the number of NCIs (App. PFF 396).

136. Palmetto would have us believe that Duke's suggestions to inspectors that they "avoid Q-1A's as much as possible" and "ease off" on the craft"-- has the improper and unlawful effect of discouraging the documentation of deficiencies of Q-1A's" (PFF 62). Palmetto bases its assertion on the testimony of inspection Burr (App. Ex. 29, p. 3). We reject Palmetto's interpretation and adopt the Applicants' position that:

Palmetto's proposed findings would have us confuse Applicants' efforts to reduce the number of NCIs by handling the deficiencies in accordance with other procedures, with some inappropriate effort to simply reduce the number of documented deficiencies." (App. Reply to Proposed Findings -- of Intervenors -- fn. 12, p. 53).

The apparent misunderstanding between Burr and his supervisor Ledford in respect to "ease off on craft" is discussed below at Section C ¶ 19.

137. Were Construction Deficiencies Adequately Repaired? The technical concerns submitted by the welding inspectors were reviewed by the Technical Task Force for "technical inadequacies". They found none that they considered "actual" inadequacies, but 24 were considered to be

¹⁶ Ross viewed his resistance to use of the R-2 procedure as a major source of conflict with his supervisor Allum (Ross, Tr. 6953-54).

"potential" inadequacies and, as necessary, were evaluated further by the appropriate Duke organizations (App. Ex. 11, pp. 10, 13).

138. The NRC Resident Inspector at Catawba, Mr. Van Doorn, also conducted an in-depth review of all the technical concerns, the task force evaluations, and management corrective actions. Further, Mr. Van Doorn reviewed all of the NCIs processed for Catawba in the 1981-1983 period (Staff PFF 134). We place substantial weight on Van Doorn's evaluations and excerpt much of the Staff's proposed findings Nos. 135 and 136 in our findings below.

139. The most significant concerns from a technical perspective were those which directly or indirectly involved code or NRC violations. The Code violations were as follows:

(1) Concern K-2. Inspector Irby found pitting and poor surface finish on a number of plates for the containment dome of Unit 2. This was believed to be a manufacturing defect. NCI 9092 was written, but the problem was originally judged insignificant by design without looking at the defects. The plates were installed without satisfactory resolution of the NCI and it remained outstanding for over 1-1/2 years (TTF K-2). While the Duke evaluation showed that Code requirements had been violated, it also showed that the plates would serve their intended function (Staff PFF 135(1)). The NCI was finally resolved by making a large number of repairs on the plates. Irby was not called to testify and Intervenors comment on this concern only in association with lamination of the containment plates (Supplement to PFF pp. 12-13). Van Doorn concluded that Duke's actions were adequate to address the issue. (Staff Ex. 7, pp. 42-43). We find this incident disturbing. The

evidence indicates that substandard material shipped by the vendor was accepted by Duke. Design approved the deficiency without looking at the plate, and the plate was installed without the pitting being corrected. Irby's written concern and intervention by the Technical Task Force were needed to force corrective action after 1-1/2 years. We find it strange that the Staff passes over this situation so lightly and that Intervenor's have no comment about it.

(2) Concern D-23 (R-50). This incident of downhill welding is described above in paragraph 115. The Code violation related to lack of qualification of the welder rather than to the quality of the weld.

(3) Concern D-4 (R-6), which involved a note on an NCI that a welding symbol was incorrect is described above in paragraph 126. The Code violation related to the symbol on a drawing. The weld was technically adequate.

(4) Concern C-2, which involved control of cleanliness and missed liquid penetrant inspections is described above in paragraph 123. The Code violation related to procedures. There was no inadequacy of the hardware. NRC violation No. 50-413/81-22-03 was issued.

(5) Concern D-14 and Concern R-64. Both of these concerns are associated with "paper work" supplied to the field which did not adequately specify the size of a fillet weld to be made. There was no cross examination of the witnesses about these concerns so the prefiled testimony and exhibits in the record provide the basis for our conception of the circumstances: Over a considerable period of time, specific fillet weld sizes (L dimensions) were not always specified on

traveler-documents (M-4A forms). This meant that the inspectors had to figure out if the weld was of the size required. (Staff Ex. 7, p. 44). NCIs 13455 and 13540 were written about such problems and their resolution included an instruction to specify the needed weld size on all M-4A's issued in the future. This instruction was not followed and inspector Bryant identified another such instance in his Concern D-14. A comparable situation occurred a short time later with another inspector in Ross' crew and NCI 14033 was initiated.¹⁷

The Technical Task Force recognized that Concern D-14 identified at least one violation of QA Procedure F-9 which requires information on process control forms to be checked. The Technical Task Force also recognized that the absence of the L dimension on the M-4A forms might have resulted in some undersized welds and reinspection of a sample of 170 socket welds was made. Fourteen were found to be undersized by up to 1/32 inch. This was not in strict compliance with the Code. NCI 14070 was written to resolve the problem and Duke notified NRC with Significant Deficiency Report 413-414/82-06. (Staff Ex. 7 Att. 27).

Corrective measures included reinspection of 12,500 socket welds and the addition of more weld metal on those that were

¹⁷ This concern (R-64) was based on an occurrence in January of 1982--about the time the Technical Task Force was initiated.

undersize. Further, deficient process control papers previously issued to the field were recalled for correction.

A second Significant Deficiency Report (413-414/82-11) was submitted because pipe-to-pipe nozzle welds were found to be undersized after prior inspections had found them acceptable (Staff Ex. 7, Att. 28). All such welds were to be reinspected and repaired as necessary. The staff intimates that this action was associated with Concern R-64, but the relationship is not crystal clear.

140. Palmetto overlooks Duke's followup reinspections and repairs and proposes that we find that "[n]o [attempt] whatsoever is made to explain why 'thousands' of other welds may not exist without adequate reinforcement due to lack of specified 'L' dimensions" (PFF 527, 530). We find that Duke finally did address this problem adequately--but not until the Bryant concern was investigated by the Technical Task Force.

141. Mr. Van Doorn's in-depth review of the welding inspector concerns turned up three cases that had previously been cited by the NRC as violations. He found no new violations that were serious enough to be classed at Level I, II or III, so no new citations were issued (Staff PFF 136). The three previously identified violations included Concerns C-2 and D-4 (described above) and Concern C-3 which we have described in paragraph 25 above. It involved Construction Technical Support approving a weld in which Burr had identified a crater crack.

142. In addition to the Code and NRC violations described above, we consider four other welder concerns which warrant mention in this section. One of them (D-15) involved a hair line crack in a weld on a

pipe for a diesel generator and is described in paragraph 31 above. The Level III inspector did not find the crack. Although this particular weld was ground out and remade, there may be other similar situations where repairs were not made. Where there is doubt about the existence of a defect, the Level I or II inspector should at least be on the scene to point out what he saw to the Level III inspector.

143. Concern E-2. Inspector Cauthen found a fitter in McKenzie's crew making a socket weld without allowance for a 1/8-inch gap between the pipe and the shoulder of the fitting. If no gap is present, expansion of the pipe during the welding process may cause the weld to fail (TTF E-2). About ten welds were involved and Cauthen told the welder " . . . to cut every one of them out and refit them and call me back". This was done (Cauthen, Tr. 6437). Cauthen stated that this was on a Class G system (nonsafety related) and " . . . could have been a drain line for all I know." (Tr. 6439). Since the system was not safety related, an NCI was not appropriate. The condition could have been documented on Form CP49A, but Cauthen saw no need to delay the resolution by 2 or 3 days (Tr. 6437).

144. The Technical Task Force was concerned that other socket welds made by McKenzie's crew might also have been made without the specified gap (which is 1/16-inch rather than 1/8-inch) and they recommended that QA conduct an investigation to determine whether or not there was a practice of welding sockets without gaps (TTF E-2). Foreman McKenzie was not aware of any such investigation having been made. He pointed out, however, that the procedure was modified to require scribing of the

pipe so that inspectors could confirm that specified gaps were present in the sockets (Tr. 8733).

145. The Staff makes no finding about this concern (possibly because it is not safety related). Palmetto points out that no evidence was offered to show whether Duke followed up on the Task Force recommendation for an investigation of other socket welds without gaps (PFF-532).¹⁸ Such an investigation might well have included systems that were safety related and this Board directs Duke to confirm to the Staff whether Recommendation (1) of the Technical Task Force for Concern E-2 was implemented and, if so, what the results were.

146. In Concern E-4, Cauthen objects to implications that he "over inspects" because he looks for flaws other than construction damage on M-4I inspections of piping systems (TTF E-4). Cauthen cites pits in a pipe as an example of the flaws he noted on M-4I forms (Tr. 6453). Specific welds or pipes are not a part of Concern E-4.

147. The Technical Task Force points out that QA procedure M-4 is to identify and correct construction induced damage on ASME piping systems. The Q-1 procedure is more appropriate for non-construction induced

18 Palmetto would also have this Board take official notice, pursuant to 10 C.F.R. § 2.743(i) of a significant deficiency report dated 2/13/84 about the failure of two socket welds in the RHR system during hot functional testing. We see no justification for this since the only nexus to this concern is Palmetto's unsupported speculation that it resulted from improper set-up. In any event, a significant deficiency report made following the closing of the record is not within the narrow scope of the official notice rule in 10 C.F.R. § 2.743(i).

damage (TTF E-4). Palmetto thinks the Task Force criticism of Cauthen for using the M-4I form, rather than the Q-1 procedure is "incredible". (PFF 501).

148. We find nothing of significance here in relation to the quality of construction. Cauthen is obviously a conscientious inspector who looks for all kinds of defects. His persistence in use of the M-4I form when an NCI would have been appropriate is not commendable, but nevertheless he accomplished the necessary correction. Contrary to Palmetto's proposed finding (PFF 501), the Technical Task Force is not to be criticized for recommending that QC inspectors follow appropriate procedures.

149. In his prefiled testimony, Cauthen added four new concerns about welds in the plant (App. Ex. 34, p. 4). Two of these we have already described above (in paragraphs 84 and 86). The third relates to the undocumented defects on piping and welds he found on final visual inspections (M4-I's' (see paragraph 143 above). The fourth is concerned with some welds only receiving a final visual check. On cross examination, it was brought out that this fourth concern was associated with McKenzie's crew and the suspected absence of gaps in some socket welds which is concern E-2. Applicants point out that the systems which receive only a final visual inspection are those classified by Design Engineering as having a lesser degree of safety significance (App. PFF 122c).

150. The last concern we treat in this section is one which inspector Bryant added in his prefiled testimony (App. Ex. 30, p. 8).

This involves structural steel subsequent to its acceptance by an inspector. Attachments may be welded to the structural steel and later removed, leaving damage which is not subject to further scheduled inspections. Cross examination by this Board brought out that Duke was in the process of developing a new procedure to assure that all such damage was identified and evaluated (Bryant, Tr. 6153, Ross, Tr. 7007). We presume that this action is a direct result of Bryant's expressed concern (App. Ex. 14, p. 10).

151. We see this structural steel inspection deficiency as something that "fell through the cracks" of the overall QA program. Once recognized, Duke aggressively initiated corrective action to cure the problem.

152. The Staff has summarized Resident Inspector Van Doorn's conclusions about the technical adequacy of the Catawba plant in their proposed finding No. 138. We adopt this finding with only minor alterations:

"Based on his extensive review of the welder inspector concerns, his comprehensive review of NCI's and his responsibilities as Resident Inspector at Catawba, Mr. Van Doorn stated:

(1) He had "no reason to believe that significant technical discrepancies have occurred at Catawba which have not already been corrected or which are not now being corrected (Staff Ex. 7, p. 49).

(2) He would not change his written conclusions that the technical evaluations were accurate and appropriate corrective action taken, and in fact, the evidence presented at the hearing (nearly all of which he sat through) reinforced his conclusion. (Tr. 9680-81, 9875-76).

(3) All of the procedural violations. . ." identified by the technical task force are of the lowest two levels of severity. (Tr. 9941-42).

(4) Although there have been procedural violations. . . ." some probably undetected, he knew of no programmatic breakdown that would have resulted in failure of backup checks on quality, and thus uncorrected deficiencies (Tr. 9897-98)."

153. In their prefiled testimony, the welding inspectors and their supervisors who submitted concerns responded to questions about whether Catawba was being built safely. All were satisfied that the parts they knew about were built to be safe. (Staff PFF 139).

154. A few inspectors believed a deficiency of safety significance would have been present if some concern had gone uncorrected:

(1) Ross-Concern D-30; grinding on the inside of a pipe (¶ 8).

(2) Bryant-Residual damage to structural steel (¶ 150).

(3) Burr-Concern C-3; lack of fusion (§ 25).

(4) Bryant and Ross-Concern D-15; the fine crack disputed by the Level III inspector (§ 31).

155. Compliance with 10 C.F.R. 50 Appendix B. Appendix B sets forth eighteen criteria with which licensees must comply in establishing and operating their quality assurance programs. In their proposed findings of fact, Intervenors would have us conclude that several of these Appendix B criteria have been violated in connection with each of the twenty-seven welding inspector concerns they discuss in some detail. Palmetto Proposed Findings, pp. 171-256. Palmetto merely quotes various Appendix B criteria without providing any rationale for their alleged applicability to particular concerns. Most of the Appendix B criteria are cast in very general terms and therefore their applicability to the facts of particular concerns is frequently not clear. In many cases, we were unable to determine Palmetto's theory of alleged violation in the absence of any explanation from Palmetto. We do not feel obliged to treat each alleged criterion violation point by point in response to Palmetto's scatter shot approach. However, we have reviewed the concerns Palmetto discusses in light of the cited Appendix B criteria and we note where certain criteria appear to have been violated.

156. The Commission's regulations provide guidance on the significance of violations in Appendix C III to 10 C.F.R. Part 2. Five levels of severity are specified. Severity Levels I and II are very significant and in general involve actual or high potential impact on the public. Level III violations are cause for significant concern.

Level IV violations are less serious but are more than minor; i.e. if left uncorrected, they could lead to more serious concern. Level V is the lowest category and signifies only minor safety or environmental concerns. As Intervenors point out (PFF 537), Part 2, Appendix C IV A states:

"Because the NRC wants to encourage and support licensee initiative for self-identification and correction of problems, NRC will not generally issue a notice of violation for a violation that meets all of the following tests:

- (1) It was identified by the licensee;
- (2) It fits in Severity Level IV or V;
- (3) It was reported, if required;
- (4) It was or will be corrected, including measures to prevent recurrence, within a reasonable time; and
- (5) It was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation"

157. The Staff's in-depth review of all of the welding inspector concerns turned up three cases that had been cited previously as NRC violations (see 141 above). Mr. Van Doorn was looking especially for serious violations (Level III and above) but he found none above Level IV (Van Doorn, Tr. 9938). He thought that Appendix B Criterion V (Instructions, Procedures, and Drawings) had been violated in many of the 43 cases classified by the Technical Task Force as "actual procedure violations," but because of their low level of severity and because Duke had found and reported them, NRC did not issue violation notices (Tr. 9939-40). Van Doorn testified that it is not unusual to have procedures

violated. "It isn't particularly significant. Procedures are probably violated weekly." (Tr. 9946).

158. Palmetto directs a scathing attack against Van Doorn for deciding not to issue notices of violation in relation to the inspector concerns (PFF 536-538). Palmetto would not credit Duke management for identifying the violations mentioned in the inspector concerns and they cite recurring problems with the use of NCI's. In view of the low level of severity of the violations and Duke's concerted efforts to correct technical deficiencies, we find no "lack of zeal" in enforcement on the part of the Staff.¹⁹ The objective is a plant that will operate safely -- not a box score on violation notices.

159. Of the 27 concerns reviewed in their proposed findings, Palmetto would have us find that 22 of them show violations of Appendix B, Criterion I.²⁰ Criterion I is concerned with organization of the QA program. Palmetto focuses on the language of the rule which specifies

¹⁹ Several of Palmetto's proposed findings (e.g. 158, 169-170, 536-539) question the competence or integrity of the NRC Resident Inspector at Catawba or other NRC Region II personnel. Some of our findings rely on Staff Testimony or actions and, to that extent, we are endorsing the Staff. Beyond that, however, and because the NRC Staff is not the license applicant in this proceeding, it is not necessary that we make detailed findings about the Staff's role. Suffice it to say that while we may not agree with everything the Region II personnel did at Catawba, we believe them to be conscientious and men of integrity. On the whole, we think they did a good job.

²⁰ The 22 identified by Palmetto are: D-3, D-5, D-7, D-9, D-15, D-17, D-20, D-22, D-23, D-24, D-27, D-30, C-3, E-1, E-3, E-4, E-5, I-1, L-1, Q-1, Q-2, and R-28.

that "[t]he authority and duties of persons . . . performing activities affecting the safety-related . . . components shall be clearly established and delineated in writing.", and that such persons " . . . shall have sufficient authority and . . . freedom to identify quality problems" and have ". . . sufficient independence from cost and scheduling when opposed to safety considerations." (10 C.F.R. 50, App. B I). Apparently Palmetto equates the inspector's perceived lack of management support, subjection to harassment, and pressure by construction with violations of Criterion I. (PFF 40). They also view the assignment of inspectors to QA ". . . supervisors unable or unwilling to support effective implementation of the program" as a violation of this Criteria (PFF 41).

160. Palmetto's interpretation of Criterion I is distorted. As indicated in our discussion of the independence of Duke's Quality Assurance organization (IA paragraphs 49-57 above), Criterion I relates primarily to allocations of functions and reporting relationships. We find no violations of Criterion I among the concerns of the welding inspectors.

161. Criterion II deals with the establishment of a Quality Assurance Program. Palmetto focuses on the provisions of this criterion which call for adherence to written procedures and for training of personnel performing activities affecting quality. Palmetto asks us to find that 21 of the concerns somehow involve violations of Criterion

II.²¹ The only hint they provide as to theory of violation is in their proposed finding 69. Here they intimate that craft foreman McKenzie had not received training about nonconformed situations. As we have repeatedly ruled, training issues are outside the scope of Contention 6. Many of the other concerns Palmetto lists under Criterion II involve some procedural discrepancy or the need to reinstruct craft or QC inspectors on the use of procedures. Significantly, Palmetto does not associate Criterion II with the verbal voiding of NCI's (PFF 53).

162. This Board, as well as the Applicant and the Staff, recognize that a number of procedural violations have occurred. As pointed out by Van Doorn, however, the appropriate enforcement criterion for something that is only a procedure violation is V (Tr. 9938-39). We interpret Criterion II as applicable to broad frames of reference, as contrasted with specific instructions or field procedures. For example, lack of a training program in some area would violate II, but an individual forgetting what was taught would not. On this basis, we reject all of Palmetto's proposed findings of violations to Criterion II. However, we would place three concerns in the Criterion II violation category which Palmetto did not treat. Concerns D-14 and R-64 (described in ¶ 139(5)) identify problems of the lack of information (L-dimensions) on process documents. This was a pervasive problem that required the reinspection

²¹ These 21 concerns are: D-3, D-5, D-7, D-15, D-17, D-20, D-22, D-23, D-24, D-27, D-30, C-3, E-1, E-3, E-4, E-5, I-1, Q-1, O-2, Q-3, and R-28.

of thousands of welds. The third concern is that expressed by Bryant in his prefiled testimony about damage to structural steel members. This inadequacy was apparently overlooked when the QA program was originally documented. It was being corrected at the time of the hearing. See ¶ 150, above.

163. Criterion V deals with instructions, procedures and drawings. It states in pertinent part:

Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings . . . and shall be accomplished in accordance with these instructions"

Palmetto lists eight concerns (D-15, D-18, D-20, D-22, D-24, D-25, D-30, and Q-1) as violations of Criterion V. We agree as to concerns D-18, D-22, D-30, and Q-1 because of the supervisor's instruction to the welding inspector to "sign off" on a condition he did not agree with, to not write an NCI, or for the discarding of an NCI, although D-18 and D-30 are the only ones we consider significant. We also agree with D-15 because we think instructions should provide for a direct dialogue between the visual inspector and the Level III inspector if there is a dispute about the existence at a flaw. Since we classify NCI voiding under Criterion V, we add concerns C-3, D-3, D-5, D-7, D-23, and Q-2. In respect to deviating from construction procedures, we add D-19.

164. Criterion VIII provides for the control of materials to " . . . assure that the identification of the item is maintained by heat number, . . . or other appropriate means . . . to prevent the use of incorrect or defective materials" (10 C.F.R. 50 App. B VIII). Palmetto lists six concerns they believe violate this Criterion, viz: D-5, D-7,

Q-2, Q-3, E-5, and R-28. Two of these (Q-3 and R-28) are non-safety system related and the other three are violations only in a technical sense because the minor lapse in control was short lived. Curiously, Palmetto did not place concern Q-1 in this category. This involved the plate installed on the floor of the spent fuel pool with the markings on the bottom. We (and the Staff) see Q-1 coming closer to a violation of Criterion VIII than the concerns listed by Palmetto.

165. Criterion IX specifies that:

" measures shall be established to assure that special processes, including welding, . . . are controlled and accomplished by qualified personnel using qualified procedures"

Palmetto thinks ten of the concerns show violations of this criterion. (D-7, D-9, D-18, D-19, D-20, D-22, D-23, D-25, D-14 and R-64). Apparently Palmetto equates "technical inadequacy", (as used by the Technical Task Force) with a violation of Criterion IX (Palm. PFF 274). We view this criterion as applicable to the existence of special procedures and whether or not welders were qualified for the procedures they used. Violations of those procedures are covered by Criterion V. On this basis we find clear, but minor, violations in the case of D-23 because the welder was not qualified for downhill welding, and for D-14 and R-64 because of repeated failure to include a needed weld dimension on instructions issued to the field. We add D-4 because of the incorrect weld symbols on a drawing. By some stretch of the imagination, D-18 might also be included because special instructions were not provided for attaching valves of an unusual shape.

166. Criterion X deals with "inspection". Intervenors focus on the provisions which require verification of conformance with documented procedures and the observance of inspection hold points. (10 C.F.R. 50, App. B X). They propose Criterion X violations for 4 of the concerns; viz: D-24, D-30, E-3 and E-4. We agree only with D-30, where the inspector was told to sign off on a condition inside a pipe that could not be seen. Concern E-4, where Cauthen found minor discrepancies passed over by other inspectors, might also be included. More clear cut examples of inspectors missing deficiencies are D-14 and R-64, where thousands of socket welds had to be reinspected.

167. Criterion XV deals with non-conforming components and requires controls to prevent their inadvertent use or installation. Further, "[n]onconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures." (10 C.F.R. 50, App. B XV). Palmetto makes Criterion XV a pivotal issue in its arguments, asserting that the Q-1 Procedure and the NCI are Applicants principal means of ensuring compliance with this Criterion (PFF 43); that Davison's and Baldwin's voiding of NCI's was intended to circumvent compliance with Criterion XV (PFF 53); and that "nonconformance" as used in XV equates to a "bad weld". (PFF 274). We have already rejected the argument that the Q-1 procedure is the primary compliance procedure (§ 90), and that NCI voiding is intentional circumvention of compliance (132, 133). We also reject the idea that "nonconformance" under this criterion is equatable with "bad welds." Many nonconformances are not involved with hardware per se, and

Criterion XV itself provides for the acceptance, repair or reworking of nonconforming items.

168. Palmetto asks us to find that 11 of the concerns show violations of Criterion XV. These are: D-3, D-5, D-7, D-18, D-25, D-30, R-28 (J-1) E-1, I-1, D-14 and R-64. All but the last two appear to be associated with the suppression or verbal voiding of NCI's. In the absence of justifying circumstances, we find violations in the prevention or voiding of an NCI in concerns D-18, D-30, and I-1. We would also classify D-14 and R-64 as violations, not because of NCI problems, but because the QA program failed to promptly resolve welding deficiencies of a pervasive nature. As we pointed out in Finding 130, we would also include D-23, C-2, and D-4 as minor violations of XV because of difficulty encountered by the inspectors in initiating NCIs.

169. Criterion XVI deals with corrective action and states in pertinent part:

"measures shall be established to assure that . . . nonconformances are promptly identified and corrected . . . that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition, . . . the cause . . . and the corrective action taken shall be documented and reported to appropriate levels of management". (10 C.F.R. 50, App. B).

Palmetto finds the following 12 concerns to violate XVI: D-7, D-9, D-15, D-17, D-19, D-22, D-30, R-28, E-1, I-1, D-14 and R-64. Here, apparently, Palmetto again focuses on voiding of NCI's (PFF 53) and their notion that the Technical Task Force "ignored" the root cause of the concerns (PFF 260).

170. Palmetto does not explain whether they think the violation was "documentation" of the corrective action (or lack of it) on an NCI, whether the repair was not done properly, or whether there was some other problem. We will not speculate. Our evaluation includes possible violations for D-19, D-30 and I-1 because of documentation problems, and D-14 and R-64 because identification and correction were not prompt.

171. Criterion XVII deals with Quality Assurance Records. Palmetto focuses on the portion of this criterion requiring maintenance of records of inspection results and the action taken in connection with deficiencies noted. They propose violations for 15 concerns and apparently associate them with the discarding of NCI's (PFF 53). The concerns identified are: D-3, D-5, D-15, D-17, D-22, D-23, D-25, D-30, Q-2, E-5, R-28, E-1, E-3, E-4 and I-1. We agree that there should have been an NCI or other documentation in the cases of: D-3, D-5, D-23, D-30, and Q-2. To Palmetto's list we also add D-18 and D-24 since these concerns identify situations where needed records were not maintained because NCIs were not filed, and C-2 because of the difficulty the inspector had in having the NCI accepted.

172. Criterion XVIII requires that:

"A comprehensive system of planned and periodic audits shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program" (10 C.F.R. 50, App. B).

Palmetto thinks Concerns C-3, Q-1, and Q-3 show violations of this Criterion. We find nothing in the record that would associate these or any other inspector concerns with the audit program.

Conclusions

173. Based on our analysis of the technical concerns and the associated record, we are satisfied that Duke did not deliberately condone substandard workmanship nor attempt to circumvent the QA program.

174. There are two cases in the record (paragraphs 8 and 13 above) where inspectors were improperly instructed to "sign-off" on work that was suspect. There is no associated evidence that the intent was to approve faulty work, however.

175. In several cases there was disagreement between an inspector who filed a concern and a Level III inspector about the significance of an imperfection. The Level III inspector may not have always been right, but there is nothing in the record to indicate a proclivity to approve substandard workmanship.

176. Although there were a few minor deviations from material traceability procedures, there is no evidence that improper materials were installed.

177. Preventing inspectors from writing NCI's, including "verbal voiding", was not so extensive that it could have significantly affected the quality of construction. In most cases the "voiding" was an understandable attempt to confine NCI's to situations requiring engineering evaluations.

178. In a few situations there is some evidence that construction personnel attempted to expedite work by circumventing QC inspector decisions (e.g. C-3/25, D-23/113), but these were isolated cases.

Construction foremen occasionally pressured welders to complete a job, but we find no unusual or pervasive effort to cut corners in order to meet cost and time schedules.²²

179. All of the welding inspectors and first line supervisors who testified appeared very conscientious about doing a good job, were not dissuaded by perceived lack of management support on technical concerns, and were satisfied that the plant was built safely.

180. The record indicates very few situations where Duke failed to take reasonably prompt action to correct confirmed deficiencies. Delayed repair of pitted containment plate (138) is one example.

181. We are influenced by the fact that the NRC Resident Inspector, on the basis of extensive experience at Catawba, does not believe that there are any significant technical discrepancies which have not already been corrected or are not now being corrected.

182. This Board concludes from the extensive evidence presented on the technical concerns of the welding inspectors that they do not represent a pervasive failure or significant breakdown in Duke's OA program or pressures from construction personnel which resulted in significant deficiencies in the Catawba plant.

²² This conclusion is subject to the outcome of the investigation triggered by the "foreman override" concerns raised by Welder B. See pp. 236-38, below.

C. Concerns about Retaliation.

1. Introduction. In the preceding section the Board examined the various pressures welding inspectors related concerning the identification, documentation and correction of construction nonconformances and their impact on inspectors morale and job performance. This section considers the inspectors' perceptions of Applicants' reactions to their concerns. Allegations of retaliation against inspectors for raising safety concerns are examined. Are the allegations true and, if so, what influence, if any, did they have on inspectors' job performance and the effectiveness of the quality assurance program?

2. The Pay Reduction Recourse Procedure. The Board accepts the Staff's review of the factual background for these allegations, as stated in Staff PFFs 224-226 and most of 227.

3. "During the course of the recourse proceeding invoked by numerous welding inspectors during the Fall of 1981 and Winter of 1982 in order to attempt to reverse their pay reclassification, the inspectors began to express some long-standing grievances against the on-site QA management, particularly Mr. Davison, who from 1974 until early 1981 had been responsible for the QC inspection program at Catawba. See, Palmetto Exh. 6; Applic. Exh. 14, Davison, p. 2. For example, in Inspector Kenneth Karriker's memo to Bob Morgan on January 14, 1982, ostensibly to notify Duke of Mr. Karriker's pursuit of his recourse rights, the focus was not on pay, but on Mr. Davison's responsibility for violations of QA procedures, and his feeling that Mr.

Davison, who was then QA Manager for the Projects Division of Quality Assurance in Charlotte, should not be involved in resolution of the recourse due to his being 'the root of our problems.' Palmetto Exh. 39; Applic. Exh. 14, Davison, p. 2. Mr. Karriker claimed that in a recent meeting of inspectors with Mr. Davison on January 11, 1982, it appeared that Mr. Davison was trying to 'build a personal defense.' Id. Similarly, Inspector John Bryant's record of a January 7, 1982 meeting with Mr. Davison was that the latter 'insinuated that if we cannot trust our upper management that we should find another job....' Palmetto Exh. 40."

4. "Another inspector, J. R. Rockholt, wrote the corporate personnel department on January 13, 1982 that when he told Mr. Davison the previous day that he 'didn't have any confidence in him and wished to talk to Mr. Owen,' he was told that if he didn't follow company procedures, he was headed for real problems. Mr. Rockholt took this as 'threatening me with my job if I didn't do everything his way...' Palmetto Exh. 38, p. 1 (1/13/82 letter to W. H. Bradley from J. R. Rockholt). This account was more or less corroborated by Mr. Davison's own notes of a January 12, 1982 meeting with Mr. Rockholt. Palmetto Exh. 37. See also, Tr., pp. 3986, et seq. Mr. Davison was thus aware that he was a major focus of the inspectors' concerns. Davison, Tr. 3689-90, 3760. Palmetto Exh. 31 (Zwissler notes of meeting in which Davison said he was 'part of [the] problem'). Mr. Rockholt's written testimony was that fearing retaliation, he did not feel free to express all his concerns. Applic. Exh. 31, Rockholt, p. 3; Davison, Tr. 3991."

5. "Although the Board credits the inspectors' statements that they believed the communication problems and lack of support they felt were the responsibility of Mr. Davison, it is less clear that Mr. Davison's responses to them were taken as serious threats of retaliation. Mr. Rockholt, for one, was not even slightly dissuaded from expressing his concerns as he saw fit. The first indication of this is his letter to Mr. Bradley the next day. Palmetto Exh. 38. The second indication was Mr. Rockholt's confrontation with the Executive Vice President on January 27, 1982, on whether Duke was going to retaliate against inspectors for going to the NRC. Palmetto Exh. 2 (transcript of Owen meeting with inspectors). The third indication is that no welding inspector has been fired since 1980. Davison, Tr. 4330-31. The fourth indication is that Mr. Rockholt himself stated that his relationship with Mr. Davison had improved, Rockholt, Tr. 6343, and that he in fact did express all his concerns. Applic. Exh. 31, Rockholt, p. 3."

6. "Nor was Mr. Davison's behavior indicative of someone in the process of carrying through on a threat. Mr. Davison's response to Mr. Rockholt's request of January 12, 1982 was to inform Mr. Owen that several inspectors wished to meet with him. As noted, such a meeting soon followed. Palmetto Exh. 37. (Despite Mr. Bryant's account of the January 7, 1982 meeting, he stated he felt free to express his concerns. Applic. Exh. 30, Bryant, p. 3.) More importantly, the Board finds no evidence in the record to suggest that Mr. Rockholt (or Mr. Bryant) stopped identifying and documenting procedural violations, as

appropriate. Mr. Rockholt's view was that as a result of the welding inspectors' expression of concerns, the QA program was working as it should work. Applic. Exh. 31, Rockholt, p. 6. And this, in turn, was, at least in part, brought about by corrective actions implemented by Mr. Davison himself. See, Palmetto Exh. 43 (outlining training program and new 'Stickman' procedures for better resolution of technical questions)...."

7. Since Intervenors did not organize their Proposed Findings in the same manner as the Staff, the issue of Mr. Davison's role in the recourse proceedings was not addressed directly. However, Intervenors made references and allusions to Mr. Davison's role in their "Background" section on "The Welding Inspectors Revolt" (see PFF 165, p. 105 and 172, p. 108) and cited some of the same welding inspectors testimony under the title of "Harassment of Welding Inspectors" (See, PFF 201, p. 121 re Bryant and 205, p. 124, re Rockholt). The Applicants did not treat this issue separately in their proposed findings. Because of the emphasis at the Hearings on Mr. Davison's role, it seems desirable to treat this issue separately as the Staff has done.

8. It is clear to the Board that welding inspectors identified Mr. Davison with the job classification review that resulted in lower pay for welding inspectors. Also, Davison's actions in individual cases were interpreted as a lack of management support for welding inspectors. Thus, the welding inspectors were suspicious of Mr. Davison's motives and interpreted his actions and words as threatening when, according to Mr. Davison's testimony, he did not intend to convey that impression.

Except for the Ross case discussed below, the Board finds no substantial evidence that Mr. Davison actually did retaliate against welding inspectors for expressing their concerns. Although, his communications skills with inspectors were somewhat lacking, Mr. Davison played a role in identifying concerns and problems to top management and in proposing corrective actions. Having observed and listened to Mr. Davison for many days in the witness stand, he impressed the Board as a soft-spoken man of few words, with a low-key, even somewhat taciturn, manner. These attributes may have contributed to his communication difficulties with the welding inspectors who could have pictured Mr. Davison as unapproachable.

9. Retaliation for Bringing Concerns to the NRC. An issue raised by Mr. Nolan Hoopingarner (see pp. 196-199, below) and some welding inspectors was whether inspectors and other employees were discouraged from or retaliated against for taking their concerns to the NRC, particularly the NRC resident inspector. This issue was not one submitted to the three task forces reviewing inspector concerns (Zwissler, Tr. 3589-90; McMeekens, Tr. 3590; C. N. Alexander, Tr. 3591). The Board accepts the Staff's descriptions of the facts relating to the several instances below. See Staff PFFs 247, 248 and most of 249.

10. Mr. Burr, a welding inspector, raised the issue "of retaliation for going to the NRC in an interview with Ms. Gail Addis, a corporate personnel officer, during the second step of the pay recourse proceeding. C. N. Alexander, Tr. 3567-69; Applic. Exh. 8, Addis, Tab 3 (12/3/81 memo from Addis to Owen). It was not pursued by the task

forces because Mr. Burr did not submit it as one of his concerns. Cobb, Tr. 3572-73. (Mr. Burr stated he did not do so because he believed he had to be able to document each concern. Applic. Exh. 29, Burr, kp. 3.)"

11. "Mr. Burr stated that he "heard Davison and Wells were going to investigate who talked to NRC,²³ and I didn't even talk to NRC." Applic. Exh. 8, Addis, Tab 3. Actually, very little information was developed at the hearing on this specific allegation; however, a great deal was heard concerning whether the inspectors felt free to go to the NRC with their concerns, what Duke's policy on going to the NRC was, an incident in which Mr. Davison met with inspectors "in pairs" in 1980 to discuss Duke policy, and a response by W. H. Owen to a query on possible retaliation for going to the NRC by Mr. Rockholt at a January 27, 1982 meeting with inspectors about their concerns."

12. "A memo dated April 25, 1977 from R. L. Dick, Vice President, Construction, sets out company policy on bringing matters to management and the NRC. It states:

We expect our employees to express any concerns they may have about the quality of work to their supervisor or any level of company management. In addition, we have voluntarily agreed to post the following Nuclear Regulatory Commission communication.

²³ The reference is to the concern involving lack of fusion which Burr found, but which technical support had said was acceptable, only later to be determined by the NRC to be rejectable. See Concern C-3, Applic. Exh. 11, Cobb, Attach. 5; Staff Exh. 7, Van Doorn, Attach. 29.

* * *

Any nuclear industry worker who has concerns or questions about the nuclear safety of any facility or activity licensed by the Nuclear Regulatory Commission may bring these matters to the attention of an NRC inspector or the nearest NRC Regional Office if they cannot be resolved directly with his or her employer. The NRC will treat the identity of a workers (sic) as a confidential source if the worker requests that his identify not be disclosed (emphasis added). . . ."

13. This statement fails to define clearly the company policy. It seems to imply that an employee must take his/her concerns to the company first before going to the NRC. Certain Applicant testimony at the hearing supports that interpretation. Alexander, Tr. 7508. On the other hand, the Applicants in their proposed findings speak of "absolute" and "unrestricted" rights of employees to "go to the NRC at any point in time." Appl. PFFs 537-538. The Applicants' policy statement should be revised and communicated to its employees in a direct and explicit manner. In that connection, the Board sees no objection to the Applicants asking employees to bring problems to their attention first, so long as there are no express or implied restrictions on their freedom to go to NRC at any time. Presumably, the earlier a matter is brought to management's attention the more rapid will be a corrective response. But where, for example, there is lack of trust, an employee may prefer to go directly to the NRC.

14. The Staff in PFF 250, p. 126 states as follows: "In the fall of 1980, NRC Inspector George Maxwell informed Mr. Davison during an

exit interview that in the course of his inspection some personnel²⁴ had come to him concerning resolution of NCIs on nonsafety related matters, and other matters. Staff Exh. 7, Van Doorn, p. 13; Staff Exh. 6, Maxwell, pp. 6-7, Applic. Exh. 14, Davison, p. 14. Subsequently, Mr. Davison met with the welding inspectors "in pairs" to tell them that if they had concerns, technical or non-technical, they should first bring them to management to try to resolve, before going to the NRC. Applic. Exh. 14, Davison, p. 13; Applic. Exh. 29, Burr, p. 3. Mr. Burr stated that he interpreted this as a "reprimand," id., although most other inspectors considered the meetings simply informational. See, e.g., Rockholt, Tr. 6208-9."

15. Mr. Warren Owen, Executive Vice President, Construction and Engineering, subsequently met with welding inspectors to discuss their concerns and the recourse policy. During that session he was asked by Mr. Rockholt whether there would be any retaliation if inspectors presented their concerns directly to the NRC (Tr. 1993). Mr. Owen's response was not as clear and forthright as it might have been and is subject to differing interpretations (Tr. 1993-95). Mr. Owen suggested each person would have to make a personal decision, act in "good faith," and if the concern was "genuine" that person had a right and perhaps an obligation to go to the NRC. (Palmetto Ex. 2, p. 6; Owen, Tr. 1998-99.)

²⁴ Mr. Maxwell states he did not identify the individuals as welding inspectors or otherwise. Maxwell, Tr. 9395.

Mr. Rockholt testified to the effect that Mr. Owen's words conveyed a message to him that he "better not go" to the NRC. Tr. 6361. However, the Board heard other inspector witnesses who came away from this meeting with an understanding that they would not be retaliated against for going to the NRC. (Ross, Tr. 7068-69; Crisp, Tr. 8353-58, 8361; Godfrey, Tr. 8311.) [fn] The Board and parties listened to the tape and Mr. Owen's talk did not come across as threatening.

16. The preceding paragraphs illustrate an unfortunate lack of clarity and consistency in Duke's policy and practice when an employee wishes to take a safety concern to the NRC. Must he go first to company supervisors, is he merely encouraged to do that, or should he be encouraged to go directly to the NRC? The policy -- whatever it is -- should be clear, and it should be spelled out in plain English to all its employees. Since these issues involve the relationship between licensee employees and the NRC, it should be the responsibility of the NRC to establish a uniform policy for all reactor licensees and their employees. The only effort along those lines of which we are aware is NRC Form 3, which apparently is posted on licensee bulletin boards and which was Attachment E to the Applicants' Exhibit 37. Form 3 is very inadequate. It does not communicate any clear policy on basic issues involved here -- e.g. whether an employee may or must raise a safety concern with his employer first. See Board colloquy with the Catawba Resident Inspector, Tr. 9876-84. The form is written in legalistic jargon and addresses many different subjects in a confusing manner. For example, under the caption "Employee Protection" it refers to "protected

activities," without defining what they are. In our view, the NRC should promptly develop the appropriate policies on these matters and set them forth in a plain English notice for posting at all reactor sites. Until such steps are taken, it should come as no surprise if individual licensee policies are ambiguous and employees are left in the dark.

17. The Board deduces from the evidence as a whole that the Applicants felt uncomfortable with complaints being made directly to the NRC and with the impact complaints might have on licensing proceedings, such as this one. While the Applicants urged employees to bring problems to its management, we find no attempt to punish inspectors for going directly to NRC. The record shows that some inspectors contacted NRC freely (Staff Ex. 7, Van Doorn, pp. 8, 11, 12, 13; Staff Ex. 6, Maxwell, p. 6; Bryant, Tr. 9491-93). Generally, the testimony reflected an understanding that employees could contact NRC without retribution. Perceptions to the contrary seem to have been the result of ambiguous messages from the NRC and Duke management and of misapprehension by the inspector.

18. Retaliation for Strict Inspections. The Board heard several incidents where inspectors interpreted instructions to mean "ease off" or "slack up" on inspections. We inquired into these matters to determine if there was pressure from management to overlook violations.

19. William H. Burr, a welding inspector, related a discussion with his supervisor, Stanley Ledford, in which Mr. Burr interpreted Mr. Ledford's remarks to mean future advancement would be limited if he did

not "ease off" on craft (App. Ex. 29. Burr, p. 3; Burr, Tr. 5885-86). Mr. Burr, in response to Board questions, said he took this to mean he had gone too far in inspections and that he might be considered overzealous (Burr, Tr. 5953). Mr. Burr also said there was no instruction not to follow procedure (Burr, Tr. 5953-54). He did not "ease off" but rather he became more determined to do his job (Burr, Tr. 5931).

20. Mr. Ledford, for his part, does not recall saying "ease off" craft, but acknowledged he had many complaints from craft that Mr. Burr would look for reasons to turn down work (Ledford, Tr. 9089-90). Since Mr. Ledford worked days and Mr. Burr the second shift, Mr. Burr would call him at home frequently for verification of some action Burr proposed to take. (Ledford, Tr. 9090). Mr. Ledford wanted Mr. Burr to make more decisions on his own and not cause delay waiting for instructions or verification (Ledford, Tr. 9093). Mr. Ledford said he was considering Mr. Burr for promotion because increasing workload might require an additional supervisor. Ledford discussed Burr's opportunities in the same conversation over coffee (Ledford, Tr. 9091-98).

21. The Board had the impression that both witnesses were truthful, but were misinterpreting what the other was saying. While Mr. Burr interpreted the incident as a type of threat to future promotion, the Board considers it to be an inept attempt by Mr. Ledford to handle two matters in an indirect manner. We do not find pressure to let procedural violations go undocumented or uncorrected. We can sympathize

with Mr. Ledford's desire not to be called at home frequently, up to eleven thirty at night.

22. Descriptions of several cases cited in the Staff's PFFs 258, 259 and 260 are accepted for the most part. Mr. Bryant reported a circumstance where Mr. Davison told inspectors they were overinspecting miscellaneous steel welds (App. Ex. 30, Bryant, Att. A; Palmetto Ex. 40, p. 2). ". . . Mr. Davison denied it. Davison, Tr. 4037. Mr. Bryant was particularly concerned that, when an NRC inspector subsequently found a weld undersized, Mr. Davison threatened to give Mr. Burr, the inspector, an "A" violation (three of which may lead to termination). Applic. Exh. 30, Bryant, Attach. A; Crisp, Tr. 8395-97; See Davison, Tr. 4033-35.) However, the net result of this incident was that inspectors were "pretty tight on them wanting to have a little extra something ... to cover your own self ..." Crisp, Tr. 8396 (PFF 258). Similarly, Mr. Cauthen was told he was looking a little too hard to find defects on his M-41 inspections, where the procedure called for a "walk-down" for construction damage, not the complete reinspection of the system (Cauthen, Tr. 6450-51). Mr. Cauthen admitted, "I always go a little farther than what I am supposed to" on M-41's (Cauthen Tr. 6524, PFF 259)." Mr. Cauthen testified that Mr. Ross told him to slack up on writing NCIs (Cauthen, Tr. 6447-48) and that he was overinspecting (Cauthen, Tr. 6562-63). However, Mr. Cauthen stated that he never had an NCI turned down (Cauthen, Tr. 6560-61).

23. "There was, in fact, considerable evidence that the welding inspectors had a tendency to go beyond the procedures, and to inspect

against their own personal ideas of what was a good weld or sound inspection. See, Applic. Exh. 11, Cobb, Attach. 5, Concern E-4; Bryant, Tr. 6158-9; Gantt, Tr. 8550-51; Burr, Tr. 5953; Reep, Tr. 8673; Crisp Tr. 8395-6, 8437-8. Previous examples given of violations cited on non-safety related systems which applied only if the item were safety related exhibit this tendency as well. See, e.g., Applic. Exh. 11, Cobb, Attach. 5, Concern G-3; Cauthen, Tr. 6441-6446 (PFF 260)."

24. The Board interprets these various allegations of inspectors about being told to "ease off." "slack up," or that they were "overinspecting" as symptoms of problems with procedures and communication. The inspectors felt they had to follow a procedure to the letter. Management felt the inspectors were not accepting reasonable tolerances, but the procedures did not provide for this judgement. Management felt procedures other than NCIs could be used, but inspectors read procedures to call for NCIs. Craft complaints led QA management to attempt resolution through oral instructions and informal or ad hoc procedures rather than basic changes in established procedures. The inspectors resistance and failure to follow such oral messages led to tensions between inspectors and their management. The Board does not believe there was any intent by management to accept unsafe work. The testimony of inspectors was that they followed procedures and rejected work which did not measure up, in spite of anything to the contrary in messages or "signals" from their management. The confusion between inspectors and management about procedures has been alleviated by changes in procedures initiated following the

Technical Task Force Report (See ¶ B98 re Q1 procedure and B135 re R2 procedure).

25. Discrimination Against "Beau" Ross. Mr. G. E. ("Beau") Ross, a first line supervisor, claimed he was given a low performance rating by his supervisor, Mr. Arthur Allum because of his role in expression of welding inspector concerns (App. Ex. 34, Ross, Att. B). He filed recourse procedures on April 18, 1983 and May 13, 1983.

26. Mr. Ross' initial complaint reads:

I feel that I have been discriminated against in my job performance and most recently in my yearly evaluation. I feel that Art Allum is prejudiced against me because I have on several occasions spoken up when I felt the program was not being followed. Art is inclined to go along with some questionable situations and when I question the legality of these situations, I get branded as not doing my job. I thought that was part of my job. I also have on numerous occasions told Art that I did not feel he [was] supporting me on issues where I should be supported. Art holds this against me. I have questioned some construction practices, on several questionable cases, Art calls this not communicating with craft. I have found inspectors not properly doing their duties, Art blames me for entrapment. I get deliberately left out of some major decisions which could affect my ability to properly cover my area and provide inspection coverage. I ask questions and don't get answers.

I felt last year that I was retaliated against on my evaluation. I felt that I was being punished for standing up for what I felt was right. With God as my witness, I submitted nothing except what I morally felt was wrong. I felt that my evaluation was pay back because I was not a yes man. I asked Art about possible recourse, but got no answer from him. Numerous occasions arose during the year when I felt intimidated, opposed, and interfered with. Things had improved a great deal, communications were better, information was being given to explain decisions, I had just about regained confidence in the system when my evaluation came along and let me know in no uncertain terms that I had misjudged...."

Id.

27. The Board adopts the Staff's description of the record in its PFFs 229-242, as follows: "Mr. Ross believed his "fair" rating was the result of questioning decisions by Mr. Allum on procedural violations. In Ross' second memo, he notes that in 7 of 9 years as a supervisor he had received "competent" or better ratings, but after the inspector concerns were submitted he got two consecutive "bad" ratings. He states: "This tells me retaliation, payback, and discrimination." Id. See also, Ross, Tr. 6994-7000."

28. "The Ross accusation of retaliation involves not only Mr. Allum, but also Mr. Davison. Mr. Ross stated that Mr. Allum agreed that Mr. Ross' prior rating for 1981-1982, apparently by L. Davison -- in which Mr. Allum played only a minor role -- was retaliatory. Ross, Tr. 6776, 7058. Ross also stated that Mr. Davison had downgraded a "4" - or superior rating by Mr. Baldwin in 1980 to a "3," or competent one. Ross, Tr. 6996-97. Mr. Ross believed Mr. Davison was the source of Mr. Allum's prejudice against him. Ross, Tr. 7000."

29. "The focus of cross-examination in this regard was on Mr. Ross' 1982-1983 rating, as documented in Palmetto Exhs. 36, 50, and 51. It is difficult to read Mr. Allum's February 13, 1983 evaluation of Mr. Ross (Accountability Summary and Appraisal), Palmetto Exh. 50, or his Personal Performance Plan Worksheet, Palmetto Exh. 51, and get a clear idea of why Mr. Ross was rated low. A descriptive statement at the end gives some clues:

Beau's performance in the first seven months of his evaluation period were less than satisfactory. During that period he showed lack of support of management decisions. This was illustrated by

his failure to accept the explanation given to him on recertification of welding inspectors in MT & PT and his dissatisfaction expressed concerning the interpretation given by QA Technical Services concerning the proper use of R-2As and Q-1As. Communications between Beau, his crew, and craft and Technical Support personnel has improved over the last annual evaluation but is in need of much improvement. This was caused in part by his using another inspector to investigate problems on concerns of craft rather than doing it himself...."

Palmetto Exh. 50. Similar statements are made in an interim evaluation made approximately November 1, 1982. Palmetto Ex. 36.

30. "Mr. Allum testified that the key factors in the low evaluation were: Mr. Ross' unwillingness to resolve problems with craft and craft supervision on a first hand basis but rather to do so by sending inspectors, Allum, Tr. 4522-4, and his unwillingness to give his crew answers to questions which they did not want to hear. Instead he was said to refer the inspectors to others, such as Mr. Allum. Allum, Tr. 4536-7. Mr. Ross was also said to have mischaracterized the source of a decision not to nonconform a downhill weld (Concern D-23 of Mr. Bryant), saying that it was Mr. Baldwin's idea to remove the weld and correct it by rewelding, rather than "NCI it." Baldwin, Tr 4539. According to Mr. Baldwin, this had been Mr. Ross' idea. Id. (Mr. Ross noted that he never stopped an NCI from going forward, even if he disapproved. Ross, Tr. 6960.)"

31. "Mr. Allum also rated Mr. Ross low for challenging his explanation for why the inspectors were getting NDE instruction. Mr. Ross would not accept Mr. Allum's statement that it was not in order to send them back to the Cherokee construction site. Allum, Tr. 4497-4500. Mr. Allum had other complaints: Mr. Ross challenged use of

the R-2A, as taking away authority from inspectors (Allum, Tr. 4514, 4517); Mr. Ross shouted at Mr. Allum in the presence of Mr. Baldwin and two OC engineers (Allum, Tr. 4515, 4519); Mr. Ross misrepresented to his crew what Mr. Allum told Mr. Ross -- giving as an example, Mr. Ross telling a crew member management turned down a requested transfer, when Mr. Ross said he could not afford to lose the inspector from his crew. Allum, Tr. 4493-4495. This last basis for the "fair" rating was not communicated to Mr. Ross. Allum, Tr. 4496."

32. "In response, Mr. Ross explained that he initially objected to use of the R-2A because the process control sheet had not been changed, and directed that the Q-1A, not the R-2A, be used to document corrective actions. Ross, Tr. 6952. He also noted Mr. Allum had never told him before Mr. Grier did on April 27, 1983 that he was supporting his men more than management. Ross, Tr. 6798. In addition, he was told by Mr. Allum that construction technical support was doing R-2A reviews; but they were not. Ross, Tr. 6753. Mr. Ross said that Mr. Allum was not a good communicator.²⁵ Ross, Tr. 6775.²⁶"

25 "This assertion was supported by Mr. Rockholt, based on his experiences with Mr. Allum. On June 9, 1983, Mr. Rockholt complained to Barbara Horne, Employee Relations Assistant for the QA Department, that during a recent Employee Forum (one of the "communications" facilitators implemented as a result of the task forces) Mr. Allum acted disparagingly toward Mr. Rockholt, and, generally, was prejudiced against Beau Ross' Crew. Palmetto Exh. 87. In another similar matter, Mr. Allum reacted disparagingly when, on July 15, 1983, Mr. Rockholt asked Mr. Allum why welding inspectors had no electric fans, whereas NDE inspectors did.
(Footnote Continued)

33. "Mr. Ross' fair rating was, in part, a facet of the communications problems which evolved from differing approaches to use of the QA procedures to identify and document construction deficiencies, and continuing mistrust between Mr. Ross and his crew on the one hand, and middle management, on the other. Mr. Allum's reasons focused on Mr. Ross' failures at communications. However, the Accountability Summary and Appraisal (AS&A) for Mr. Ross does not provide for giving a great deal of weight to Mr. Allum's reasons for rating Mr. Ross low."

34. "As we read the AS&A, there are three categories which appear to have a relationship to the problems which Mr. Allum identified as the source of Mr. Ross' low rating: "Interface: Proper communications with other groups and departments," "Carry out responsibilities of QA and Construction Department QA Procedures," and "Resolving technical problems concerning quality." In each of these areas, Mr. Ross was rated "2," with a weight of "3." The descriptions of his "Accomplishments/Comments" in these areas are not especially strong.

(Footnote Continued)

According to Mr. Rockholt, Mr. Allum then replied, "NDE inspectors get fans because they work." Palmetto Exh. 88. Both incidents suggest that Mr. Allum was not on good terms with the welding inspectors. (After June, 1983, Mr. Allum was no longer second-line supervisor over any visual inspectors.) Applic. Exh. 21, Allum, p. 3; Palmetto Exh. 87." The Board adds that based on its observations of Mr. Allum as a witness, his communications skills are not well developed.

26

Mr. Ross' recourses to Mr. Willis and Mr. Davison were both denied. Palmetto Exh. 53; 35. See also, Applic. Exh. 34, Ross, Attachment B.

However, even if these ratings were proper, it would appear that Mr. Allum did not properly use the last accountability area, which is reserved for areas "outside the Principal Accountabilities" (emphasis added), when he cited therein problems which occurred in the three other accountability areas noted above to support his rating. (Mr. Allum rated Mr. Ross a "1" in this omnibus area, which had a weight of "3." A rating of "3" in that category would have resulted in an overall rating of "2.48," or very close to the "competent" range of "2.5 to 3.4." Palmetto Exh. 50.)"

35. "To illustrate the point, under "carry out responsibilities of QA and Construction Department QA Procedures" reference is made to "identification of items requiring Q-1As and R-2As," an area also referenced in the category as having been "outside" a principal accountability. We note the same double consideration in the "outside" category and the "Resolving technical problems concerning quality" category, with respect to answering questions himself. Palmetto Exh. 50."

36. "Two other internal inconsistencies bother us. First, Mr. Ross appears to have been "whip-sawed" by the early interim evaluation which rated him low for trying to answer a question he should have referred to supervision, and then in the AS&A, rating him low for not answering questions he could have answered himself. Palmetto Exhs. 36, 50. While it is possible that the two references are not inconsistent, that is, they refer to different types of questions, we would not fault Mr. Ross for being confused by these evaluations."

37. "The Board also questions whether faulting Mr. Ross for allowing an inspector to pursue his own disagreements through supervision is inconsistent with informal employee recourse and with the more open access to QA personnel indicated by elimination of the "technical review" block in the new Q-1A. Similarly, it is inconsistent to argue that Mr. Ross is at fault both for not pursuing his disagreements fully through channels, and also faulting him for not supporting management decisions. See, Applicants' Findings, ¶ 223; Palmetto Exh. 50."

38. "The Board is also troubled by the apparent intentional failure of Mr. Allum to communicate, for three months, the November 1982 interim evaluation which stated that without improvement, Mr. Ross might not be continued as a supervisor. Palmetto Exh. 36. Allum, Tr. 4579, 4589-90; See also, Allum, Tr. 4574-5, 8; Davison, Tr. 3939-40; 3951. Mr. Davison conceded that this delay was contrary to Duke policy. Davison, Tr. 4583-4."

39. "More to the point, Mr. Davison notes that "a large contributor to Beau's feelings of being treated unfairly resulted from lack of specific, clear standards for Beau's performance and the lack of formal review sessions to go over Beau's performance." Palmetto Exh. 35. The Board views these failures in the evaluation to have resulted in unfairness, not merely contributing to Mr. Ross' feelings of unfairness. The lack of clarity left Mr. Ross without sufficient notice of the basis upon which he would be rated. Mr. Davison seems to perceive this as well, but suggests only prospective action to correct this. Id."

40. "Another consideration is the testimony of other witnesses about Mr. Ross. Even discounting a "we" versus "them" attitude between the crew and supervision, the Board asked nearly all of the welding inspector and supervisor witnesses their opinion of Mr. Ross. None gave him a rating lower than "4." See, Sifford, Tr. 9150; Ledford, Tr. 9108; Crisp, Tr. 8415-6; Bryant, Tr. 6014, 6016, 6027, 6029, 6030. It may also be noted that both Mr. Willis, and Mr. Allum, are no longer supervising Mr. Ross and his crew. Davison, Tr. 3857."

41. The Board takes note of other circumstances which provide background for our evaluation of this matter. In 1981, Mr. Davison sent a confidential memo to Mr. Wells, then corporate quality assurance manager, about the welding inspector concerns. Part of the proposed solution was to transfer Beau Ross and C. R. Baldwin (Palmetto Ex. 13). Baldwin was replaced by Mr. Allum, but Ross declined transfer. This reinforces the conclusion that the subsequent low ratings of Ross, first by Davison and later by Allum (under Davison's supervision) were intended to discourage strict adherence to QA procedures by Ross and his crew.

42. When Mr. Ross declined transfer, it appears to the Board that an effort was made to build a case against Mr. Ross to justify future action to demote or fire. The Board cannot avoid noting the difference in the record concerning the Ross evaluation case and the dispositions of harassment incidents involving craft foremen, e.g., Mr. Mullinax and Mr. McKenzie (discussed below at pp. 165-170, 173-175). In the latter cases, the foremen were made to understand they might be fired, but no

record was made. In Ross' case, an extensive record was made that could be a basis for firing, but Mr. Ross was not dealt with completely openly.

43. George Grier, who succeeded Mr. Wells as corporate quality assurance manager, wrote a lengthy confidential memorandum to the file about a meeting he had with Mr. Ross while Ross' recourse on his rating was pending. The memorandum read in part as follows (Palmetto Ex. 33):

The last area I discussed was in regards to the hearings. I explained to Beau that one of our big tasks would be to put the concerns expressed by welding inspectors into perspective. The intervenors will be characterizing those concerns in the worst possible light. We need to be clear on the significance of those concerns and in particular will have to be clear on the meaning of terms like "intimidation," "threats," "falsification" and "pressure to approve faulty workmanship." These are words that are used in the concerns and could be used to describe very extreme circumstances.

The Board views the allusion to possible problems at a hearing in connection with Mr. Grier's counselling Mr. Ross about his performance as improper. Although Mr. Grier denied any improper intent (Tr. 3884), the Board thinks a reasonable person probably would interpret these comments as an attempt to influence future testimony in this proceeding.

44. Based on our review of the testimony and exhibits, the setting in which events occurred, and the credibility of the witnesses, the Board finds that the 1981-1982 evaluation, the November 1982 interim evaluation, and the 1982-83 evaluation of Mr. Ross, all at the "fair" or "2" level, were unfair and in retaliation for Mr. Ross' and his crew's

strict adherence to QA procedures and expression of safety concerns.²⁷ The persons directly responsible for the discriminatory evaluations of Mr. Ross were Mr. Davison, Mr. Allum (as to the interim and 1982-1983 evaluations), and Mr. Grier (as to the 1982-1983 evaluation, which he should have overruled). Mr. Grier and Mr. Davison occupy senior level supervisory positions. Therefore, these actions are fully attributable to the Duke Power Company.

45. In retrospect, Duke would have been wise to listen to Mr. Ross and the complaints of his crew of welding inspectors as they developed long prior to the Task Force Reviews. Instead, the company chose to let the problem fester and ultimately to accuse Mr. Ross of being unsupportive of management and acting inappropriately in questioning management decisions. Duke corporate management has chosen to

²⁷ Palmetto asks us to find the Ross evaluations to be violations of 10 C.F.R. 50, apparently meaning 10 C.F.R. 50.7. PFF 254. That provision prohibits discrimination against an employee for engaging in certain "protected activities," as defined in section 210 of the Energy Reorganization Act of 1974. Since there is no clear evidence in the record indicating that Mr. Ross himself voiced concerns to the NRC prior to the evaluation in question, we find no violation of 10 C.F.R. 50.7. But see Ross, Tr. 6777. However, the evaluations did constitute discrimination against Mr. Ross on account of his voicing safety concerns. They therefore violated the spirit of section 50.7, if not its letter. In any event, a retaliatory job evaluation against an employee for raising safety concerns is inconsistent with the thrust of 10 C.F.R. Part 50, Appendix B and the "reasonable assurance" determinations that must be made under 10 C.F.R. 50.57(a)(3) and the Callaway decision discussed at p. 20, above. Presumably, a pattern of such evaluations, not shown here, could preclude the necessary determinations and result in denial of an operating license.

characterize the problems that surfaced as "communications problems." E.g., prefiled testimony of Owen, p. 16; Alexander, p. 5. The primary responsibility for such problems rests with management; the changes made later to resolve such problems were not within Mr. Ross' authority or responsibility to change. Mr. Ross appeared to the Board to have been a dedicated employee, just trying to do his job.

46. We adopt portions of the Staff's PFF's 243 and 244, as indicated. ". . . The Board finds that Applicants' treatment of Mr. Ross was inconsistent with their programmatic responses to the welding inspector concerns and inconsistent with effective implementation of their quality assurance program." Notwithstanding these observations, the evidence does not support a finding that Mr. Ross' performance of his work was negatively affected by the toll of these events on him. Mr. Ross himself stated that the inspection process was not compromised. Ross, Tr. 6965; Applic. Exh. 34, pp. 6, 7, 9. See also, Rockholt, Tr. 6314-15; Cauthen, Tr. 6542. Despite the rating, Mr. Ross stated that the quality assurance program (and presumably his role in it) is "going pretty much as it should." Applic. Exh. 34, Ross, p. 9. Mr. Ross stated:

we don't have the problems that we had before. We do have the doors open to us. If we do have problems now, they are addressed and they are taken care of in an appropriate way.

* * *

It's just a whole different atmosphere now...."

47. Viewing the discriminatory evaluations of Mr. Ross in light of related welding inspector concerns, there appears to have been an unsuccessful attempt on the part of some mid-level supervisory personnel to bring about an informal relaxation of inspection procedures. This is a serious matter. Had it been successful, it might have undermined the QA program at Catawba by diminishing the efforts of inspectors. Because Mr. Ross and his crew continued to perform those duties conscientiously, there was no "breakdown" or even relaxation of the QA program. While important in itself, we further note that Mr. Ross was involved in only one part of the QA program at Catawba; we received no evidence of other similar discriminatory evaluations. Thus there is no direct evidence that the overall QA program at Catawba was adversely affected by Mr. Ross' evaluations. In these circumstances, the discriminatory actions against Mr. Ross, while blameworthy, are not a basis for denying or conditioning the license application. We expect the airing of this matter in public hearing and in this decision will have a salutary affect on the company's handling of similar matters in the future.

D. Harassment of Welding Inspectors

1. Introduction. The Board views harassment of welding inspectors to be a serious allegation, if true. Duke's management claims to have procedures in place to handle such problems. The policy of the construction department reads:

The construction department promotes equal treatment of all employees. The harassment of any employees is contrary to this policy and will be considered justification for disciplinary action.

Harassment is any action that singles out an employee, to the employee's detriment, because of, but not limited to race, sex, religion, national origin, age, handicap, or innate personal characteristics. Harassment involves two or more employees who may or may not include supervisors. Ex. 73.

The policy of the quality assurance department is similar. Both of these statements appear to be aimed at certain types of labor discrimination practices, involving, for example, sex or race; they do not specifically address the type of issues which arose in this case concerning alleged harassment of welding inspectors to the detriment of the effectiveness of the QA program.

2. In reviewing these allegations the Board found it useful to clarify its own concept of harassment. The inspector's job consists of identification and documentation of compliance or deviation from construction procedure according to prescribed procedures. Any action taken by another employee or superior intended to modify the actions of the inspector for the purpose of impeding the proper performance of the inspector's task is considered to be harassment. The use of or threat to use physical force or other violence is obviously the most overt form

of harassment, but harassment can be more subtle, taking the form of oral invectives or behavior designed to intimidate, embarrass, or ridicule the inspector. To be effective, harassment policy has to be applied to conduct offsite, as well as onsite.

3. The Board recognizes that an air of tension between the inspector and the inspected is inherent in that relationship. No one likes to have to do work over. Furthermore, the Board is aware that rough language may be used on construction projects to indicate friendly as well as hostile feelings. In the cases reviewed, the Board has made an effort to distinguish between such expected factors and harassment. We also allow for situations where an honest disagreement exists concerning interpretation of procedures. We would not deny either party the right to disagree, but would require that formal procedures be followed in resolving such disagreements in an impersonal manner.

4. The Reep - Jones Incident. When welding inspector Max Reep found welder G. R. Jones lying down resting about 30 feet from his welding rods, Mr. Reep took possession of the rods with the intent of writing an NCI report for failure to maintain control of the rods as required by Quality Assurance Procedure H.3. Mr. Jones was alerted to this action by a pipefitter and took back his rods from Reep's pocket before Reep left the area. Reep completed his inspections and then repossessed the rods from a pouch hanging on the wall about 6 feet from Jones. Jones told Reep he would not leave with his rods and forcibly took them out of Reep's hands. Mr. Reep filed a harassment charge. Palm. Ex. 62; Reep, Tr. 8678-82. See also Palm. Exs. 63-71.

5. The harassment charge was not upheld. The QA Department supported Mr. Reep because of the implied threat by Jones; however, the construction management people did not go along because Reep did not need physical possession of the rods to write an NCI. (Rogers, Tr. 5263-64; Dick, Tr. 5268) Reep thought he did. (Reep, Tr. 8644 and 8647-48). A violation notice of procedure H-3 (material control) was issued against Jones and he was also counseled about unprofessional conduct. Palm. Ex. 70; Dick, Tr. 5249-50.

6. The Applicant would have the Board find this incident "unfortunate ... inconsequential and merely indicative of the natural conflict which sometimes exists between inspectors and . . . inspected." App. PFF, p. 80. The Intervenors suggest that this is another instance where "management wholly refuses the chance to stand up for its quality assurance program and its inspectors who try to do so." PFF 226. The Staff's position is somewhat equivocal, i.e., Jones was interfered with but it does not show a failure of QA management to prevent harassment of inspectors. PFF 266.

7. The Board finds this a case of aggravated personal confrontation more than harassment, as we have defined it. The actions of Jones seemed to be aimed more at retaining possession of his rods than in keeping Reep from reporting what he thought he should report. In this case the violation of procedures seems more marginal than in others. The sudden awakening of Jones may have been contributory. Reep's persistence in taking possession of the rods a second time when that was apparently unnecessary may also have aggravated the situation.

The Board notes that a violation was written, Mr. Jones was counseled, and the QA department did stand behind its inspector. Thus the Board cannot support Intervenor's criticism of the handling of this case, but the Board does not concur with Applicants that it was inconsequential. On balance, however, the Board thinks this incident was handled appropriately.

8. The Jackson - McKenzie Incident. Because of the complexity of this incident, the Board adopts the Applicants' factual history in its proposed findings 256-262 (as our findings 9-15), since it is accurate (with one exception we note), gives the necessary detail, and is still concise.

9. "This incident began on November 11, 1981 in the RBS area adjacent to the reactor pressure vessel. (Tr. 8821-22, Jackson 11/30/83.) Welding inspector Larry S. Jackson (Jackson) was walking across a platform toward a location where he was to make a weld verification when he saw about ten feet below him pipe fitter Fox grinding on a two-inch diameter stainless steel pipe. Jackson perceived that the grinding disk being used by Fox was not marked with red paint as prescribed by Construction Procedure 170 (CP-170). Saying nothing, Jackson walked down to Fox's work area to examine the disk. (Tr. 8823-25, Jackson 11/30/83.)"

10. "At Jackson's request, Fox handed the disk to him, whereupon Jackson saw two red 'Magic Marker' marks on the paper on the backside of the disk. (Tr. 8828, 8901, Jackson 11/30/83.) By Jackson's account, while he was descending to the work area, Fox, having noticed Jackson's

presence, took the grinder to his tool box where he placed the two red marks on the disk.²⁸ (Id.) Since Jackson believed he would have seen the red marks had they been on the disk at the time he first observed the work in progress from the platform, he decided to initiate an NCI for violation of CP-170. (Tr. 8828, 8834, 8903, Jackson 11/30/83.)"

11. "The type of disk involved is an abrasive wheel three inches in diameter and is used for grinding in preparation of pipe joints for welding. (Tr. 5669, Dick 11/2/83.) Standard procedure at Catawba was to mark the disks used to grind stainless steel pipe with red spray paint to distinguish them from disks used to grind carbon steel pipe. (Tr. 8755-57, McKenzie 11/30/83.) The purpose of the marking procedure was to keep disks containing carbon steel fragments or particles from being used interchangeably on stainless steel pipe. (Tr. 8792, McKenzie 11/30/83; Tr. 5669-70, Dick 11/2/83.) These disks are used up rapidly 'in a few minutes.' (Tr. 8797, McKenzie 11/30/83.)"

12. "After examining the disk, Jackson left Fox's work area taking the disk with him. (Tr. 8834, Jackson 11/30/83.) Jackson then met Fox's supervisor, Edward J. McKenzie (McKenzie), and discussed the matter. (Tr. 8835, Jackson 11/30/83.) At McKenzie's request, Jackson handed him the disk from his work pouch, whereupon McKenzie looked at it, commented on its red marks, and put it in his own shirt pocket.

²⁸ Jackson testified that although he did not see Fox mark the disk, Fox must have done so while Jackson walked down to Fox's work area. (Tr. 8828, Jackson 11/30/83)

(Tr. 8835-37, Jackson 11/30/83.) Jackson asked for it back but McKenzie refused. By Jackson's account, he then reached into McKenzie's shirt pocket whereupon McKenzie stepped back, balled up his fist, and told Jackson that if he touched him again, he would knock his eyes out. (Id.) By McKenzie's account, Jackson poked McKenzie repeatedly in the chest while demanding return of the disk and asserting that he was going to issue an NCI report. (Tr. 8768, 8811, McKenzie 11/30/83.) Nothing further happened and Jackson then left the work area. (Tr. 8837, Jackson 11/30/83.)"

13. "A short time later, McKenzie and Jackson together went to Jackson's supervisor, Charles Baldwin, who immediately reviewed the matter and concluded that the disk should have been marked with red spray paint. (Tr. 8772, McKenzie 11/30/83.) McKenzie then apologized to Jackson and the two men shook hands and returned to work. (Id.) Later that day Jackson initiated an NCI report regarding the section of pipe on which Fox was working at the time the incident arose. (Tr. 8845, Jackson 11/30/83.)"

14. "The next day, November 12, 1981, Jackson went to the RBS area to place a red NCI tag on the section of pipe upon which Fox had been grinding the previous day. (Tr. 8848-49, Jackson 11/30/83.) According to Jackson, he asked Fox to point out that section of pipe, which Fox did, and Jackson tagged it. (Id.) As it turned out, Jackson tagged the wrong section of pipe. Shortly thereafter McKenzie approached Jackson,

impolitely addressed him²⁹ and informed him that he had tagged the wrong pipe. (Tr. 8850, Jackson 11/30/83.) Jackson immediately went to his supervisor and filed a formal harassment charge against McKenzie for verbally abusing him. (Tr. 8853, 8855, Jackson 11/30/83.) McKenzie went to see Charles Baldwin who sent a person to tag the correct section of pipe. (Tr. 8778, McKenzie 11/30/83.) The next day, Jackson, who had been 'on loan,' was returned to his regular crew and work area. (Id.; Tr. 9072, 9100, Ledford 12/1/83.)"

15. "The final outcome of this incident was that the NCI report concerning the section of pipe was allowed to stand; however, the piping system which included this section of pipe was later deleted (cut out) and removed from the building for reasons totally unrelated to the incident. (Tr. 8780-81, McKenzie 11/30/83; Tr. 8911, Jackson 11/30/83.) According to McKenzie, this incident was the only time a violation occurred regarding an 'unmarked' grinding disk. (Tr. 8791, McKenzie 11/30/83.) McKenzie testified that he did not know of any occasion where an unmarked disk was partially used, marked, and then reused on a different type of type. (Tr. 8812, McKenzie 11/30/83.) McKenzie also testified that he collected all his crew members' red magic markers the day after the Jackson incident. (Tr. 8781-82, McKenzie 11/30/83.)"

²⁹ The Applicants' characterization of what McKenzie said as an "impolite address" is euphemistic. See Tr. 8850.

16. The Applicants' review of the case found that Jackson's actions in attempting to retrieve this disk contributed to the escalation of the confrontation and that there was no harassment. Dick, Tr. 5325-26, 5329. However, McKenzie and Jackson were both counseled about unprofessional conduct and McKenzie was told not to use abusive language. App. PFF 265. Both McKenzie and his crew got a verbal reprimand about ridiculing inspectors, Dick, Tr. 5329-34. McKenzie was told a repetition could jeopardize his job. Dick, Tr. 5309.

17. Intervenor points out that McKenzie admitted he deserved the reputation of being a bully on the job. McKenzie, Tr. 8719. Intervenors claim that McKenzie and his crew were perceived to have gotten off "scott free." Palm. PFF. 221. Intervenors claim this was a clear signal to inspectors that they could expect no support from management. Palm. PFF 222. The Staff agrees with the Applicants' resolution. Staff PFF 270.

18. The Board considered the demeanor of witnesses, as well as their testimony. We disagree with Applicants and Staff. This is a case of harassment. The Board is not persuaded that in attempting to retrieve the disk from McKenzie, Jackson violated his person to such an extent (if at all) as to excuse the subsequent threats and ridicule that occurred the following day. After an agreement that an NCI would be issued, the actions of the crew and its foreman the following day, in the Board's view, were designed to intimidate, ridicule and denigrate the inspector.

19. Although this episode did not affect the ultimate safety of the system involved, attempts to enforce procedures should not result in harassment. It would not be unreasonable for the perceptions arising from this case to be as suggested by Intervenors. The actual actions taken, however, were much more forceful and supportive of inspectors than the general perception on the job. In this case, had the reprimand to the crew and the warning to the foreman been made a matter of record and communicated to the inspectors, the perception of management support of QA would have been quite different.

20. The Deaton Rifle Incident. William Deaton, a welding inspector supervisor, had to repeatedly reject the fit up of containment plates made by a particular iron worker. Deaton, Tr. 5793-94. One day on the way home from work a car pulled alongside the car in which Deaton was riding. A man, recognized as the iron worker, pointed a rifle at Deaton. They exchanged words and the other car pulled away. Deaton 5794-95. The next day Deaton reported the incident to his own supervisor. The iron worker was allowed to be terminated at his own request (Beam, Tr. 5345-46) because the company was uncertain of its legal position in an offsite incident. Dick, Tr. 5623-24. Deaton said the resolution satisfied him because it was a problem with an individual who was removed. Deaton, Tr. 5800-01.

21. Intervenors characterize the Applicants' response -- allowing the ironworker to quit -- as "lack-a-daisical" and "only the slightest wrist slapping". Palm. PFF 196. The Board, however, thinks as Mr. Deaton does. This was inexcusable, aberrant behavior of an individual.

The problem was solved quickly by the removal of the individual. In this case, we think the Applicant took a reasonable approach. The effect was about the same as firing, if not as forthright. However, the Board is concerned about the company's hesitancy to fire the iron worker merely because the wrongful conduct occurred offsite. To be effective, a QA program cannot tolerate offsite harassment. We have no doubt about the company's authority to discipline employees for offsite acts of harassment.

22. The Cauthen M4-I Inspections. Boyce Cauthen was responsible for "walk-down" inspections in the reactor building. These are a final inspection primarily for construction damage on previously inspected and approved systems about to be tested. Any deficiencies are noted on an M4-I form and could lead to an NCI report. (Cauthen, Tr. 6508-11.) Mr. Cauthen was harassed by other welding inspectors whose prior inspections approved welds that Cauthen found to be substandard, particularly inspectors from Mr. Ledford's crew (Cauthen, Tr. 6511-12), and especially Mr. Driscoll of that crew. Cauthen, Tr. 6517-18. The harassment took the form of "flak" and avoidance by fellow inspectors. Cauthen, Tr. 6512. Mr. Driscoll cursed Mr. Cauthen and promised to have him removed from the job. Cauthen, Tr. 6518.

23. Mr. Cauthen testified that he was told he was "looking a little too hard" for defects (Cauthen, Tr. 6451) and that he was only to look for construction damage. Cauthen, Tr. 6450 and prefiled testimony, Attachment A. He also said he did not stop looking hard (Cauthen, Tr.

6451) and would continue to note on an M4-I anything he found. Prefiled testimony, Attach. A.

24. Management's first reaction to crew complaints was to change the reinspection system so that deficiencies noted by Mr. Cauthen would be referred to the original welding inspector and his foreman for joint reinspection. Cauthen, Tr. 6512. This was a sensible move, but complaints continued. Mr. Cauthen testified that all of his referrals were verified. Cauthen, Tr. 6514. A short time after the encounter with Driscoll, Cauthen was transferred by Art Allum (Cauthen, Tr. 6518-20) and was replaced by an inspector in whom Mr. Cauthen had no confidence. Cauthen conceded he had written himself up for missing bad welds on a few occasions (Cauthen, Tr. 6520), and that nobody was perfect.

25. This is a case of harassment of an inspector by other inspectors. Craftsmen were not involved and there is no suggestion of construction scheduling pressures. Simply, the inspectors did not like another inspector finding fault with their work. Transfer of Cauthen may have eased tensions and, consequently, have been seen as desirable in some ways by Cauthen and management. However, the Board considers this a case of harassment and that the management did not recognize and deal with it as such. The Board is perplexed that anyone would suggest an inspector limit observations to only construction damage. Fortunately, Mr. Cauthen was stubborn enough not to heed such a senseless instruction. Duke is instructed to modify its instructions

and procedures, if necessary, to avoid any such understanding (or misunderstanding, if that be the case).

26. The Harris - Mullinax Incident. This incident involved a welding inspector, Lindsay Harris, and an ironworker crew and foreman, Tom Mullinax. App. Ex. 34, Attachment A, p. 16, and Ex. 67, Harris attachment, p. 1. Mr. Harris found that a tack weld applied in the fit up of an airlock was not properly preheated. Harris, Tr. 8967 et seq. Mr. Harris testified that he had said he would write out an NCI if the improperly preheated tack weld was not cut out. Harris, Tr. 8968. According to Harris, foreman Mullinax threatened to whip him (or knock his teeth out) if he did not leave his men alone. Harris, Tr. 8968, 8985.³⁰ The matter was referred by each man to his supervisor and in a subsequent meeting of the parties relations were improved. Harris, Tr. 8968-69. Harris was satisfied the job was completed correctly. Harris, Tr. 8969. In a separate meeting, and unknown at the time to Mr. Harris, Mr. Wall, Job Superintendent, orally reprimanded Mr. Mullinax and cautioned against any repetition. (Mullinax, I.C. Tr. 1041, et seq., and App. Ex. 99, p. 3).

27. The Applicant would have the Board find that the Harris-Mullinax incident "amounted to little more than a regrettable

³⁰ There was some indication that the threat to Harris was an attempt by Mullinax to say that his crew, not he, would whip Mullinax. Tr. 8983. We find this distinction improbable and, even if based in fact, insignificant.

verbal exchange" PFF 280. The Intervenor decries the fact that the only action taken was a "mere verbal reprimand". PFF 199. The NRC Staff describes the incident as one that "on its face ... sounds serious", but then downplays it because Mr. Harris has no continuing concerns and there was no negative impact on Harris' inspection. The Staff suggests that Mr. Harris' main concern was that, to his knowledge, no action was taken against Mr. Mullinax in support of Mr. Harris' position. PFF 277.

28. The Board concurs with the Staff insofar as finding that Mr. Harris continued to do his inspection job in a way he thought proper. Also, working relations between Mr. Harris and Mr. Mullinax and his crew were improved afterward. The Board, however, cannot simply dismiss the matter as a "regrettable verbal exchange." The incident was a serious case of harassment involving a threat of physical force to induce an inspector to be less rigid. It makes little difference what part of the anatomy is to be struck and whether the force is to be applied by the foreman or someone under his control.

29. We do not know if Palmetto is concerned that only a reprimand was given, or that it was only verbal, or both. A reprimand indicating that repetition can result in termination seems a reasonable response to foreman Mullinax. The Board does not understand, however, why the reprimand was not confirmed in writing, since future job security was purported to be involved. Furthermore, failure of the Applicant to communicate information on the disposition of cases like this to the inspectors could only lead to an impression among them that they would not be supported in an effective way. Thus, although the Applicants'

actions in this matter were in the right direction, the handling was so inept it could only hurt inspectors' morale.

30. The Bryant Incidents. The Board accepts the Staff's recitation of events in their proposed findings, 278-280, as follows.

31. "Inspector John Bryant raised three incidents of alleged harassment: one in which a welder, H. Beard, threatened to push Mr. Bryant off the scaffold they were standing on, another in which a craft foreman, M. Brazell cursed him for turning down a fit-up due to an improper material marking, and a third in which a general foreman for pipe fit-ups in the auxiliary building, H. Ellenberg, said that if it were the last thing he did he was going to get Bryant out of the auxiliary building. Applic. Exh. 30, Bryant, Attachment A; J. R. Bryant, Tr. 6050-6057. Mr. Bryant's concerns focused on Mr. Davison's reaction, which was that such incidents were just part of the job, and that nothing was done about the incidents. Bryant, Tr. 6053."

32. "On cross-examination, Mr. Bryant noted that the Beard incident was satisfactorily resolved when he talked to the craft foreman, and the welder came to Mr. Bryant and apologized. He stated the men work together without problems now. Bryant, Tr. 6177."

33. "With respect to the Brazell incident, there is little in the record beyond Mr. Bryant's statement that the event occurred and that Mr. Davison took no action. Applic. Exh. 30, Bryant, Attach. A; Bryant, Tr. 6054-55. The statement by Mr. Ellenberg came during a period in which Mr. Bryant's inspecting group had identified 'a good number of rejections' and this was holding up the craft's efforts to meet its

schedule. Bryant, Tr. 6055-56. Mr. Bryant noted that his subsequent removal from auxiliary building inspections came when his crew moved to another job assignment, and had no connection with the noted incident. Bryant, Tr. 6156-7."

34. There is no indication these events were considered by the Non-Technical Task Force (Bryant, Tr. 6053-57), and no corrective action appears to have been taken with respect to them. Any preventive action taken by Applicants would only have been organizational changes that came subsequently. The Board sympathizes with Mr. Bryant's frustration at receiving no response from Mr. Davison about these incidents. A threat to push one off a scaffold is not a light matter to be sloughed off as part of the job. We believe this incident should have at least been investigated.

35. The Rockholt Incident. John Rockholt is a welding inspector. The Intervenors relate an incident with a craftsman as an example of harassment. Palm. PFF 204. The Staff's Proposed Findings on harassment do not mention this incident. Mr. Rockholt testified that a craftsman bumped him with his shoulder. Rockholt, Tr. 6372. The craftsman did not work on anything related to Mr. Rockholt's area of Inspection. Rockholt, Tr. 6373. The craftsman was described by Mr. Rockholt as a "militant-type" who "didn't like his own mother". Mr. Rockholt reported it and was dissatisfied with the seeming lack of action. Rockholt, Tr. 6373.

3. The Board does not condone such conduct, but it does not fall within our definition of harassment. There is no evidence that the

incident had any relation to Mr. Rockholt's work or was intended to keep him from performing his duty. Rather it appears to be an unfriendly action by a mean character. As such it is a question for the Applicants' personnel people, not this Board.

37. The Langley Incident. Former welding inspector Harry Langley testified that on one occasion welders threatened to kick his rear end. Langley, Tr. 6883. Very few specifics of the incident are given and the timing is uncertain. Mr. Langley said that the threat "sent me up the hill after them", and he continued to do his work. Id. The record does not support any firm conclusions about this incident but, in any event, it does not appear to have been a major case of harassment nor to have interfered with Mr. Langley's work.

38. Impact of Harassment. Harassment was raised by a number of other inspectors in their concerns, but they do not appear to be as serious as some of the incidents detailed above. "See, e.g. Harris, Tr. 8969; Godfrey, Tr. 8307-08 (on incidents such as being cursed by L. Lowry: "if anything, it made us a little stricter"); Crisp, Tr. 8435 (any harassment did not affect performance; he inspected the work, not the person)." Staff PFF 282.

39. "Mr. Bryant stated that he thought threats from craft were not properly handled, and that some inspectors might be discouraged from filing harassment charges after the Reep resolution, Bryant, Tr. 6049, 6012, but no inspector said harassment affected job performance. See, e.g., Deaton, Tr. 5800; Reep, Tr. 8685; Crisp, Tr. 8428; Godfrey, Tr. 8307-8." Staff PFF 283.

40. Some inspectors believed the craftsmen and their foremen were too production minded. App. Ex. 10, McMeekin, Attach. 4, p. 6. At least some of the time, a poor working relationship seems to have existed between the crafts and some inspectors. This may have resulted, in part, from poor communications about construction procedures and lack of clarity about company policy concerning quality versus production. Some craftsmen thought inspectors were sneaky, trying to catch them in violation (Dick, Tr. 5390-91) and some inspectors thought craft were trying to slip by with substandard work. App. Ex. 10, McMeekin, p. 10 and Cauthen prefiled testimony Attach. A. If these attitudes had continued, they had the potential for reducing the motivation of QA inspectors and thereby effecting the QA program, and ultimately the quality of the construction.

41. The evidence presented to the Board does not indicate any faulty items went uncorrected. The inspectors affirmed that they continued to do their work properly in spite of the harassment. In some instances where the inspector perceived a lack of support, this too did not seem to affect the future actions of the inspector.

42. The Board was also interested in what was done to improve working relations and reduce harassment. As previously noted (pp. 57, 60), harassment concerns were submitted by the welding inspectors in response to the company's request and were considered by the Non-Technical Task Force. Establishment of a QA Department Harassment Recourse Procedure was recommended (App. Ex. 12, C. N. Alexander attach. 3, p. 5) and implemented. Open lines of communication between craft and

inspection were also addressed. An employee relations specialist was made available. The Construction Department amplified its instructions to include "intimidation, coercion, or kidding will not be tolerated" and implemented a quality awareness program. Dick, App. Ex. 24 and Tr. 5198. These measures were reported to have improved the situation. Ross, Tr. 6964; Crisp, Tr. 8414; Rockholt, Tr. 6343, 6199-6200.

43. Conclusions. Based on the foregoing analysis of the record the Board finds that some welding inspectors were subjected to harassment by craft workers and craft foremen for doing their job. This varied from insult and shunning to threat of injury. The existence of these incidents indicates that other similar incidents probably occurred in areas other than welding. However, the testimony reflects that the welding inspectors were not deterred from doing their job by the harassment.

44. Intervenors suggest we find that harassment of welding inspectors at Catawba constitutes a violation of 10 C.F.R. Part 50, Appendix B, Criterion 1 in that: Such conduct ... impugns the authority and freedom of persons in the performance of their quality assurance responsibility." (PFF 190, 191 & 234.) The evidence does not support such a conclusion. The few incidents described did not deter these inspectors from performing their duties, nor was the freedom of the QA program restricted.

45. The dimensions of the harassment problem as we have defined it should be viewed in the context of the duration and magnitude of the Catawba project -- some nine years of construction involving thousands

of employees. In that perspective, the number of significant harassment incidents in this record is relatively small. As we noted previously (See IA 26, above), the welding inspectors were asked to and did list virtually all of their concerns, including harassment concerns. Most of the welding inspectors had worked at Catawba for several years (a few of them from the inception of the project) and therefore it is reasonable to assume that they would have listed any harassment incidents that had become generally known among QA inspectors at the site.³¹ This was a vigorously contested case in which the parties offered all the strong evidence they could find. In these circumstances it seems reasonable to conclude that virtually all of the significant harassment incidents that have occurred at Catawba -- or at least all such incidents involving welding inspectors -- are in the record of this case. In any event, in the absence of any indication to the contrary, we can assume that correspondingly small numbers of harassment incidents have occurred in other major craft/inspection areas, e.g., concrete and electrical work. All of this indicates that harassment was not a widespread phenomenon at Catawba.

46. In most cases, the Applicants acted in a reasoned manner to discourage repetition. Even so, the Board in looking at the Applicants'

³¹ Our primary concern is with incidents that become well known on the site because they would have a wider chilling effect on the zeal of inspectors than an incident that goes unreported. It seems fair to assume, moreover, that most unreported incidents are of a minor nature.

actions collectively finds them lenient. A reasonable person could have taken more severe action in each case. In addition, the Applicants' failure to publicize their actions or to communicate in a supportive way with the inspectors left inspectors with a feeling that management was not supportive of the inspection activity.

47. Lack of a clear statement of policy on harassment of inspectors was a major part of the problem. The Applicants' present written policy is aimed primarily at equal rights/equal opportunity issues. The Board directs the Applicant to revise its harassment policy and finds 6 months an appropriate time for this action. We suggest that the company obtain input from both craftsmen and inspectors in the revision process.

II. Concerns Raised by Messrs. McAfee and Hoopingarner

A. 1. McAfee Concerns About Concrete Pours. William Ronald McAfee worked in various jobs at Catawba from March 1977 until March 1979. He worked as a prepour runner (a message carrier) in concrete work in early 1978. He testified that a wall of a reactor building was poured in a very heavy rain and that he saw two to three inches of water in the forms. Palm. Ex. 93, McAfee testimony, pp. 25-26, McAfee, Tr. 7873-74. Mr. McAfee was present during the middle of the pour for a few minutes. McAfee, Tr. 7873-74. He testified that covers were not in place (Palm. Ex. 93, McAfee 25-26). Mr. McAfee was concerned that excessive water might weaken the concrete, but conceded that he did not know whether this was an improper pour. McAfee, Tr. 7874.

2. Applicants' witnesses testified that procedures require protective materials, if warranted. Davison, Tr. 7413. A surveillance report on the pour in question had been conducted. App. Ex. 55. That report reflected that the pour had been free of water, and that adequate arrangements had been made to keep water out of the form area. Id. Documents also reflected that the pour had been inspected and approved. Id.; App. Ex. 54. The concrete pour in question called for a design strength of 5000 psi; test cylinders on an adjacent pour had broken at about 7000 psi. Dressler, Tr. 7606-07.

3. We adopt the Staff PFF 31 on this subject, as follows:

"Mr. Bryant, an NRC inspector from Region II, testified that his conclusions [that Applicants had adequately protected against rain damage] were based on examination by Region II of the records of 256

pours made during the time period January to March 1978. Staff Exh. 5, Bryant, pp. 6-8. Of particular note is his reference to a QA surveillance on a pour made the same day as pour W82, which showed that the pour was temporarily stopped after water accumulated in the forms and on the surface of the concrete, so that water and stone pockets which had resulted from rain water working cement off the aggregate could be removed. Id., at 7-8."

4. Mr. McAfee impressed the Board as a candid and forthright witness. Thus, the Board does not doubt his testimony as to what he saw. Even so, Mr. McAfee was present for only a few minutes during a pour lasting several hours and there is no evidence that what Mr. McAfee saw materially affected the quality of the concrete. The evidence also indicates that despite any marginal decrement in strength of the concrete caused by rain, the concrete would still be far above design strength. In any event, our primary concern is not so much with a particular pour as with whether the evidence indicates a systematic deficiency with respect to concrete pours, and the inspection of pours. The Board finds none.

5. Mr. McAfee also related an incident as a prepour runner in which he had difficulty obtaining the approval of the QA Department to allow the pour to begin. Palm. Ex. 93, McAfee testimony, p. 26; App. Ex. 37, Dressler testimony, p. 34. After several hours delay, a QA person reportedly waived requirements Palm. Ex. 93, McAfee testimony, p. 27. Mr. McAfee was uncertain what requirements were waived. McAfee, Tr. 7877. A subsequent review of records by the Applicants in the

relevant time period disclosed waivers on nine different pours, three of which were safety related, and all of which were properly documented. Davison, Tr. 7463-64, 7470. Non-safety related pours do not require formal QA approval. App. Ex. 37, pp. 35, 37 and Davison, Tr. 7462.

6. The information provided by Mr. McAfee about this incident was so lacking in specificity that it is hard to retrospectively reconstruct what may have happened. The Applicants' evidence shows that appropriate procedures were used to document safety-related waivers. This incident does not indicate any breakdown of the QA program.

B. 7. Rain in the Control Room. Nolan R. Hoopingarner, II. worked at the Catawba site for about three years as a general builder, rodbuster and scaffold builder. Hoopingarner Testimony, p. 1, Palm. Ex. 94. Mr. Hoopingarner and Mr. McAfee cited an incident where water fell from the ceiling of the control room onto the installed control panels (Palm. Ex. 93, McAfee testimony, pp. 27-28; Palm. Ex. 94, Hoopingarner testimony, pp. 23-24.) They attributed the problem to leakage in the roof.

8. The Applicants conceded that water had fallen from the ceiling, but attributed the cause to condensation on the cold ceiling. App. Ex. 37, Dressler testimony, p. 23. There was no heat in the room at the time. An electrical inspector filed a nonconforming item report (NCI) on the incident (McAfee, Tr. 8120-21; App. Ex. 52 (NCI 4432)).

9. Mr. Bryant of the NRC Staff confirmed the condensation and also some roof leakage at a roof joint. Staff Ex. 5, Bryant, p. 11. Two NCI reports on the day of the incident (nos. 4395 and 4432) stimulated corrective actions to wipe the panel boards, supply heat, seal the roof,

and test the circuits. (Palm. Ex. 111; McAfee, Tr. 7880-81; App. Ex. 37, Dressler testimony, p. 24; Davison, Tr. 7472-73; Dressler, Tr. 7352, 7362, 7372, 7595-96. Switches in the control panels that had been exposed to the moisture were tested subsequently and did not fail. Dressler, Id.)

10. It seems immaterial whether moisture was caused by condensation, roof leakage, or both. The problem is the same as to result, i. e., moisture on the control panel. While the incident was unfortunate, it was the result of unforeseen circumstances and does not reflect culpable negligence on the part of the Applicants. The aftermath of the incident demonstrated that the QA program was effective in producing corrective action. Mr. McAfee concedes as much. McAfee, Tr. 7878.

C. 11. Flooding of the Diesel Generator Rooms. We adopt the Staff's proposed findings 48 and 49, as follows:

"During the weekend of September 29-30, 1979, seven inches of rain fell in the Catawba [area] during a 38-hour period. At the time of this exceptionally heavy rainfall, site grading and drainage had not been completed, and certain manholes and electrical conduits were open allowing water to flood the diesel generator rooms. NRC Inspection Report Nos. 50-413/79-18; 50-414/79-18 (October 25, 1979), Staff Exhibit 10a, p. 4; Testimony of Charles J. Wylie, et al., Applic. Exh. 37, Freeze, Allgood, p. 15. The floor of the diesel generator rooms is approximately 40 feet below the outside grade, Hoopingarner, Tr. 11907, and as a result of the combination of external events and the stage of

construction, 41 inches of water filled Room 1A and 8-1/4 inches filled Room 1B. Staff Exh. 10a, p. 4."

12. "Witness Hoopingarner stated that water came into the rooms through an outside stairwell, and that the diesel generators had been subjected to rain [falling through an open hatch]. Hoopingarner, Tr. 11907; Palmetto Exh. 94, Hoopingarner, p. 23. The NRC inspector, Milton Hunt, stated that there was no evidence that they had been ruined on. Hunt, Tr. 11841. Applicants undertook to make an inventory of all equipment in the diesel generator rooms at the time of the flood and wrote NCIs for equipment which was submerged or partially submerged. Applic. Exh. 37, Wylie, Freeze, Allgood, Weir, Barron, p. 17."

13. Since the rainfall was 7 inches and the flooding reached about 41 inches in the control room there had to be multiple sources of flood water. The Board thinks it likely that the route of entry of most of flood water was the open manholes and conduits. Thus, the Board finds the combination of the stage of construction and the unusually severe rainstorm combined to produce this event. The important questions for the Board, however, were (1) did the Applicants act prudently in meeting storage requirements for diesel generators, (2) have measures been taken to prevent a recurrence, and (3) has flooded equipment been properly refurbished?

14. We adopt the Staff's proposed finding 53, revising the last line:

"First, Applicants had implemented storage requirements in accordance with ANSI N-45.2.2 level C (Special), which required (1)

coverings to prevent moisture from falling on the equipment, (2) energizing of space heaters where applicable, and (3) weekly inspections of all components. Applic. Exh. 37, Allgood, Barron, Weir, Wylie, p. 16. Nevertheless, these storage requirements clearly were not adequate to prevent the flooding and resultant damage. However, as noted by the Staff, the size of the equipment was such that much of it had to be installed before the building was completed. Grading cannot be completed while movement of heavy equipment, underground construction and the like are still going on. Staff Exh. 5, Bryant, p. 27." Given these circumstances, and the unexpected extremely heavy rainfall of seven inches in a 38-hour period, Applicants appear to have taken reasonable actions to protect equipment. Id., at 26.

15. We adopt the Staff's proposed finding 54, as follows:

"Second, the supervision of the cleaning and repairs by TDI representatives (Karcher, Tr. 11872), and the origination of 37 non-conforming item reports (Applic. Exh. 37, Allgood, Wylie, Barron, Weir, p. 16) assured that an immediate evaluation was made as to whether exposed parts would require repair, replacement or some other disposition (Hunt, Tr. 11855). The steps Applicants took to inventory all equipment potentially damaged (Weir, Tr. 11878) and to assure that all inspections were performed (Barron, Tr. 11885; Allgood, Tr. 11884), and the subsequent factory restoration by TDI (Karcher, Tr. 11872), indicate that Applicants' procedures for identifying, documenting, evaluating, and correcting a significant deficiency such as the degradation of the diesel generator system were in place, implemented

and resulted in restoration of this system to serviceability. Through its inspection process, the NRC regional inspection staff monitored the initial condition, planned corrective actions and the progress of achieving these corrective actions, and closed the items out as corrected. Staff Exh. 5, Bryant, pp. 26-27; Staff Exh. 10a; Palmetto Alliance Exh. 107; Staff Exh. 10b, Inspection Report Nos. 50-413, 414/81-08 (May 20, 1981), par. 5(c)."

16. Specific corrective actions taken were as follows:

1. The diesel generator engine and other parts affected by water were cleaned. Wylie, Tr. 11,889.

2. The generator was flushed with clean water and subsequently dried out. Wylie, Tr. 11,889.

3. All the components in the control panels and the terminal cabinets which had been affected by water were discarded and replaced with new components. The cabinets were cleaned and restored. Wylie, Tr. 11,889.

4. All the motor starters which had been damaged by water were replaced. The motor control centers were cleaned and restored. Wylie, Tr. 11,889.

5. All accessory and support equipment for the diesel generator was refurbished and brought to an acceptable condition. Wylie, Tr. 11,889.

6. The engine crank case was opened and inspected. The high water level had been below machine parts. The crank shaft was inspected and there was no evidence of deterioration. Barrish, Tr. 11,890.

7. Safety related electrical cables were tested. Allgood, Tr. 11,891.

8. The air compressor motors were returned to the factory for rewinding and refurbishing. Allgood, Tr. 11,891.

9. The RTD manifold was flushed with clean water and dried. Weir, Tr. 11,892.

10. Certain valves were disassembled and cleaned. Weir, Tr. 11,892.

11. Air tanks were cleaned. Weir, Tr. 11,892.

12. Crank shaft seals were cleaned and inspected. Karcher, Tr. 11,893-4.

17. We adopt the Staff's proposed finding 56, as follows:

"To prevent recurrence of such an incident, site grading has been completed, the conduit for electrical cables that served as the principal pathway of water entry has been sealed, and the drainage system has been installed. Van Doorn, Tr. 9813-4. Davison, Tr. 7557. Sump pumps are now installed in the subject manholes. Dressler, Tr. 7570. The current NRC resident inspector, Mr. Van Doorn, noted that despite "nasty rains" since the incident, similar problems have not occurred. Van Doorn, Tr. 9627."

18. On the basis of the evidence the Board does not find the Applicants derelict prior to the flooding. We find that the Applicants have taken appropriate steps to refurbish or replace damaged equipment and that reasonable steps have been taken to prevent a recurrence of flooding.

19. Palmetto's case was based primarily on the testimony of Mr. Hoopingarner, who did not possess any expertise on diesel generators or the effect of flood water upon them. The Applicants' case was presented by a panel of well qualified experts, including a representative of the diesel manufacturer, two electrical engineers and three mechanical engineers. Tr. 11,870-11,882. The panel was responsive to questions on all aspects of the flooding incident. Palmetto objected to the presentation of this panel during the Applicants' rebuttal case. In the interest of obtaining a full record, we overruled that objection. Palmetto then waived entirely its right to cross-examine the Applicants' panel, not asking them a single question. Tr. 11,882-11,883. Although we are not treating that waiver as an abandonment of its right to contest this issue, we take into account Palmetto's total failure to probe the Applicants' direct case in our assessment of the record. Quite apart from that factor, however, the Applicants are clearly entitled to prevail on this issue by the weight of the evidence.³²

D. 20. Electrical cable. We adopt the Staff's proposed findings 42-46 on this subject, as follows:

"Messrs. McAfee and Hoopingarner each raised the concern that electrical cables and cable ends were not being adequately protected,

³² On June 22, 1982, the date of this Partial Initial Decision, the Board admitted a late contention concerning problems that have arisen in the course of testing and inspection of diesel generators at Catawba. See nn.3 and 50 hereof.

such that pulled cables were found lying on the floor, in water, and were subject to abuse, such as from having wall boards placed on them, all in violation of Applicants' storage requirements. Palmetto Exh. 93, McAfee, pp. 28-29; Palmetto Exh. 94, Hoopingarner, p. 9. Mr. McAfee also stated that no records were kept of failures to properly protect cables. Id. Written testimony by Mr. Dressler indicated that Applicants investigated Intervenors' allegations of widespread failure to properly store electrical cable and found a few instances of improper storage, but of a minor nature, which were corrected. Applic. Exh. 37, Dressler, pp. 3-4. A Staff review of ten electrical inspections by NRC Region II-based inspectors between mid-1978 and August 1980, as well as inspections by the NRC Resident Inspector from February to July 1980 resulted in only one violation of requirements relating to electrical cable storage -- a cable identified by Mr. Hoopingarner, reported in Inspection Report Nos. 50-413 and 414/80-19. Staff Exh. 5, Bryant, p. 14."

21. "Another NRC inspection of electrical equipment noted several housekeeping deficiencies. These included two Class IE installed cables lying on the floor in an area which previously contained some standing water, and the tops of Class IE panels damaged by workers using these panels as supports while conducting other work activities. These were cited to show unsatisfactory housekeeping conditions related to Class IE cable trays and cables. The NRC issued a deficiency for noncompliance with Criterion XIII of Appendix B. The report notes, however, that

appropriate corrective actions were taken. Inspection Report Nos. 50-413, 414/80-12, Staff Exh. 3, pp. 3-4."

22. "Although these minor housekeeping deficiencies are noted, what is of concern to the Board is whether safety related cables have been degraded as a result of poor storage practices, and whether Applicants' procedures are sufficient to identify, document and correct problems that develop during the course of construction. While we have noted the single violation identified by Mr. Hoopingarner, neither the NRC nor the Applicants identified similar violations. The testimony of Mr. McAfee is that problems identified with unprotected cable ends were readily corrected. Palmetto Exh. 93, McAfee, pp. 28-29; McAfee, Tr. 7884."

23. "Despite Mr. McAfee's disclaimer statement that cable pull problems were not documented, it was brought out on cross-examination that he wrote an NCI on a cable he discovered to be damaged during an unplanned inspection. McAfee, Tr. 7886-87. He also documented cable protection problems on M-40C forms. McAfee, Tr. 7991-2."

24. "All safety related electrical cable pulled during the period covered by this concern was interlocked or braided armored cable (electrical cable wrapped in steel) or is protected in conduit. Applic. Exh. 37, Dressler, p. 5. The ends of electrical cables are taped to protect the cable from water. Id. As much as 10-30 feet of extra cable are typically pulled in order to assure the pull is not too short so that, even if the ends of cable pulls touch the ground, there is little likelihood that this excess cable at the end is actually used. Id., at 4; see also McAfee, Tr. 7884. Additional lengths are discarded in

stripping of insulation, where connections are made. Applic. Exh. 37, Dressler, p. 4. Non-wicking cable, that is, cable which does not absorb moisture, is used so that the likelihood of damage from water is remote even if ends are left untaped. Id., at 5. Finally, preoperational testing of electrical systems to determine the integrity of insulation, as well as functional testing, provides further assurance that such cable will serve intended purposes. Id., at 6."

25. There appears to be no dispute that electrical cables were sometimes found lying on the floor. Numerous deficiency reports document this occurrence. Davison, Tr. 7440. There is no evidence, however, that faulty or damaged cables were actually installed. Due to the protection afforded by the type of cable used (armor plate, non-wicking material), the practice of cutting off ends, and testing, there is no safety significance in an occasional cable lying on the floor. QA inspection procedures appear adequate and were used. On this record, the Board considers this a relatively trivial matter.

E. 26. Piping and Rebar. We adopt the Applicants' proposed findings 484-485 on this subject, as follows:

"Mr. Hoopingarner alleged that pipes were lying on the ground at the piping fabrication shop and that, in the rebar storage yard, rebar was touching the ground and vegetation was growing through it (PA Exh. 94, Hoopingarner, pp. 17, 18) [footnote omitted] Mr. Hoopingarner offered no opinion as to whether such incidents constitute a threat to safety operation of the facility."

27. "We find both incidents to be of minimal significance. Again, we note that Mr. Hoopingarner made at least three different site tours with two different NRC Inspectors (Apps. Exh. 37, Dressler et al., p. 4; NRC Staff Exh. 5, Bryant, p. 13; NRC Staff Exh. 6, Maxwell, p. 3; PA Exh. 94, Hoopingarner, pp. 7-9, 16-17, 18). In those site tours, Mr. Hoopingarner was able to point out only one instance of rebar touching the ground in the rebar yard and one instance of piping touching the ground outside the pipe fabrication shop. This did result in a Notice of Violation concerning pipe storage which was the subject of NRC Inspection Report 50-413/80-19 and 50-414/80-19 (80-19) (PA Exh. 107)."

28. There is no safety significance in rebar touching the ground so long as it is inspected to see that any weeds, dirt, excessive rust, etc., are removed prior to use. This was done (Appl. Ex. 31, Dressler, p. 28; Staff Ex. 5, Bryant p. 28; Davison, Tr. 7574-5). Similarly, piping is inspected prior to use and safety-related piping is cleaned and tested (Appl. Ex. 37, Dressler p. 28). The Board also considers these two piping and rebar storage incidents to be relatively trivial matters. As the Staff points out, "with 50,000 tons of rebar and 400,000 feet of pipe, occasionally some of it may get on the ground." Staff PFF 61.

F. 29. Alleged Improper Weld Quenching. Mr. Hoopingarner testified that he saw a welder use a wet rag to quench a red hot weld on a pipe. He testified that the welder told him that using the wet rag constituted a violation of procedures but that it was necessary to "get the pipe right." Hoopingarner Testimony, pp. 10-21, Palm. Ex. 94. Mr.

Hoopingarner is not a welder himself, but he apparently concluded that the wet rag procedure had some safety significance. Accordingly, he reported the matter to NRC Inspector Maxwell. Id.

30. Both the NRC and the Applicants investigated this incident. The NRC's Report No. 50-413, 414/80-08 states that:

"the inspector discussed the quenching of welds with the welder identified by the concerned employee (Mr. Hoopingarner). The welder stated that he had not practiced nor witnessed the quenching of welds at the Catawba site. The inspector discussed the quenching of welds with the authorized Nuclear Inspector and knowledgeable Duke Power Company workers. These persons stated that they had not witnessed, nor were they aware of, quenching of welds at Catawba. There were no statements that supported the employee's concern relative to quenching."

Even assuming the alleged quenching incident occurred, quenching is permissible with prior approval. Even without such approval, it has no safety significance. Bryant Testimony, p. 22, Staff Ex. 5. The Applicants' investigation and resulting testimony were to the same effect. Dressler Prefiled Testimony, pp. 7-9. We conclude that, at the worst, this alleged incident represents an isolated procedural violation having no safety significance.

G. 31. Unsafe Scaffolds Causing Unsafe Welds. Mr. Hoopingarner alleged that unsafe scaffolds has been erected 10 to 40 feet off the ground. He claimed that the welders were afraid to go up on those scaffolds and therefore did their welding hurriedly, resulting, in Hoopingarner's opinion, in unsafe welds. The welders allegedly said to him that "we just fill the gap ... fill that hole." Hoopingarner Testimony, p. 22, Palm. Ex. 94.

32. We note again that Mr. Hoopingarner is not a welder (Tr. 8035) and that he apparently did not see any of these elevated and allegedly unsafe welds himself. He does not claim that any welder told him directly that these welds were unsafe. Without the benefit of more context, statements about filling the "gap" or "hole" are ambiguous at best. See Davison Testimony, p. 10, App. Ex. 37.

33. The NRC investigated this allegation. Report No. 50-413, 414/80-08 states that:

The inspector discussed the subject with craft workers, QC and QA inspectors, and safety assistants and supervisors. There were no statements made that supported the allegation. These workers stated that scaffolds and platforms are built to satisfy the craft workers including welders, additional work areas are provided upon request, and craft work including welding is not started until the worker, or welder is satisfied that the work platform is safe and adequate for the job requirements. No related concerns were expressed to support the employee's concern.

The Applicants' review of this allegation substantiated the Staff's investigation. Davison Testimony, pp. 9-12, App. Ex. 37. Furthermore, that testimony describes the extensive and redundant inspection program for welds. This program gives substantial added assurance that Mr. Hoopingarner's allegations do not raise a safety concern.

H. 34. Mr. Hoopingarner's Access to the NRC. During his three years as a Duke employee at Catawba, Mr. Hoopingarner expressed a wide range of safety and other concerns to his superiors and to various NRC

representatives.³³ There is a contested issue concerning whether Mr. Hoopingarner was ordered not to talk to the NRC. Most of the relevant facts are not in substantial dispute.

35. In April, 1980, Mr. Hoopingarner approached NRC inspector Maxwell as Maxwell was walking through Hoopingarner's work location on a tour of the site. Alexander Testimony, App. Ex. 37. According to Hoopingarner, he told Maxwell "that Duke Power was trying to fire me for bringing up all these safety items and the wrongdoing that was going on." Hoopingarner Testimony, p. 5, Palm. Ex. 94. Mr. Hoopingarner further testified that shortly thereafter his general foreman, R. H. McDowell, approached him and "gave me a direct order that I would not talk to or approach the NRC man."³⁴ Id. A few days later, Mr. Hoopingarner discussed the matter with Mr. Turner of the Employee Relations Department and, shortly after that, Mr. Hoopingarner was called to the office of Danny Powell, also of Employee Relations. Powell "withdrew" the order from McDowell that Hoopingarner should not approach the NRC man. Hoopingarner Testimony, p. 6, Palm. Ex. 94.

33 Mr. Hoopingarner also expressed various worker safety concerns to the Occupational Safety and Health Administration. See, e.g., Palm. Ex. 94 at 13.

34 The Applicants presented a somewhat different version of what McDowell said to Hoopingarner -- that workers could talk to an NRC inspector if approached on the job site, but that they should not initiate contact with an inspector while working. Alexander Testimony, pp. 13-14, App. Ex. 37. Given our perspective on this incident, we can assume without finding that Mr. Hoopingarner's version was essentially correct.

36. There was apparently some confusion at that time about company policy as to whether workers could approach NRC inspectors.³⁵ Clarification was sought from Mr. Beam, the Project Manager, who stated the policy as:

(1) NRC can talk to employees on company time as long as it is not extensive.

(2) If NRC man is in work area, employee can approach him to show him something quickly. If they want to talk at any length with him, they should notify their supervisor so an appointment, which may or may not be during working hours, can be set up. Turner Memorandum, dated April 23, 1980, Palm. Ex. 91.

Mr. Turner stated the foregoing policy to both McDowell and Hoopingarner. When Hoopingarner remained concerned about McDowell's original order "not to talk to the NRC man," Turner told Hoopingarner to consider that "order" countermanded. Id.

37. We find from the foregoing that Mr. Hoopingarner was improperly told that he should not approach an NRC inspector. We also find, however, that that directive was effectively withdrawn at least twice shortly thereafter. Furthermore, this incident appears to be an isolated occurrence, not part of a pattern of restricting access to the NRC. The evidence discussed hereafter makes it abundantly clear that Mr. Hoopingarner was not deterred from contacting the NRC.

³⁵ The Applicants point to an April 25, 1977 letter from Mr. Dick, Vice President - Construction. Alexander Testimony, p. 14, App. Ex. 37. This letter was cast in very general terms and provides no clear guidance on the situation involved here.

38. Palmetto is critical of the "clarified policy statement" laid down by Mr. Beam and quoted above, but it gives no specifics. In our view, Mr. Beam's version of Duke's policy was not unreasonable, at least in the absence of a clear policy on worker access to the NRC from the NRC itself. In the absence of such an NRC policy, it is hardly surprising that utility policies might vary from time to time and often be unclear. See discussion at pp. 145-46, above.

I. 39. Mr. Hoopingarner's Alleged Retaliatory Firing. The facts bearing on Mr. Hoopingarner's firing on September 4, 1980, are set forth in the record at length and are relatively complex. We will refer to and summarize the evidence only as necessary to explain our findings. The evidence can be interpreted to support three different reasons for Mr. Hoopingarner's firing; that it was: (1) in retaliation for his voicing concerns to the NRC; (2) a customary sanction for multiple unexcused absences; or (3) in response to his unusual and disruptive behavior on the job. As we shall explain, we conclude that Mr. Hoopingarner was fired primarily because of his unusual and disruptive behavior on the job and, secondarily, for his unexcused absences. He was not fired because of his contacts with the NRC. These conclusions are based on our overall assessment of the evidence - - no single matter was decisive. Equally important, our conclusions rest on the demeanor and credibility of the witnesses. We stress in the latter regard that we do not question Mr. Hoopingarner's sincerity, or that he was telling the truth in this case as he, Hoopingarner, saw it. We came to believe, however, that Mr. Hoopingarner's perceptions were distorted by his

self-righteousness, poor judgment, and zeal to right every wrong he saw at Catawba.

40. Mr. Hoopingarner began making complaints to his superiors and NRC inspectors about a range of personnel and nuclear safety matters in late 1979. Hoopingarner Testimony, pp. 4-5, Palm. Ex 94. Following his first encounter with Inspector Maxwell (see para. 34, above), Hoopingarner had an extended meeting with Maxwell, including a tour of the site, on April 28, 1980. Id. pp. 7-10. Maxwell Testimony, pp. 2-4. Mr. Hoopingarner raised a number of safety concerns, some of which were presumably within his knowledge as a builder, (e.g., scaffolds, protruding ladders) and some of which presumably were not (e.g., welding, pipe hanger installation). Hoopingarner told Maxwell that he had already raised these concerns to numerous Duke personnel, including Steve Alexander, Marty Meldon, Bob Hamilton, Stan Wingate, Don McGurty, Brian West, Danny Powell, Robert McDowell and John Scruggs. Maxwell Testimony, p. 3. Shortly after this meeting, Mr. Maxwell was instructed by his superiors not to take any further action on Mr. Hoopingarner's concerns because Hoopingarner had charged that Maxwell was on Duke's payroll. Id. at 5. Palm. Ex. 99.³⁶ Although he had no further dealings with Mr. Maxwell, Mr. Hoopingarner later took two

³⁶ As Mr. Hoopingarner later recalled it at the hearing, he had said that Maxwell and Duke employees were "in cahoots" with each other. Tr. 8052. Either formulation charges corrupt conduct for which there is no basis in the record.

additional site tours with NRC Inspector M. D. Hunt. Palm. Ex. 107, p. 31.

41. Nor did Mr. Hoopingarner confine himself to raising what he saw as safety concerns. He was also vocal in his criticisms of his co-workers and supervisors. One of his supervisors, Mr. Pelfrey, undertook to counsel Mr. Hoopingarner in March 1980 concerning various Hoopingarner charges against Pelfrey and other workers. In a memorandum of the counseling session, Pelfrey referred to seven of Hoopingarner's co-workers being interviewed separately; each had said, in substance:

there was no problem with the way the crew was handled, or the way the job was ran, and that if there was a problem it was Nolan himself.

The Pelfrey memorandum concluded that:

I think his continued accusations of these and other alleged items could and have caused a moral[e] problem on this crew, which therefore brings down the maximum productivity of this crew as a whole.

Therefore he was informed on this day 3-24-80 by R. H. McDowell in my presence to cease these accusations and bickering, or else it could result in dismissal of his job.³⁷

Mr. Pelfrey gave Mr. Hoopingarner a copy of the memorandum. Tr. 7751.

42. About a week after the Pelfrey memorandum and a few days after his tour of the site with NRC inspector Maxwell, Mr. Hoopingarner was involuntarily transferred from his crew in the auxiliary building to

³⁷ Palm. Ex. 96. We see no reason not to fully credit the statements in this memorandum. It and several related exhibits were introduced by Palmetto as substantive evidence, without qualification. Tr. 7764, 7954.

another crew working in the cooling towers. The reason given by Personnel Relations for the transfer was Mr. Hoopingarner's personal safety and protection. Palm. Ex. 101. The evidence amply supports that reason. Many of his fellow workers disliked Mr. Hoopingarner and he had received a number of veiled threats. Hoopingarner, Tr. 8008-8009; Beam Tr. 5467. The underlying reasons for this animosity are disputed. Mr. Hoopingarner claims that supervision had turned his crew against him by selective enforcement of safety rules against them on account of his raising concerns. Hoopingarner Testimony, p. 12. Similarly it was suggested that Hoopingarner's crew were afraid that they would be the targets of hostility intended for Hoopingarner because of his constant accusations. Dick, Tr. 5596-97. These explanations do not seem plausible under the circumstances. Mr. Hoopingarner also claims that his crew became angry with him because they knew he had gone to the NRC and were afraid he would cause a plant shutdown and loss of their jobs. Id. at 13. We find this thesis -- that Mr. Hoopingarner's activities as a self-appointed safety crusader could be viewed as threatening a project shutdown -- even less plausible.³⁸ We believe that his crew's

³⁸ Many of Mr. Hoopingarner's "concerns" had nothing to do with nuclear safety. See, e.g., Palm. Ex. 83. Nor did Mr. Hoopingarner's explorations of the site, frequently in areas he knew nothing about, turn up very much of interest to the NRC. No major problems were brought to light. Citations for few minor violations were issued. It is unclear whether the same violations would have been cited without Mr. Hoopingarner's involvement. See NRC Reports on Catawba Nos. 80-08 and -19.

animosity toward Mr. Hoopingarner basically grew out of his self-righteous conviction that he alone cared about safety and his indiscriminate accusations against others on the job. See Pelfrey memorandum, Palm. Ex. 96.

43. On May 15, 1980, Mr. Hoopingarner requested and was granted a meeting with Mr. Beam, the Project Manager, and Mr. Alexander, the Personnel Manager at Catawba. This meeting lasted about two hours and Mr. Hoopingarner covered a wide range of topics. The very fact that the meeting took place demonstrates that Mr. Hoopingarner could get a hearing from senior supervisory personnel at the site. Indeed, we find it remarkable that a Project Manager with responsibility for several thousand employees and a multi-billion dollar project could afford to take the time to listen to the kinds of things Mr. Hoopingarner had to say. Apparently, Mr. Hoopingarner talked with Mr. Beam on several occasions. Beam, Tr. 5457.

44. The May 15 meeting was memorialized in a memorandum. Palm. Ex. 83. Mr. Hoopingarner expressed several safety concerns, some of which were viewed as warranting a response. Most of his comments, however, were unrelated to safety. For example, Mr. Hoopingarner made general observations about project management. He also expressed concerns about costs, e.g., that unnecessary rework was being done at Catawba. Hoopingarner even questioned Beam about a grill that had been made for employee use on site because the work hours used in fabrication would be passed on to the consumer. Ironically, Mr. Hoopingarner also

wanted to know if it was legal for Duke to hold employees in the parking lot and not pay them as traffic was let out by rows.

45. The following description of comments by Mr. Hoopingarner at the May 15 meeting shed some light on the preceding comments and bear on Mr. Hoopingarner's state of mind:

(a) Says the plant is a "hell hole," and the Lord will clean it up "one way or another." Relates that "those people" are trying to destroy him; that they threatened to drop something on him. (He couldn't relate a specific threat from anyone).

(b) Feels he was moved from [the auxiliary] building because his life was in danger. He says every one should be moved if we cared about others' safety. States that "things are getting better due to what he's done, and this is the Lord's way of doing it." Then he said he was put in cooling towers to keep him from spreading the word of righteousness over the job.

(c) Feels that we should read the Bible more. Lord leads him daily at work and will help him clean up the "den of iniquity" that exists. Id.

In the course of the May 15 meeting, Mr. Hoopingarner referred to his co-workers as "earthlings" and "slaves." See Palm. Ex. 83, p. 9; Beam, Tr. 5570-5571; 5600.

46. In addition to animosity, Mr. Hoopingarner's activities caused disruptions. For example, Mr. Dick, Vice President-Construction, testified that when Hoopingarner approached Maxwell on the job site (see ¶ 34. above), Hoopingarner's gadfly reputation caused his entire work crew to stop and watch. Tr. 5474-5475. See also Tr. 5464, 5594. In addition, Hoopingarner's investigative activities took considerable time away from his assigned work. Beam, Tr. 5464, 5470-5471, 5473. To cite one more example, Mr. Hoopingarner testified that he attempted to get documentary proof of alleged "wrongdoing" from mechanics in the

powerhouse, a place where he had no assigned responsibilities and no apparent knowledge of the hardware. Hoopingarner Testimony, p. 12; Tr. 8092-8094.

47. Duke fired Mr. Hoopingarner on September 4, 1980. The circumstances are accurately summarized by the Staff in their proposed findings 76 and 77, which we adopt, as follows: "Mr. Hoopingarner was removed from service (a Duke practice when an employee is accused of an offense that could lead to termination), by Mr. Cantrell, his supervisor at the cooling towers, for failure to follow instructions -- talking to a welder when he should have been working. Dick, Tr. 5544; Hoopingarner, Tr. 8029; Palmetto Ex. 94, Hoopingarner, pp. 19-20. It was subsequently determined that Mr. Cantrell's action was not justified, and Mr. Dick directed that Mr. Hoopingarner be returned to service. Dick, Tr. 5491, 5496."

48. "R. S. Alexander, site personnel manager, called Mr. Hoopingarner on Friday evening, to return to work the next Monday, Alexander, Tr. 7511-12, 7515; Dick, Tr. 5493. On that Monday, Mr. Hoopingarner did not return, and was again called by Mr. Alexander and informed that he should return. Hoopingarner, Tr. 8034; Palmetto Ex. 94, Hoopingarner, p. 20. However, Mr. Hoopingarner, on the advice of his lawyer, did not return to work until Wednesday morning, at which time he was again taken out of service, this time for having three unexcused absences -- one in July 1980 for failure to secure permission to stay out of work after he had a dentist appointment, and the two days he had not returned in accordance with Mr. Alexander's instructions.

Palmetto Ex. 94, Hoopingarner, p. 20; Alexander, Tr. 7523-4. The determination this time was to terminate Mr. Hoopingarner for having three "rules of conduct" violations based on unexcused absences on three different days. Dick, Tr. 5500; Alexander, Tr. 7521. Again, Mr. Dick participated in this decision. Dick, Tr. 5500."

49. Palmetto contends that Mr. Hoopingarner's firing was in retaliation for raising safety concerns, particularly with the NRC. PFF 236-237. We reject that contention. If anything, his supervisors at the site (with one exception, see ¶¶ 34-37, above) bent over backwards to allow Mr. Hoopingarner opportunities to voice concerns to them and to the NRC. The idea that Mr. Hoopingarner, with his limited expertise, could be viewed by Duke as a source of difficulties for them with the NRC -- particularly with a knowledgeable resident inspector scrutinizing the same site -- is not credible. Nor is it credible that Duke wanted to deter other employees from following Hoopingarner's example. The widespread hostility Mr. Hoopingarner brought upon himself by his activities certainly would have discouraged imitation.

50. We find that Duke had at least a colorable basis for firing Mr. Hoopingarner for his unexcused absences, and that the absences played a part in the firing decision. Some 200 other Duke employees were terminated for unexcused absences in the period 1979 - 1981. Alexander, Tr. 7603. The circumstances of Mr. Hoopingarner's last two absences were somewhat unusual, however, in that they were for consecutive days and were apparently incurred on advice of counsel. We share with

Palmetto (PFF 104) some doubt whether an otherwise valued employee would have been fired by Duke in the same circumstances.

51. We conclude that, apart from the unexcused absences factor, the unstated reason for Mr. Hoopingarner's firing was his well established pattern of unusual and disruptive behavior on the job. That Mr. Hoopingarner purported to be interested in nuclear safety is irrelevant. He could have achieved similar disruptive effects by talking politics or religion. It was his pattern of neglecting his assigned work and accusing co-workers and supervisors of various wrongs that caused the trouble. Duke, as an employer, is entitled to a day's work for a day's pay and a reasonable degree of harmony in its work force. We find on this record that Duke was fully justified in firing Mr. Hoopingarner for failing to meet those standards.

52. We do not mean to imply that a concerned employee should not have reasonable opportunities to raise concerns with the NRC, including during working hours. We need not define what is "reasonable" in this context, except to note that Mr. Hoopingarner went well beyond any reasonable standard.

53. We have considered the statements of in camera Witness 3 which tend to corroborate some of Mr. Hoopingarner's contentions. Witness 3 Affidavit at pp. 7-11. We question Witness 3's credibility in these respects. We note that he, like Mr. Hoopingarner, was fired by the Applicants and thus may be biased against the company. Id. We also note that Witness 3 chose to confirm some of the least credible parts of Mr. Hoopingarner's testimony. Id., p. 10, first and second full

paragraphs. In any event, even if Witness 3's statements were to be considered credible, they are far outweighed by the mass of contrary evidence we have already discussed.

III. The In Camera Witnesses

A. Witness 1.

1. Introduction. Witness 1³⁹ raised seventeen concerns in his initial in camera testimony. I.C. Tr. 46-130. The Board later granted motions to strike thirteen concerns. I.C. Tr. 481-486.⁴⁰ As to the remaining four concerns, we denied the motions to strike. The testimony was not retained for its specifics, however, but merely to show the underlying bases for the following Board questions:

Witness 1 expressed concerns about out-of-roundness, wall thickness, fit-ups, and stress induced by bending pipes in the safety-related sprinkler system of Unit Number 1.

Assuming these concerns are well founded, how would the functional use and structural integrity of that system be affected under adverse conditions? What corrective action, if any, is required for the safe operation of the plant? I.C. Tr. 482.

2. The Board decided not to recall Witness 1 to testify because most of his prior testimony had related to non-safety matters and his testimony generally had been quite non-specific. The Applicants subsequently presented a panel of nine persons, including six engineers,

39 We designate this witness and a subsequent witness as witnesses "1" and "3" in order to keep their identities confidential. Their identities are disclosed in the record of the in camera proceeding. Participants in that proceeding are subject to a protective order barring disclosure of witness identities and other confidential information.

40 The matters referred to in Palmetto's proposed finding 552 were stricken and we therefore disregard that proposed finding.

to address the Board question. The other parties and the Board cross-examined the Applicants' panel.

3. Out-of-Round Piping. Witness 1 testified that piping he worked on in the annulus of reactor building 1 was "out-of-round" or egg-shaped on the inside so that it would have to be ground or deformed for a proper fit. I.C. Tr. 21-23. This testimony underlies our concern whether "out-of-round" pipe could raise a safety question with respect to the containment spray system.

4. The containment spray system is designed to reduce containment pressure in the event of a loss-of-coolant accident. The system piping is about 8" in diameter. The piping is to conform to the ASME Code, which includes quality limits. The pipe for the spray system must be bent to match the dome curvature. The bending produces ovality, which is also addressed by ASME requirements. App. Ex. 95, Ray, et al., pp. 4-5. Ray, Barnes, Williams, I.C. Tr. 606-609.

5. The Board agrees with and adopts the Staff's proposed findings 15-17, 19-20 on this subject, as follows.

6. "ITT Grinnell, the pipe fabricator which does the bending of pipes for Duke, is ASME-authorized and holds an NDT stamp, signifying that it is ASME-certified for such work. Ray, I.C. 624. Applicants' review of their vendor audits of Swepco and ITT Grinnell revealed no QA problems with either company regarding piping specifications. Ray, I.C. 722-23. In addition to vendor audits, Duke conducts a receipt inspection of this piping, and prior to use of the piping there are QA fit-up and QA welding inspections. App. Ex. 95, Ray, et al., p. 6."

7. "The ovality of piping is of concern to the structural integrity of the containment spray system in fitting up the ends of piping and welding them together to ensure the piping is properly sealed against leakage. Ovality may be adjusted by the craft to within allowable tolerances by use of Dearman clamps and hand pressure, as specified by the ASME code. Barnes, I.C. 668-670; App. Ex. 95, Ray, et al., p. 7. The restraints induced in the pipe due to fit-up and the adjustments of ovality by force would induce secondary stresses in the pipe wall but would have no effect on the primary stress levels in the pipe. These secondary stresses would be reduced by the heat of welding and any remaining locked-in secondary stresses would not affect the ability of the pipe to perform its intended function. App. Ex. 95, Ray, et al., p. 12."

8. "Review of the pertinent QA documents, including weld tickets, mill test reports for heat numbers in the systems and all M-4A's for welds in this system, did not reveal any ovality of piping in this spray system beyond the specification. Shropshire, I.C. 704-707."

9. "Even assuming excessive ovality of piping and some turbulence in the flow of water through the system, there would be smooth transition of the flow down to the point of maximum ovality and such turbulence would not induce vibrations in the piping which might lead to rupture of the pipe. Barnes, I.C. 730-731. Since the concern with ovality in piping is in sealing the pipe against leakage, this would be significant in situations where piping is screwed together, since there would be no way to seal such piping. However, when pipe is welded

together, it is the weld that seals the pipe against leakage and ovality is not significant in this situation. Ingram, I.C. 738."

10. "Since applicable codes permit both ovality and the correction of ovality within certain limits, and ovality itself does not interfere with the functioning of the containment spray system except insofar as it might prevent completion of adequate welds to seal the pipe, the Board finds that, given the requirement that all safety-related welds be subjected to at least fit-up and final visual inspection, there is reasonable assurance that the structural integrity and function of the containment spray system will not be adversely affected by out-of-round pipes in the system. Consequently, there is no corrective action required for the safe operation of the plant."

11. Palmetto's proposed findings on this subject (PFF 555-557), are of the speculative "what if" variety and raise no substantial concerns. Palmetto presented no contrary evidence.

12. Pipe Wall Thickness. Witness 1 expressed concerns that excessive grinding of welds on the containment spray system might have reduced pipe wall thickness below minimum specifications. The piping actually in the system has thicker wall than the piping assumed in the analysis, thus, building in a margin of safety. App. Ex. 95, Ray, et al. p. 8.

13. Excessive grinding would be detected by required visual inspections and, if found, an ultrasonic examination is done to check wall thickness. Barnes, I.C. Tr. 612-613. In addition, radiography examinations are performed on all welds in this system and that process

would also indicate any excessive grinding. Cavendar, I.C. Tr. 610; App. Ex. 95, Ray, et al., p. 8.

14. The Staff provides a helpful summary of the results of certain inspections, as follows (PFF 2F'

Applicants' review of the M-4A documentation on welds did reveal three welds that were repaired for wall thickness violations, all of which were discovered either through radiography of the welds or in the final walkdown visual inspection. Shropshire, I.C. 708. Additionally, some M-4A's indicated that minimum wall thickness was questioned and the UT inspection report check forms found these to be acceptable. Shropshire, I.C. 711. NCIs were generated for any violations of wall thickness that were identified and the items were subsequently corrected. Shropshire, I.C. 713-15.

15. Palmetto's several criticisms of the Applicants' showing are not persuasive. We comment on two. First, Palmetto complains that the Applicants refused them any informal discovery on the wall thickness issue. PFF 558. Without implying any view on the merits of any informal discovery disputes, we note that Palmetto is raising this complaint for the first time in its proposed findings. It should have been raised between Witness 1's first appearance on November 8, 1983 and the hearing on his concerns on December 15, 1983.

16. Palmetto incorrectly states that "The Applicant offers no proof that such radiography is in fact done, nor that it is required for all welds on this system." We read the sworn statements on lines 12-15 of Applicants Exhibit 35 as addressing these points.

17. In view of the foregoing, the Board finds that Witness 1's concerns about thin-walled pipes are unfounded.

18. Fit-Up Inspections. Witness 1 testified that a fit-up inspection did not occur in connection with a particular weld he described in the containment spray system.

19. The Applicants conducted a records review and identified the weld in question. Although it appeared that a fit-up inspection had been performed, the question became academic because the weld was later replaced. As the Applicants explained, "In any event, weld record form M-4A for weld INS125-4 further states that because of unacceptable lack of penetration discovered by radiography, the entire weld was cut out on 8/25/80 and remade. All subsequent inspections, welding and NDE steps on the weld record appear proper, and the weld radiographs were accepted by Duke on 9/30/80 and by the Authorized Nuclear Inspector on 9/24/80. In addition, the weld joint was hydrostatically tested to 300 psig on 8/28/83." App. Ex. 95, Ray, et al., p. 9.

The Board accepts the Applicants' explanation.

20. "Cold Springing". Witness 1 expressed concerns about "cold springing"--i.e., bending pipes to make a particular fit using chain jacks or "come-alongs."

21. Procedures in effect at Catawba provide that any more than moderate hand pressure must be done under controlled conditions. Review of the containment spray system records did not indicate that any cold springing had occurred. App. Ex. 95, Ray, et al., p. 10.

22. The only place in the containment spray system where cold springing would be at all likely to happen would be in the ring headers at the top of the dome. Sections of pipe were cut out in those areas

and the pipes had not sprung out of alignment. Id., p. 11; Ingram, I.C. Tr. 700.

23. In addition, the Applicants stated that "discussions with many of the fitters and foreman associated with erection of the system reflects that there was no cold springing . . ." Id. Palmetto complains (PFF 564) that none of these "foremen and fitters" were advanced as witnesses. There is no merit in this complaint. The Applicants did produce a panel of nine knowledgeable witnesses on Witness 1's concerns. It would have been completely impractical (as well as unnecessary) to bring in an additional number of workers to testify on the narrow point involved. Most of the panel members on the in camera concerns were middle level professional and management people. However, where it was particularly important to hear the testimony of craft workers or inspectors or lower level supervision, the Applicants produced those people.

24. The Board concludes that there is no basis for concerns about "cold springing" in the Unit 1 containment spray system.

25. The Board also asked whether, assuming Witness 1's various concerns were well founded, such concerns would have adversely affected the functional use or structural integrity of the containment spray system so as to threaten the safe operation of the plant. The Applicants answered that question in the negative, setting forth a technical basis for each concern, and the Staff basically agrees. Staff PFF's 41-42. With one exception, noted below, Palmetto did not contest

this point. The Board finds the Applicants' technical positions to be reasonable and well supported, and accepts them without repetition here.

26. Palmetto faults the Applicants for failing to explore the "clear generic implications" and "potential generic consequences" of the "defects which have been observed." This criticism is not valid for two reasons. First, the Board upon its consideration of the evidence has not found any "defects" from which "generic implications" might emanate. Second, the criticism implies that the Applicants were supposed to embark on a research program extending to all parts of the plant. But this issue was bounded by the Board's question, which spoke only to the containment spray system in Unit 1.

27. Palmetto's proposed findings 569-577 are an extended critique of portions of NRC Staff Report Nos. 50-413 and 414/80-03 concerning several subjects, including Witness 1's containment spray system issues. We find it unnecessary to address these points because, as we shall explain, we do not consider those portions of this report to be a part of the record or to be necessary for a proper decision of those issues.

28. After we heard the Applicants' case on the containment spray concerns, we entertained a Palmetto motion that the record be held open on those concerns pending receipt of a Staff report. The Staff opposed the Palmetto motion, arguing that a Staff report on those concerns was not necessary. I.C. Tr. 1206. Thereafter in our Order of December 30, 1983, we denied the Palmetto motion and formally closed the record on the containment spray concerns. Staff Report 84-03 was prepared in January 1984 and introduced as Staff Exhibit 26 at the final hearing

session on the five remaining in camera subjects. It deals with three of those subjects and also, in part, with the containment spray system. The Staff offered the report as relevant to the subjects before the Board, not mentioning its discussion of the containment spray subject. Tr. 12272. However, the Staff also said that it intended to "offer the entire inspection report" (Tr. 12272) and we later admitted the report and an associated appendix of interview summaries without limitation. Tr. 12319.

29. As a result, the present record is somewhat murky as to the status of the containment spray portions of Staff Report 84-03. Under all the circumstances, however, we think our intentional closing of the record on the subject was correct and should control. In the interest of clarity, we now determine that the containment spray portions of Staff Report 84-03 and related interview material in the appendix are not in the record for any purpose.

B. Witness Nunn.

1. Introduction. Howard Samuel Nunn, Jr., a former Duke welder, first appeared before the Board in camera in response to the Board's invitation to appear as a Board witness (Nunn I.C. Tr. 153-294). He subsequently filed two affidavits (dated 11/16/83 and 1/24/84). In the second affidavit Mr. Nunn expressed his desire for his testimony to be in the public record.

2. Mr. Nunn worked mainly as a weld repairman (Affidavit, 11/16/83, p. 6). He impressed the Board as a sincere and candid witness. Mr. Nunn raised eight issues (Nunn I.C. Tr. 153-294 and Nunn Affidavit, 11/16/83). In response to motions by Applicants and Staff, the Board struck four issues (I.C. Tr. 12/8/83) and retained the following: laminations, accuracy of radiographs, TIG wire, and "foreman override".

3. Laminations. The Staff's description of laminations in steel plate in their PFF 48 is accepted. "Laminations in steel plate are non-metallic inclusions made up primarily of residues from additions which are made to liquid steel to improve the product by reducing the oxygen content and refining the grain during the fabrication process. Staff Ex. 22, p. 3. Molten steel is poured into a mold for solidification into an ingot, which is then rolled to reduce the ingot to plate. During this process, very small amounts of air or gas can be trapped in the mold and the inclusions then form flat planes inside the plate. It is these inclusions which are referred to as laminations. The rolling process used to shape structural steels produces the

greatest strength and ductility in the longitudinal and transverse directions, which are most important to structures. Laminar discontinuities usually reduce the ductility of the material in the through-thickness direction. Staff Ex. 22, p. 3. Laminations are inherent in rolled plate. App. Ex. 110, McConaghy, et al., p. 5; Economos, Tr. 12,154."

4. While repairing welds in Reactor Building 1, Mr. Nunn found laminations in a piping penetration sleeve. Mr. Nunn was concerned because it is difficult to make a proper weld in the presence of laminations and repeated repair of these welds is sometimes necessary. Construction Procedure (CP) 88 requires the welder to grind out the lamination and fill the ground out area with weld metal. Mr. Nunn described the special care he took to make a proper weld when he was called on to make repairs. "Mr. Nunn's concerns were heightened when the Authorized Nuclear Inspector (ANI), Mr. Koskro⁴¹ expressed concern to Mr. Nunn that use of CP-88 did not solve the laminations problem, but only covered it up. These events caused Mr. Nunn to doubt the integrity of the steel itself. I.C. 154-167, Affidavit, pp. 7-15." Staff PFF 46.

5. The Staff notes (PFF 47) "... that Mr. Harry Langley also expressed a concern regarding laminations, specifically, a lamination which appeared during repair of a gouged spot on containment plate where

⁴¹ Mr. Nunn originally identified the spelling of Mr. Koskro's name as "Cosgrove", I.C. 152, and subsequently corrected this, Tr. 12,185.

the knuckle plates come up on the outside of the wall. This was on the second level, Stiffeners 18 and 19. That concern is addressed herein as well."

6. The Board accepts Staff's PFF I.C. 48-58, as follows: "The steel in the containment plate is 3/4" steel and is fabricated in accordance with ASME requirements. Staff Ex. 22, p. 2. The ASME requirements state that laminar indications on a plate edge which are 1-inch or less in length are acceptable without repair. App. Ex. 110, McConaghy, et al., p. 5; Staff Ex. 22, p. 2. This is so because laminations are of significance only when they are subjected to loads which would cause them to open, specifically, through thickness tensile loads which would produce stresses perpendicular to the plane of the lamination. However, the loads which produce stress in the containment plate at Catawba are parallel to the surface of the laminations. App. Ex. 110, McConaghy, et al., p. 6; McConaghy, Tr. 11,959-960; Staff Ex. 22, p. 3."

7. "The dominant stress loading on the containment structure results from internal pressures, the dead weight of the vessel itself, and the dome. The resulting loads are radial and longitudinal. McConaghy, Tr. 11,958. The only place in the containment where the tensile load on the plate would be affected by the presence of laminations is in the bottom of containment. Hence, the plate used in this area was ultrasonically examined to assure no unacceptable laminations were present. App. Ex. 110, McConaghy, et al., p. 6; McConaghy, Tr. 11,966-67. The only other through-thickness loads which

would be applied to the containment vessel shell would be attachments to the wall, such as some cable tray systems, some piping systems, and some minor platforms and hoists which are supported from the containment vessel proper. McConaghy, Tr. 11,972. These attachments are controlled administratively and the design analysis has established what would be acceptable attachments. McConaghy, Tr. 11,974. The Staff also testified that the type of hangers and structural members being attached to the containment liner plate would not be cause for concern. Economos, Tr. 12,077."

8. "Laminations are of concern in the welding process. This is so because the heating and cooling can open the lamination, thus admitting slag which would then show as a defect in the radiograph of the weld. Llewelyn, Tr. 11,968; Economos, Tr. 12,143-44. Hence, the Applicants developed Construction Procedure 88 (CP-88) which directs grinding and sealing of the lamination prior to welding to deal with the issue with regard to the containment plate. For welding of penetration sleeves, the Applicants have a similar process which is documented on Form F9B. App. Ex. 110, McConaghy, pp. 6-7; Ruth, Tr. 11,999".

9. "The defect that would show in the radiograph of a weld that did not seal the laminar indications would not be a matter of structural concern, but would be of some concern since it could mask an important defect, such as a lack of fusion. Barnes, McConaghy, Tr. 11,969-71; Economos, Tr. 12,079-81."

10. "The specific weld that aroused Mr. Nunn's concern over laminations was fully documented and approved by both QA and the ANI

representative. App. Ex. 110, McConaghy, et al., p. 7. Mr. Nunn, in fact, testified that he was able to satisfactorily repair this weld. Nunn, Tr. 11,186-88. Further, the Staff investigation of this concern revealed that the laminations in the weld preparation surface of the containment penetrations were repaired consistent with code requirements. Staff Ex. 22, p. 3; Economos, I.C. 150-52."

11. "Mr. Langley also reported an instance where the outside containment wall was gouged and the repair was hampered by the presence of laminations. Mr. Langley attempted to write an NCI on this; instead it was repaired using a construction procedure and the defect was removed. Langley, Tr. 6844, 6862, 6897. We should note here that Mr. Langley's concern was related to the correct documentation for the repair, rather than a concern about the existence of laminations. Id."

12. "The steel used in the containment is supplied by Phoenix Steel and is certified to the ASME code, Section 2. Ruth, Tr. 12,002, 12,006. Vendor audits did uncover two minor mistakes in the vendors' own internal audit procedures, but did not find any significant deficiencies. Akers, Tr. 12,023-25. The Staff witness, Mr. Economos, also testified that the quality of the steel at Catawba is similar to steel at other locations and, based on his extensive experience of over twelve years in the steel manufacturing process, the steel in the Catawba containment is satisfactory for this application. Economos, Tr. 12,074-77."

13. "Mr. Nunn also raised a concern regarding a 3/8-inch deep pinhole in a vendor weld where the stub of pipe was welded into the

containment wall. He testified that he pointed this out to his foreman and a QC inspector, but he believed this weld received no documentation for repair. Affidavit, p. 15; I.C. 234-235. Applicants' witnesses testified that this pinhole in a vendor weld was a weld joining a shroud support ring to the stub end of a piping penetration covering a bellows assembly, and this did not form a portion of a pressure retaining boundary. App. Ex. 110, McConaghy, et al., p. 8; Rudasill, Tr. 12,018. As a result of the Applicants' investigation of this concern raised by Mr. Nunn, it was found that this repair was not, in fact, properly documented initially, and NCI 17,511 (Palmetto Ex. 135) was written and the weld was replaced with appropriate documentation accompanying the repair. Shropshire, Tr. 12,020-22. It should be noted this weld was fully qualified even before the repair, but the Applicants took action to correct the lack of proper documentation in removing and rewelding the item with strict adherence to the ASME Code requirements. Shropshire, Tr. 12,022."

14. "Of primary concern to the Board was whether laminations in the steel plate in the containment would adversely affect the strength of the vessel in an accident environment. Tr. 11,965, 11,971, 12,048-9. However, testimony by both the Applicants and the Staff demonstrates that the stress loading on the vessel would not be affected by laminations. This is so because the containment is designed to yield in a membrane state, stretching like a balloon, and the loads that flow around the laminations are uniformly carried across the containment plate. McConaghy, Tr. 11,959-60."

15. "The Staff summary of investigative interviews revealed two other welders who had, in fact, come across laminations in the pipe sleeve penetrations in the containment, but neither of these welders found the material itself defective and both reported the laminations were repaired according to procedures. Staff Ex. 27, pp. 11, 20."

16. Palmetto reviews this testimony in its Supplement to PFF (4/6/84), pp. 4-13. However, the Intervenor fails to address most of the expert testimony in laminations. In addition to the Langley and Nunn testimony, Intervenor refers to testimony of welding inspector Irby. Irby's concern, however, was about surface pitting -- not laminations. That concern was investigated by the Technical Task Force. See ¶ IB 139, above. Palmetto did not propose any timely findings of fact on the Irby concerns.

17. We can appreciate Mr. Nunn's concern about the difficulties welders experience in making proper welds where laminations are encountered. Mr. Nunn's own testimony, however, indicates he took special precautions to make proper welds under these conditions. The testimony on this issue also indicates that the QA program at Catawba was effective in the identification, evaluation and correction of laminations. Although Mr. Nunn is a skilled welder, he is not a qualified engineer or metallurgist. The Board is also reassured by the expert testimony that laminations in steel at Catawba is within acceptable limits.

18. Radiography. The Board accepts Staff's PFF 60 and 62-69 as accurate. "The second issue which Mr. Nunn raised as a concern in connection with the quality assurance/quality control program at Catawba was his experience with radiography of welds. The welds Mr. Nunn was responsible for repairing in Reactor Building 1 were routinely radiographed after completion in order to determine whether any defects exist in the welds which might require further repair. X-rays are taken of the welds and if a defect is found, the welder is given a tracer to overlay on the weld to show the location of the defect for repair. Mr. Nunn testified that on several occasions the tracer he overlaid on the weld did not show the defect in the correct position, but would be off by several inches, or showed defects not appearing on the previous overlay. Thus he questioned the competency of the radiography department at Catawba. Affidavit, pp. 17-19; I.C. 171-175."

19. "The Applicants presented several possible explanations for why Mr. Nunn may not have found indications of a weld defect where it had been previously, or found a defect in a different location. One possibility was that the defect was removed in the repair process, since, when a welder cuts into a weld using an air arc to remove an identified defect, he possibly will remove the metal so quickly that some defects may be removed before he sees them. Also, when blending out a smooth repair area, he might find a small area of porosity or slag that he might consider a defect, but due to its size, such potential defect may be acceptable under the Code. App. Ex. 97, Cavendar, et al.,

p. 6. Indeed, Mr. Nunn himself describes this repair process in his testimony. I.C. 171."

20. "A second possibility is that in the actual preparation and use of the tracing based on the radiographs, the observed location of the defect may shift. When a tracing of the radiograph is prepared, the interpreter shows the location and nature of the rejectable defect by referencing it to location numbers around the circumference of the weld. The welder must align the location numbers on the tracing to the corresponding locations on the weld which were marked during radiography carefully, since failure to accurately align the location numbers and weld configuration can result in improperly marking the defect location on the weld. App. Ex. 97, Cavendar, et al., p. 7."

21. "A third possibility is that the geometrical relationship between the source used in the X-ray (radiograph), the defect and the film can result in the defect location on the tracing being displaced from the actual defect location on the weld circumference. App. Ex. 97, Cavendar, et al., p. 7."

22. "The Staff confirmed that in certain instances weld overlays (tracers) may not depict accurately all indications within a certain area of the weld. This may be attributed in part to technique, angle of exposure, type of indication (defect), and its location/orientation. Staff Ex. 26, p. 8."

23. "The Staff reviewed the radiograph packages of approximately 26 safety-related welds in its investigation of this concern. Radiographic reader-sheets used by film interpreters to document findings were

reviewed and evaluated for evidence of possible errors in identifying defects, their location and code compliance. This review indicated that the locations of weld defects as depicted on the overlays were accurate. The Staff's review did not show any evidence of discrepancies in interpretation, documentation and/or code violations. Staff Ex. 26, p. 8."

24. "In addition to the document review done by the Staff, welders were selected at random for interview and were asked for their assessment of the accuracy/reliability of film overlays to detect weld defects.⁴² Most welders interviewed did recall isolated instances where a radiograph of a repair would show an indication not previously identified in a prior radiograph, but stated their understanding that this was possibly due to different angle shots and techniques used in radiography. The majority expressed confidence in the accuracy of the overlays and the competence of the radiographers." Staff Ex. 26, p. 8; Staff Ex. 27, pp. 3, 5, 6, 7, 10, 11, 12, 13, 14, 15, 18, 20, 22, 24, 25."

42 "As part of the technical investigation of the concerns raised by the in camera witnesses, the Staff selected a number of welders to interview, on the basis of what systems they worked on and, from a pool of fifty to sixty, selected a random sampling. Economos, I.C. 1288-90, 1320. Based on the results of the interviews with the welders sampled, the Staff determined [and the Board agrees] that since no trend developed, there was no warrant for further expansion of the scope of the investigation. Economos, I.C. 1315."

25. "The witnesses for the Applicants testified that it is easy to misalign a tracer (overlay) on a weld by $\frac{1}{2}$ inch. Rogers, I.C. Tr. 866-67. In fact, Mr. Nunn himself testified that in laying the tracer on the weld he 'had to go an inch, an inch this side -- this way, where the line had been marked; because I know depending on the angle that they shot them at, that it could be just a little bit off.'" Nunn, I.C. 916.

26. "Additionally, the Applicants' witnesses testified that the code requires complete coverage of a weld to be shown via radiographs, and once a repair is made it is re-radiographed and this process continues until the weld shows no defects." Cavendar, I.C. 879-881.

27. Palmetto, in its Supplemental Proposed Findings, p. 27, alleges that radiography is used "as a weapon to overrule the rejection decisions already made by welding inspectors to approve questionable workmanship." They cite four examples involving welding inspector Bryant to support this charge. (Intervenor Supp. PFF 46-48.) Bryant's concern D-15 does not seem to involve radiography. See ¶ IB 31, above. Reexamination of the radiograph resulted in finding concavity in D-30. See ¶ IB 8, above. D-27 was a case where a Level III inspector overruled a Level II inspector on the basis of judgment after visual inspection and radiographic evaluation. See ¶ IB 24, above. D-22 reflects that a "minor" weld defect was accepted after redoing of PT examination and later by leak test. See ¶ IB 6, above. None of the cited concerns support the thesis put forth by Palmetto.

28. It is not unusual for repeated radiographs to show differences because of variation in location or angle of the shot. Furthermore, there are several possible reasons why a welder could have a problem locating a defect from the radiograph. These experiences do not in themselves necessarily reflect on the competence of the radiography department. While other welders reported some similar problems, the Staff investigation found that these welders seemed to generally have confidence in the competence of the radiography department. Therefore, Mr. Nunn's concerns notwithstanding, the Board finds no sufficient reason to question the competence of the radiography department. The testimony indicates that defective welds were repaired and inspected, repeatedly if necessary, until corrected.

29. TIG Wire. The tungsten-inert-gas stick welding process is known as "TIG" and weld filler material used in the process is "TIG wire" (I.C. Tr. p. 149). Mr. Nunn reported problems with one batch of TIG wire that sputtered when used and tended to create excessive porosity (I.C. Tr. 176-80, 203-04, 247-53) He also referred to similar problems with 3/32 stick rods (electrodes). (PF # 592, p. 288 to # 594, p. 290.) Intervenors assert that bad weld rods were used and that the welder's understandings of what to do with bad TIG wire varied (PFF 592-594 and Supp. PFF pp. 19-23).

30. The Staff has adequately addressed this concern in Staff's PFF 72-76. "Investigation of this concern by both the Applicants and Staff confirmed that one batch of TIG wire did appear to have a black streak or scoring under the protective coat on this wire. However, this wire

was tested by actually welding with it and the welds thus produced were subjected to NDE examination and no defective welds were produced using this material. App. Ex. 96, Rogers, et al., p. 8. The Staff review of welds done with this particular TIG wire revealed that welds fabricated with this material were of sound quality, as evidenced by their radiographs. Staff Ex. 26, pp. 5, 7."

31. "The Staff investigation found that the material in question met minimum chemical and mechanical properties required by the applicable code. Staff Ex. 26, p. 7. The filler material was checked at the issue station and even though the wire tested proved acceptable, instructions were issued to welders directing them to discard any wire believed to be defective and use other wire. Rogers, I.C. 804-806."

32. "With regard to the flux problems, again analysis gave no indication that the electrodes would not meet code requirements. However, since minor chipping of the flux on the striking ends of some electrodes was occurring, all were examined visually and those with irregularities were removed from service. App. Ex. 96, Rogers, et al., pp. 8-9."

33. "The Staff investigation revealed the amount of inclusions found in a random sample of safety-related welds done with this material was consistent with this type of material, weld thickness and

process....⁴³ A majority of welders interviewed in connection with the Staff investigation admitted having some problems with defective weld filler material, but none of them reported knowledge of any defective welds caused by use of this material. Staff Ex. 27, p. 2. Rather, when defective filler material was identified by a welder, it was discarded. Staff Ex. 26, p. 7."

34. "A vendor audit conducted by the Applicants in connection with the electrode flux problem found no deficiencies in the vendor's QA program. Roy, I.C. 817. Welders also had standing instructions to check filler material that was issued to them, and to discard any material that they had cause to doubt. Rogers, I.C. 795-96, 778-780."

35. The testimony reveals that some welding material used at the Catawba site had some irregularities or imperfections. The problem appears to have been mainly with a particular batch of TIG wire. Problems noted with electrode flux appear to have been isolated events. The TIG wire problems were reported, investigated, and instructions were issued on actions to be taken.

36. The Board does not find these events to reflect a general breakdown in quality control of welding material. The wire in question may have slowed work or resulted in waste by welders discarding

⁴³ The deleted sentences state that there was "... no evidence ... any defective pieces used to fabricate safety-related welds." Palmetto contests that statement (I.C. PFF 36-38), citing equivocal evidence. Assuming that a few bad welds might have been made with defective TIG wire, they should have been detected in inspections.

questionable material, but there is no indication any defective welds were accepted. One could also wonder why all the defective TIG wire was not recalled and discarded. While Mr. Nunn testified that the defective TIG wire was used, he was able to produce satisfactory welds in spite of the difficulties encountered in its use (I.C. 901-903, 921, 936).

37. Intervenors would have us find a violation of 10 C.F.R. 50, Appendix B, Criterion XVII. Because no records were kept of the craft test welding with the TIG wire questioned by Mr. Nunn (Palm. I.C. PFF 36, p. 21), we are dubious that Criterion XVII is meant to apply to this situation, i.e., a trial welding by craft with material previously accepted under required procedures. If a violation at all, it would be very low level. The Staff appears to be of a similar view since they make no references to a potential violation of this criterion in its concluding I.C. PFF 78 (or preceding supporting paragraphs, I.C. PFF 71-77). Rather, Staff finds this series of events evidence of an effective QA program (I.C. PFF 58). The Applicants assert that there were no procedural requirements or records to be kept and no reason to do so. (I.C. PFF 65.) The Board agrees with the Staff and Applicants and we reject Intervenors I.C. PFF 36.

38. "Foreman Override". Mr. Nunn stated that welder foremen would order welders to do work in a manner contrary to prescribed procedures or to the welder's ideas of correct welding. (I.C. Tr. 181-6, 193-5, 204, 254-8, 267-8, 283-7, 289-90). These concerns came to be referred to collectively as "foreman override". Specific incidents were listed by the Applicants (fn 10, p. 45, Appl. PFF), as follows:

- "1. He alleged that his foreman told him to finish his welds so that they looked more uniform, despite the fact that Mr. Nunn did not believe that this had anything to do with the adequacy of the weld.
2. He alleged that a fellow welder, Mr. Henry, told Nunn that Henry's foreman pressured Henry to finish one weld using a certain weld rod that was inappropriate. The witness alleges that Henry further stated that the weld was rejected, Henry's stencil was pulled because of this rejection, and he was unjustly forced to recertify.
3. Mr. Nunn alleged that another welder, Mr. Young, stated to Nunn that Young was forced by his foreman to weld one Class G weld despite the fact that the fit-up was unacceptable, and because of the poor fit-up, the one weld was rejected. He alleges that Young told him that his stencil was pulled because of this one rejected weld and Young was unjustly forced to recertify.
4. Mr. Nunn alleged that one other welder, Mr. Pay, attempted to cover up defects in a weld because he was afraid of foreman pressure.
5. Mr. Nunn alleged that his foreman, Mr. Rudasill, attempted to pressure him to tack weld fit-ups on 2 inch schedule 80 stainless steel pipe for Mr. McKenzie's crew in the Unit 2 Reactor Building without proper paperwork present.
6. Mr. Nunn alleged that welding foremen inappropriately approved welds on construction hangers (which he stated are at times safety-related) in order to increase production."

39. A Staff investigation of these concerns reported "... that while some individuals may have held their foreman in relatively low esteem in terms of qualification and ability to manage the crew this was not pervasive and may have been a personality problem. The vast majority of the craft interviewed spoke very highly of their past and present field supervisors (foremen)." (Staff Ex. 26, p. 5). The Staff notes that (Staff PFF 80) "... the Applicants testified that they uncovered no instances where the foreman sacrificed quality, and that if the piping (welding) schedule was falling behind a deadline, extra crews

were put on for two shifts. App. Ex. 112, Rogers, et al., p. 5; Wilson, Tr. 12,229-30."

40. The Board sees nothing improper in a foreman asking a welder to finish welds to make them look better even if the welder does not think it necessary.

41. We accept the Staff's account of the Henry, Young and Ray incidents. Staff PFF 83, 84. "The incident with Mr. Henry, as recounted by Mr. Nunn, concerned an instance where Mr. Henry was told to use the 1/8 rods that he had at hand, rather than going to the rod issue shack to get 3/32 rods. The 1/8 rod was said to be too large a diameter for the job at hand, and the result of using improper material on this weld was that the weld proved to be defective. Mr. Henry lost his certification as a welder and had to re-test, because a foreman told him to work with the wrong materials. Nunn, I.C. 184-86, 246."

42. "Mr. Henry testified at the hearing that the machine he was using was defective, preventing him from obtaining the proper heat for the weld. He did not inform his foreman at the time, however, that the machine was defective, but he did report it later. He retested and his certification was returned. Henry, Tr. 12,232-36, 12,244."

43. This incident shows the Board that defective work was caught and appropriate action taken. Thus the QA program was working; although the foreman may have been as much to blame for the defective weld as the welder.

44. The incident involving Mr. Young concerned a weld he had made two years previous to the actual incident. According to Mr. Nunn, Mr.

Young had done a weld at a fit-up on the night shift that was not properly put together. Two years later a defect in the weld was discovered when the line was cut open to install a valve. Mr. Young was required to retest to keep his certification. Nunn, I.C. 185, 256. Mr. Young testified, however, that the incident did not occur as Mr. Nunn had related it. He was not on the second shift when the weld was originally made. Young, Tr. 12,243. The weld was bad due to a 1/8" excessive penetration and he did re-test to certify his ability to continue welding. Young, Tr. 12,236-39, 12,244." Staff. PFF 85. Again, this incident demonstrates to the Board a QA program functioning properly.

45. Mr. Ray had a problem with his stick rod. "According to Mr. Nunn, due to foreman pressure, Mr. Ray continued welding with the defective rod, causing an improper weld that had to be redone. I.C. 257-8. Mr. Ray testified at hearing and stated that while welding on a structural hanger, the foreman he was working for was dissatisfied with Mr. Ray's work and required him to re-test, that is, run a practice coupon. When he returned, he ground the weld and had it inspected, but he was not pressured to do the weld improperly by the foreman. Ray, Tr. 12,241. Mr. Ray also stated that while his foreman did challenge him by stating Mr. Henry was doing better, he regarded this as encouragement to improve, rather than pressure to do inadequate work. Tr. 12,246-7." Staff PFF 86.

46. We accept the Staff's description of Mr. Nunn's concerns about paperwork and foreman OK in PFF 81-82 and Staff's investigation in PFF

81, 82, 87 and 88 (in part). "With regard to the instance concerning tack weld fit-ups without proper paperwork, the Applicants testified that the only work in the reactor building involving a crew working with 2-inch Schedule 80 stainless steel pipe where QA signatures on fit-up were absent was on prefabrication of a temporary bypass around the blowdown heat exchanger. This bypass was discarded after flushing of the system and such work does not require any paperwork. App. Ex. 112, Rogers, et al., p. 9; Rudasill, Tr. 12,249."

47. "With respect to Mr. Nunn's concern over the construction foremen writing "vis-ok" on welds, the Applicants testified that construction hangers are not used in nuclear safety applications, and the welding foreman is the individual who approves such non-safety-related welds. App. Ex. 112, Rogers, et al., p. 11; Barnes, Tr. 12,226-227."

48. "The Staff investigative summary of interviews did not indicate a pervasive problem with the issue of foreman override, but rather that there had been isolated incidents between craft and some foremen. Staff Ex. 27, pp. 2, 3, 12, 13, 15, 17, 18, 22, 23. Additionally, with but one exception, none of the welders interviewed in the Staff investigation indicated any foreman pressure to use defective materials to fabricate welds or to do any welds outside procedures. Staff Ex. 27, pp. 3, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 23, 24, 25."

49. "An individual designated by the Staff as 'Welder B' did make such an allegation. The summary of the interview of 'Welder B' was distributed to the Board and lead counsel of the parties only, in order

to protect the identity of 'Welder B' and to preserve the integrity of the Staff inspection process. Tr. 12,373. The Staff noted it was pursuing the allegations and would be reporting back to the Board with the Staff's results. On February 17, 1984, the Board determined to leave the record open for the purpose of receiving the Staff inspection report on this matter. Tr. 12,553." We also noted that we were "not prepared to dismiss [the Welder B matter] as an isolated instance on this record" and that we would consider what, if any, further action was called for after reviewing the Staff's report. Id.

50. The Board and parties subsequently received letters from Staff Counsel dated April 11, 13 and 26 and May 14 and 29, 1984 concerning Welder B. The April 11 and May 14 letters enclosed summaries of meetings and the April 26 letter enclosed Staff Inspection Reports Nos. 50-413/84-31 and 50-414-17 (describing a Staff special inspection). The May 29 letter enclosed additional Staff followup information. All of these materials are received into the record. However, these materials do not resolve this matter. As reflected in the summary of the meeting between the Applicants and Region II personnel on April 18 and 19, 1984, the Licensee is presently carrying out an extensive inquiry into the concerns first raised by Welder B and subsequently corroborated in varying degrees by other employees. Presumably, the Licensee's inquiry will thereafter be reviewed by the Staff and, following that, the Board will expect a further report from the Staff.

51. In view of the present posture of the Welder B concerns, we are holding the record open for the purpose of reviewing reports from the

Applicants and Staff on their resolutions of these concerns. Upon receipt of those reports we can consider whether any further proceedings are appropriate, such as party comments on the reports or further evidentiary hearings. However, on the basis of the present record we are resolving the "foreman override" issue in the Applicants' favor, subject to the Board's later resolution of the Welder B and related concerns. Apart from the Welder B concerns, there is no evidence that "foreman override" was a widespread problem at Catawba.

52. The Board finds nothing inherently wrong in a supervisor requiring a craftsman to do work in accordance with the supervisor's instructions, even if contrary to the craftsman's thinking. The Board, of course, would be concerned if such action by a supervisor resulted in defective work or a violation of QA procedures. It appears in the circumstances cited by Mr. Nunn that the QA program worked in identifying and correcting defective work, although in some instances Mr. Nunn felt it worked in a way to reflect unfairly on the welder. There may have been one or more isolated incidents of improper pressure from a welder forman, but contrary to Intervenor's conclusions (PFF 30 & 31, p. 18), there is no indication of a pattern of foreman pressure to "get the job done" without regard to quality. Mr. Nunn's testimony indicates that in two cases bad welds were found and corrected. Thus the Board concludes, with respect to foreman override, that, subject to the resolution of the Welder B and related concerns, there has been no compromise of the QA program at Catawba, but on the contrary, the evidence indicates the program is effective.

C. Witness 3

1. Introduction. Witness 3 provided the Board and parties with an affidavit of his concerns and was cross-examined on them in an in camera session. I.C. Tr. 296-395. Applicants identified eighteen different concerns in Witness 3's testimony and affidavit and moved to strike the evidence on all of them. I.C. Tr. 406-414. The Staff supported the Applicants. I.C. Tr. 428. Palmetto argued that all eighteen concerns should be considered and included three of them⁴⁴ among a list of ten priority issues. I.C. Tr. 446. This Board granted the motions to strike eleven of the concerns and portions of two others. I.C. Tr. 518-523. The seven concerns we retained are discussed below.

2. Applicants subsequently presented a panel of eight employees who addressed five of the concerns. Four members of this panel were engineers, two were former coworkers of Witness 3, one was his former foreman, and one was a construction superintendent. App. Ex. 104, 105, 106, 107 and 108. The Board did not recall Witness 3 as its witness at this time and he did not accept our invitation to hear the Applicants' responses to his concerns. I.C. Tr. 1,106.

3. When we closed the record on most of Contention 6 on December 16, 1983, we left a few in camera issues open, pending receipt of Staff technical positions. One of the open issues was "honeycombing" of

44 These were: placement of rebar, honeycomb in concrete, and doors of the wrong size on the Auxiliary Building.

concrete as identified by Witness 3. Memorandum and Order of December 30, 1983, p. 4. NRC inspector Harris investigated honeycombing and related concerns and prepared Inspection Reports 50-413/84-07 and 50-414/84-06. Harris sponsored this Inspection Report as his testimony on honeycombing on the final day of the hearings. Staff Ex. 30.

4. Witness 3 prepared an affidavit in response to the Harris Inspection Report (Palmetto Ex. 143) and also testified on the final hearing day. I.C. Tr. 1370-81.

5. Honeycombing. As stated by the Staff:

"[h]oneycombing is defined by the American Concrete Institute (ACI) as voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles. Common causes of this are inadequate vibration, use of low slump (dry) concrete, and placements congested with reinforcing steel (rebar), embedments and penetrations."

Staff I.C. PFF 94.

6. Documentation and prompt repair of honeycombing had been a problem at Catawba for several years. Following an NRC inspection in April 1979, Duke was given a notice of violation for failing to identify and repair a large honeycomb in the Unit 1 containment building. I.C. Tr. 1148-49. In response to this citation Duke improved its M2 program for honeycomb and adopted a new QA procedure, S5, requiring a final walk-through inspection. I.C. Tr. 1155. Further, Duke has begun a 100% reinspection of all surfaces of nuclear safety-related structures. I.C. Tr. 1155. This reinspection was in progress at the time of the hearing. The adequacy of repairs is to be verified by NRC inspectors. Staff PFF 105.

7. Witness 3, whose work on the Catawba project included construction of forms for concrete and installation of rebar, testified that he had observed a substantial amount of honeycombing when forms were removed. P.A. Ex. 143, p. 4. He mentions particularly the exterior "doghouse" of Unit 1. His first affidavit (I.C. Tr. 304) at page 3 speaks of "... honeycombs ... in bunches, and many were a half-foot in diameter. The foreman's initial reaction was to put forms back over the honeycombs and literally cover them up." Later, in his response to the NRC Inspection Report, he refers to "... holes big enough to sleep in." Palm. Ex. 143, p. 6. We read Witness 3's concern as related more to construction techniques than to specific deficiencies. Palm. Ex. 143, p. 6. Witness 3 also pointed out that honeycombing may occur because of trash in the bottom of forms and because of bracing and other items placed inside the forms. I.C. Tr. 1371-72.

8. NRC Inspector Harris testified that honeycombing is associated with exterior surfaces rather than internal voids. I.C. Tr. 1360. This opinion was based on his twenty-four years of experience and his knowledge that concrete is poured into the center of forms and flows, with the aid of vibration, outward through the rebar. I.C. Tr. 1361. Voids larger than one cubic inch are to be documented by QC inspectors and repaired according to procedures specified by technical support. I.C. Tr. 1129.

9. Without knowledge of the 1979 notice of violation, Harris had questioned Duke about their handling of honeycomb. This inquiry was

9. Without knowledge of the 1979 notice of violation, Harris had questioned Duke about their handling of honeycomb. This inquiry was prompted by honeycomb he saw in the reactor building but for which he could find no evidence that it had been identified. I.C. Tr. 1347-48. He was satisfied that pours made after 1979 were adequately documented, but was concerned about the documentation prior to that time. (Id.) Harris made this an unresolved item which was still under investigation when he testified. (Id.)

10. Palmetto finds it "incredible" that NRC Inspector Harris was not aware of the 1979 notice of violation on this subject. We agree with Palmetto, especially in view of the attention we gave this violation on December 16, 1983. I.C. Tr. 1148-61. An NRC inspector charged with investigating a particular problem at a particular site should know the history of the problem at that site. Nevertheless, we believe that Inspector Harris' testimony, based on his extensive experience and demeanor as a witness, is basically sound.

11. Based on the corrective action that has been and is being taken, this Board finds that there is reasonable assurance that all honeycombing of safety significance has or will be identified and adequately corrected. The Staff is directed to verify that any remaining honeycombing of significance is adequately repaired prior to low-power testing.

12. Palmetto alludes to improper actions by the builder foreman who, according to Witness 3, put forms back on for the purpose of hiding a large area of honeycombing. PFF 612-614. We believe that a chagrined

foreman might very well want to minimize the length of time that poor workmanship was exposed to view. We agree with Applicants, however, that such action has no safety significance since QC inspection and subsequent repair is not avoided. App. Supplemental Reply to PFF, p. 40.

13. Rebar Spacing. Witness 3 initially stated his concern as follows:

"... the rebars were not spread evenly and therefore did not match the spacing requirements of the blueprints. Sometimes the last rebar would have to be located outside the concrete to match the spacing requirements. As a result, the foreman would just have us move the rebars to fit inside the concrete."

Affidavit pp. 2-3.

14. Although the rebar spacing concern was associated with the turbine building which is not safety-related, the Board allowed further testimony because the bases of the concern appeared to be construction practices and associated quality control.

15. Applicants' witnesses pointed out that while bar placement is specified in design drawings, the Design Concrete Specification allows a 2-inch tolerance on the spacing of each piece and further deviation upon approval of the project engineer. App. Ex. 108, p. 4. Foreman Durham also testified that Witness 3 seemed to want to follow his own ideas of how to install rebar, even though this would be more difficult and deviate from the drawings. I.C. Tr. 1134-36.

16. Witness 3 acknowledges that QC inspectors looked at and approved rebar installation prior to pouring of the concrete. He complains about the inspectors' lack of construction experience (I.C.

Tr. 332-333) and, relative to bar spacing, "... it went from one extreme to the other that they quit looking not just for numbers but they were down measuring to the 16th to see if they were in the right place." I.C. Tr. 332.

17. We find nothing here to indicate that there was any significant deviation from design in the placement of reinforcing steel, nor does this concern reflect any breakdown in the QA program for assuring proper installation of the rebar.

18. Removing Braces and Forms Too Soon. On the basis of his prior experience, Witness 3 believed that forms should be left on a slab pour for twenty-eight days for proper curing. I.C. Tr. 335-36. He was concerned that the forms and braces were torn off the Unit 1 generator pier after only fourteen days. Id. 335.

19. Applicants confirmed that the forms were removed before twenty-eight days, but that this was done in accordance with the Concrete Specification which allows removal at 70% or more of design strength provided the average mean daily temperature was greater than 40°F. App. Ex. 107, p. 3. In this case the design strength was 4000 psi. Cylinders cured in the field for test purposes and broken at 11 days showed an average compressive strength of 4500 psi -- well above design specification. Staff Ex. 30, p. 3 and App. Ex. 107, p. 3.

20. We find nothing irregular about the early removal of concrete forms under the conditions described here, nor any associated breakdown of the QA program.

21. Scheduling Pressure. The Staff appropriately summarizes the evidence on this concern and we adopt their proposed findings 116, 117 and 118 without change.

22. "Witness 3 also alleged that there was competition among the crews to see who could install the most rebar. Affidavit, p. 2. He also testified that the scheduling pressure was so intense that the object was first to do the job and then to go back and do it right. I.C. Tr. 314. He stated his foreman in the turbine building held a record at Duke's McGuire station for installing the most tonnage of rebar and he wanted to 'keep the tradition going at Catawba.' I.C. Tr. 315. The witness cited a specific example regarding placement of rebar in wall pours in the turbine building where the foreman told Witness 3 the bars were to be installed before the forms. I.C. Tr. 315."

23. "Applicants filed testimony regarding this incident explaining that the design required the horizontal bars to be on the exterior of the vertical bars and thus must be installed before the forms, since access to install the horizontal bars after installation of the forms would have been extremely difficult. Once grade was established on the interior forms, the horizontal bars were adjusted for acceptable elevation and spacing in the pour and the remainder of the form was installed. App. Ex. 105, pp. 4-5. I.C. Tr. 1130-31."

24. "Applicants' witness further testified that the measure for production is not tons of rebar per manhour, but that each pour has a number of scheduled manhours from beginning to completion. I.C. Tr. 1140. The foreman referred to by Witness 3 also testified that at

McGuire he had met the schedule most of the time, and while he was on occasions complimented for his work there, he was also on occasion 'chewed-out' for his work. I.C. Tr. 1144. This foreman also testified that if quality were sacrificed for quantity he would never meet a schedule, since everything that has to be redone will delay the schedule. I.C. Tr. 1191."

25. We find nothing in the record to indicate that proper installation of the rebar was compromised by pressure to get the job done quickly. Although Witness 3 may not have agreed with his foreman's method of doing the work, the final result was according to design and approved by QC inspectors.

26. Testing the Inspectors. Witness 3 was concerned that QC inspectors were often "hired off the street" without prior experience. He states that sometimes he "... would intentionally install hardware wrong or put in a pipe sleeve backwards, just to test and see if the QC inspectors would catch it. They never did. Although I would then go back and correct the problem ...". Affidavit, p. 4. On cross-examination Witness 3 stated that his foreman encouraged such actions, "... because he knew that we were [capable of] doing it right ...". I.C. Tr. 310-311. This intentional wrong installation of hardware with subsequent correction is said to have happened in the walls of the turbine building. I.C. Tr. 321-322.

27. The foreman implicated by Witness 3 emphatically denied any involvement in intentional misinstallation or that "... anything of this nature happened." I.C. Tr. 1123-24. Further, other builders on this

crew had no knowledge of such actions as alleged by Witness 3. App. Ex. 106, p. 7. Applicants' witnesses also point out "... that it would be extremely difficult for [embedments] to be installed incorrectly and remain undetected." Id., p. 5. We agree. We further assume that any worker caught deliberately misinstalling hardware would be severely disciplined and probably fired for cause.

28. We are persuaded that Applicants' testimony is the more credible and that this alleged concern, apart from whatever Witness 3 might have done, is not founded in fact.

29. Support for Mr. Hoopingarner. Several pages of Witness 3's Affidavit are devoted to corroboration of certain allegations by Palmetto witness Nolan Hoopingarner. Affidavit, pp. 7-12. These allegations were not separately addressed in the in camera sessions. Our findings on these allegations of Mr. Hoopingarner are presented at pp. 199-208, above. As reflected in that discussion, for the most part, the Board's interpretations of the facts differ from those of Mr. Hoopingarner and Witness 3.

30. Prenotification of NRC Inspections. This concern was not stated in the initial Affidavit of Witness 3, but was developed on cross-examination by Intervenors' counsel. I.C. Tr. 352-53. The primary concern seemed to be that last-minute housekeeping efforts would cover up the typically more disordered condition of the work areas. No mention was made of any attempt to hide or correct inferior work. I.C. Tr. 353.

31. None of the Parties' proposed findings on Witness 3's "prenotification" concern and we have no reason to do so inasmuch as no construction defect or quality assurance issue was raised. Another Board witness, Mr. Harry Langley, expressed a similar concern about prenotification of NRC inspections and we address that in Section D, below.

32. Conclusions. Of the seven concerns of Witness 3 we accepted for analysis on the record, only honeycombing was shown to warrant serious consideration in relation to construction deficiencies in safety-related structures or to the functioning of the Quality Assurance program. We find the deficiencies in Applicants' QA program that resulted in unidentified and unrepaired honeycombing prior to 1979 have been corrected and that there is now reasonable assurance that all honeycombing of safety significance has been or will be identified and corrected prior to low-power testing.

D. Witness Langley

1. Harry Langley, a former welding inspector at Catawba, first came forward with concerns in a limited public appearance session, independent of our general invitation for in camera appearances. As a matter of convenience, Mr. Langley was later heard on the record under the same procedures as the in camera witnesses. Motions to strike were granted as to all but three of Mr. Langley's concerns. Tr. I.C. 512-513.

2. Mr. Langley testified about an incident of harassment. According to Mr. Langley, he and another inspector, Lindsay Harris, had been inspecting a personnel air lock when they were threatened by the craft foreman on the job, Tom Mullinax. Tr. 6883-84.

3. Harris and Mullinax later appeared as witnesses. Harris agreed that he and Langley had once been working on an air lock at the same time, but he could not recall Mullinax threatening him at that time. Tr. 1037-38. Mullinax could not recall threatening Langley. Tr. 1039-40.

4. Harris had testified previously about a different incident that had involved angry words from Mullinax to Harris. However, it became clear that the incident occurred after Langley was no longer employed by Duke. Harris, Tr. 1031.

5. The testimony is in direct conflict as to whether the threats of Harris described by Langley actually occurred. Neither the circumstances nor the demeanor of the witnesses resolve the conflict. We can say that, given the circumstances and the occurrence of similar

incidents at Catawba, it is certainly possible that the incident did occur. We will assume it did and take it into account in our overall conclusions about harassment.

6. Mr. Langley testified about laminations in a gouged area in containment plate. This concern is addressed in our discussion of Witness Nunn's more fully elaborated lamination concerns. See pp. 218-228, above, particularly paragraphs 5 and 11. Suffice it to note here that Mr. Langley himself stated that the defect he saw had been repaired. Tr. 6897.

7. Mr. Langley alleged that workers at the site received prenotification of NRC inspections, implying that the inspections were somehow compromised. Tr. I.C. 1081. Palmetto offers no proposed findings on this concern, apparently not finding any safety significance in it. Neither do we. The applicants evidence was to the affect that prenotification did not occur, or at least was not their practice. Davison, Tr. I.C. 1012-16. Furthermore, we accept the applicants' proposed findings I.C. 140 that: "even assuming Mr. Langley's allegations were true, prenotification of a specific inspection would have no effect. Concerning completed work, all of the records documenting it are dated (IC Tr. 1060-62, Davison, Morgan, Harris, and Freeze 12/16/83). Mr. Langley himself agreed it would be too late to change completed work (IC Tr. 1082-84, Langley 12/16/83). As to in process work, specific prenotification would similarly have no effect. The NRC inspectors commonly look at numerous welds in any given area. If poor quality work was being done, a prenotice of several days would

not be adequate to retrain the welders to perform their work well under NRC observation (IC Tr. 1062-64, Davison, Freeze, Morgan, and Harris 12/16/83)."

FINDINGS OF FACT
ON TECHNICAL CONTENTIONS

I. REACTOR VESSEL EMBRITTLEMENT

A. Calculation of Reference Temperature

1. Intervenors' Contention 44/18 reads: "The license should not issue because reactor degradation in the form of a much more rapid increase in reference temperature than had been anticipated has occurred at a number of PWRs including Applicant's Oconee Unit 1. Until and unless the NRC and the industry can avoid reactor embrittlement, Catawba should not be permitted to operate."

2. The reference nil-ductibility temperature (RT_{NDT}) is significant in determining if failure can occur to the reactor vessel. (Staff Ex. 18, Elliott, p. 2; App. Ex. 92, Mager, p 4.) The initial values for RT_{NDT} at Catawba Units 1 and 2 are $-8^{\circ}F$ and $15^{\circ}F$, respectively. (Staff Ex. 18, Elliott, p. 13; App. Ex. 92, Magee, p. 10.) The intervenors concede that the initial RT_{NDT} values were determined in accordance with requirements of codes and regulations. (Riley, Tr. 11,164.) Therefore, this contention is concerned with the increase in reference temperature in reactor vessels after many years of operation.

3. Applicants based their calculations for end-of-life RT_{NDT} at Catawba on extensive tests of surveillance capsules from other Westinghouse reactors that produced trend curves showing shifts in

reference temperature as a function of neutron fluence and percent copper in vessel material. (App. Ex. 92, Magee, p. 6.) For Catawba Units 1 and 2 end-of-life RT_{NDT} values were calculated as 86°F and 109°F, respectively. (Id., p. 10.) Subsequent calculations with three times as much data base gave corresponding new values of 66°F and 98.9°F.

4. Staff's calculations are based on surveillance coupons and empirical correlations of radiation effects data. (Staff Ex. 18, Elliott, pp. 4-5.) Originally, Staff used formula and trend curves in Regulatory Guide 1.99, Rev. 1, April 1977, to compute shift in RT_{NDT} . As additional data became available, the "Guthrie Formula" was developed. (Commission Report SECY-82-465; Id.) Staff plans to use Guthrie Formula until data resulting from test coupons placed inside the Catawba reactors becomes available. (Staff Ex. 18, Elliott, pp. 6-7.) The standard deviation for the Guthrie Formula is 24°F and the Staff adds two standard deviations as a conservative measure when using that formula (Id.). This means there is a 97.5% probability that the true shift in RT_{NDT} will be less than the mean-plus-two standard deviations. (Staff Ex. 18, Elliott, pp. 13-14.) Staff's calculations result in a 97.5% probability of an end-of-life RT_{NDT} at Catawba Units 1 and 2 of less than 102°F and 125°F, respectively. (Id.)

5. Applicants did not use the Guthrie Formula in their calculations because it does not consider low copper material specifically. (App. Ex. 92; Mager, p. 13; and Mager, Tr. 10,941-42.) The Applicants did compare their values with ones obtained using

Regulatory Guide 1.99 and found results essentially equivalent. (Id., p. 14.)

6. Intervenors question the use of data from surveillance coupons because of the wide scatter of results. (Palm. Ex. 133; Riley, pp. 6-7; Intervenors PF, p. 6.) They also question the use of test specimens at Catawba as not being representative of vessel wall material and stresses. (PF, p. 12.) The Intervenors also cite the fact that Staff has research ongoing in this area as further reason to question the results. (PF, p. 9.)

7. Intervenors point to the large shift in RT_{NDT} at Applicant's Oconee plant. (Riley prepared testimony, p. 6.) Applicants do not question there has been a large shift at Oconee, but point out that these vessels have high levels of copper and that nickel is an influence also. (Staff Ex. 18, Elliott, p. 15.)

8. The Board notes the variation in data when all kinds of materials are tested, but it views Applicants' data based on Westinghouse reactors and reactor vessels with low copper content as being more reliable for this application. Also, the Staff's addition of two standard deviations to its calculations is a conservative step aimed at taking care of variance in its data. The differences cited by Intervenors in Catawba test specimens and vessel wall material are not considered sufficient to discredit their usefulness. We note that the Applicants will use six surveillance capsules instead of four required by NRC regulations, Appendix H. (App. Ex. 92; Mager, pp. 8-9.)

9. It is desirable to extend knowledge through research and put research results to immediate use, but that is no reason not to proceed using the best knowledge available. Human knowledge will never be perfect. In this case, the calculations give reasonable assurance of safety. The Oconee experience is inapplicable because of differences in material in reactor vessels. The surveillance program meets the relevant NRC regulations. The Board rejects as unnecessary the monitoring program proposed by Intervenor. (Intervenor's PFF # 43 and # 44.)

B. Pressurized Thermal Shock

10. A special concern about embrittlement is the resultant ability of the reactor pressure vessel to withstand pressurized thermal shock. The Board adopts the Staff's proposed findings on Pressurized Thermal Shock in their PFFs 388-91, as follows.

11. "To ensure that the reactor vessel will be resistant to a pressurized thermal shock (PTS) event during the life of a nuclear plant, the Staff requires that the EOL RT_{NDT} for the limiting reactor vessel beltline materials must be less than the screening criterion specified in Commission Report SECY 82-465 'Pressurized Thermal Shock'. PTS events are pressurized water reactor (PWR) transients, including those initiated by instrument or control system malfunction and postulated accidents, such as small break loss-of-coolant accidents or main steam line breaks, that result in severe overcooling of the reactor

vessel, concurrent with pressurization or repressurization. Screening criteria identified in SECY 82-465 were derived from fracture mechanics evaluations of postulated cracks whose orientation is parallel to the weld direction, and specify RT_{NDT} values of less than 270°F for base plate materials and axial welds, and less than 300°F for circumferential welds, as acceptable limits to prevent brittle failure in reactor vessels due to PTS events. Staff Ex. 18, Elliott, pp. 2-3; App. Ex. 92, Mager, pp. 15-16."

12. "The Staff's calculations, using the Guthrie Formula specified in SECY 82-465, determined EOL RT_{NDT} values of 102°F and 124°F for Catawba Units 1 and 2, respectively. Staff Ex. 18, Elliott, p. 13. Mr. Elliott indicated that these predicted values are more than 100°F below the PTS criterion required by the Staff and, consequently, the shift in RT_{NDT} for the Catawba reactor vessels would have to exceed the mean predicted value by at least six standard deviations before PTS events present a problem for the Catawba reactor vessels. Since the probability limits for six standard deviations exceeds 99.99%, the Staff concluded that PTS is not expected to be a problem for the Catawba reactor vessels. Id., at 15."

13. "The Applicants attempted to evaluate the validity of the Commission's screening criteria by performing an analysis of the risk of reactor vessel fractures using the screening criteria and also using the Staff's RT_{NDT} values calculated with the Guthrie Formula. Their analysis showed that if the screening criteria is not exceeded, the risk of reactor vessel failure due to PTS is 6×10^{-6} occurrences per reactor

year of operation. If the values for EOL RT_{NDT} arrived at for the Catawba vessel under the Guthrie Formula are used, Applicants calculated that the risk of reactor vessel failure would be less than 10^{-8} occurrences per year of reactor operation. The Applicants concluded that the EOL RT_{NDT} values using the Guthrie Formula provide a large margin of safety which, when coupled with the conservatism of the Staff's calculational methodology, make a transient resulting in a non-ductile condition in either Catawba reactor vessel 'so remote that it is essentially non-existent.' App. Ex. 92, Mager and Meyer, pp. 15-17."

14. "Therefore, based on evidence presented above by the Staff and Applicants, and noting that the level of certainty provided by their prediction of shifts in reference temperature exceeds that called for by Intervenor,⁴⁵ we find reasonable assurance that the fracture toughness of the Catawba reactor pressure vessels is adequate to prevent breach of reactor vessel integrity due to PTS events."

15. The Board also concurs with Staff's overall conclusions in its PFF 392. "Based on the foregoing evidence, the Board finds that reasonable assurance exists that the increase in RT_{NDT} over the life of the Catawba reactor vessels will not be more rapid than estimated by the Staff and Applicants, that the surveillance program at Catawba will accurately reflect the effects of neutron fluence on the reactor vessel

⁴⁵ See Riley, Tr. 11,204-05.

materials and will provide sufficient warning of any change in RT_{NDT} so that any necessary adjustments to operating limitations can be timely implemented for the protection of the public health and safety, and that the Applicants meet all relevant regulations concerning reactor vessel integrity at the Catawba facility."⁴⁶

16. On February 16, 1984, after the close of the hearings, CESG moved to reopen the record to introduce additional information which it had received on December 16, 1983, three days after its witness testified. The information was in various books that cost around \$70-\$75 each, so CESG waited until they were obtained on loan. The Board does not consider this excuse sufficient to justify reopening the record, particularly since the Intervenors have no expert to testify or cross-examine on the subjects in these publications. The Board accepts this submission only as an offer of proof.

⁴⁶ "As an alternative to the alleged inadequacy of the Staff's and Applicants' methods of determining non-ductility in reactor vessels, the Intervenors suggested the use of strain gauges to monitor reactor vessel integrity. Mr. Riley admitted, however, that strain gauges would not measure change in RT_{NDT} or embrittlement. Riley, Tr. 11,208. Moreover, Mr. Riley conceded that the regulations do not require such devices. Riley, Tr. 11,195. Therefore, Intervenors' suggestion is not only an impermissible attack on NRC regulations, but by virtue of the Board's September 8, 1983 Order, beyond the scope of the contention."

II. ADVERSE METEOROLOGY

1. Contention 17 was jointly sponsored by Palmetto Alliance and CESG. It was based on the Staff's Draft Environmental Statement (DES) and states:

The DES is concerned with environmental impacts. Presumably, these are best represented as the entire range from trivial to serious, in conjunction with the estimates of likelihood. The DES averages meteorological conditions in its consideration of accidents, 5.9.4.5. Because atmospheric inversions and quiet air are a very common feature in this region, accident consequences should be calculated for the extreme condition of inversion and very slow air movement.

In the matter of assessing serious accidents, the environmental assumptions are complex and again do not appear to consider extreme weather, p. 5-37. The DES, which differs from the CP FES in considering severe accidents, is at fault in not considering the full range of radiological impacts by not considering extreme, but frequently encountered, weather conditions.

2. The Board admitted this contention in its Memorandum and Order of December 1, 1982 (16 NRC 1805) and paraphrased it as:

"... contend[ing] that the DES does not properly evaluate impacts of design basis and severe accidents because it does not isolate and analyze those impacts assuming extreme weather."

3. The DES was superseded by the Final Environmental Statement (FES) (NUREG-0921) in January 1983, and hereafter we refer only to the FES. Relevant portions of the FES were admitted as Staff Ex. 12 (Tr. 11,456A).

4. Both the Staff and the Applicants moved for summary disposition on Contention 17, but we denied these motions in our Memorandum and Order of October 18, 1983, pointing out that the Staff

had not included in its FES any results of its calculations for design basis accidents made with "very poor" meteorology and that the manner in which unfavorable weather was factored into the severe accident evaluations was obscure.

5. At the hearing, the Staff presented a panel of three witnesses (an accident evaluator, a nuclear engineer, and a meteorologist), Staff. Ex. 20. Applicants presented one witness (a meteorologist), App. Ex. 94, and Intervenors presented one witness (a former meteorologist for the U.S. Weather Service), Palm. Ex. 134.

6. The meteorological data-base used by the Applicants and Staff to compute the impacts of design basis accidents was collected at the Catawba site over a two-year period (December 17, 1975 through December 16, 1977). App. Ex. 94, p. 2. For the serious accident evaluations, the Staff used measurements from the Applicants' onsite meteorological program for the period August 1, 1976 through July 31, 1977. Staff Ex. 20, p. 11. The meteorological conditions that existed during this period are considered to be representative of those that will exist over the next 40 years. App. Ex. 94, p. 2.

7. There is no dispute among the parties that conditions of stable air inversion and low wind speed occur frequently in the Catawba-Charlotte area. Intervenors' PFF B.3; Staff PFF 402. Applicants' meteorologist, Mr. M. Casper, testified that stable conditions exist at Catawba about 40 per cent of the time. Tr. 11,593. Maximum health consequences are associated with such conditions. Staff PFF 407. The question for us to resolve is whether the FES properly

considers highly unfavorable weather in the evaluation of environmental impacts.

8. The FES contains estimates of the environmental consequences for both design basis and severe accidents.

9. Design basis accidents postulate that specific design and operating features of the plant will limit the potential radiological consequences. "An important implication of this expectation is that the releases considered are limited to noble gases and radioiodides and that any other radioactive materials (for example, in particulate form) are not expected to be released. [Consequence calculations] also use the meteorological dispersion conditions that are an average value determined by actual site measurements." FES p. 5-35.

10. The atmospheric dispersion conditions are computed from hourly onsite meteorological data of windspeed, wind direction and atmospheric stability. Tr. 11,243-44. Precipitation is not considered and for each hourly set of data, the wind is assumed to continue to flow in the same direction at the same speed. App. Ex. 94, p. 4.

11. The "average" dispersion condition used in the FES for design-basis accidents is actually the 50 percentile or median. App. Ex. 94, p. 4; Staff Ex. 20, pp. 2-3. Although all of the atmospheric dispersion conditions for the two-year data collection period (represented as relative concentration or X/Q values) are included in a cumulative frequency distribution (Staff Ex. 20, p. 2), they influence the median only to the extent that half of the X/Q values are smaller and half of them are larger.

12. The evidence before us shows clearly that calculations of the consequences of design basis accidents presented in the FES reflects only the median atmospheric dispersion condition. Although the frequency of stable air inversions in this region is among the highest in the United States (Palm./CESG PFF B.3), none of the X/Q values representing the poor dispersion conditions associated with stable air were actually used in the consequence calculation. This conclusion follows from the testimony of Mr. Casper that, "[i]f you take into account all daily situations that occur at the site in terms of E, F and G stabilities, it would be somewhere around 40 percent of the time." The stability condition is a major determinant of X/Q. App. Ex. 94, p. 3. By definition, the "median" (or 50 percentile) is the middle of a series. It would not, therefore, be among the values that are in the lowest or highest 40 per cent of the full series. For the case at hand we surmise that the median X/Q is representative of a neutral stability condition.

13. The consequences of design basis accidents were also calculated by the Applicants and the Staff for "near worst" case (5%) meteorology. These calculations were made for the Safety Evaluation Report (SER) to evaluate site suitability and are not used in the FES. Staff PFF 404.

14. The 95 percentile X/Q (rather than the median) used in the SER calculations should be reasonably representative of the more stable

atmospheric conditions.⁴⁷ We find it unfortunate that the Staff avoids use of the 95 percentile, and even any reference to the SER calculations in the FES. This is especially appropriate in a situation like Catawba where inversions occur frequently.

15. The Staff argues that use of the "median" atmospheric dispersion condition is all that is necessary to meet NEPA requirements. PFF 395-399. They rely on application of a "rule of reason", NRDC v. Morton, 458 F.2d 827, 834 (D.C. Cir. 1972) which was applied by the Appeal Board in Public Service Co. of Oklahoma (Black Fox Station, Units 1 and 2), ALAB-573, 10 NRC 775, 779 (1979), and in Public Service Electric and Gas Co. (Hope Creek Generating Station, Units 1 and 2), ALAB-518, 9 NRC 14, 38-39 (1979), [quoting from Trout Unlimited v. Morton, 509 F.2d 1276, 1283 (9th Cir. 1974)]. The specific language of interest here is:

"An EIS need not discuss remote and highly speculative consequences.... A reasonably thorough discussion of the significant aspects of the probable environmental consequences is all that is required by an EIS." 9 NRC 38-39."

16. We disagree with the Staff that using a X/Q associated with stable weather conditions to calculate the consequences of design-basis accidents would be "remote and speculative." Improbable severe accidents (as in the case of Hope Creek), may well be highly

⁴⁷ In its motion for summary disposition of Contention 17 (July 7, 1983), the Staff stressed the significance of the SER calculations in relation to "... extreme, but frequently encountered, weather conditions." Affidavit, p. 5.

speculative, but weather conditions which occur as much as 40 per cent of the time should certainly be a part on any "reasonably thorough discussion" of probable environmental consequences.

17. Severe accidents are considered less likely to occur than design basis accidents but their consequences could be more severe since the containment structure may fail to limit the release of radioactive materials to the environment. FES p. 5-36. Prior to 1980 the Staff was not required to include an evaluation of severe accidents in its environmental impact statements. However, the Commission published a Statement of Interim Policy on June 13, 1980 (45 Fed. Reg. 40101) which required the Staff to include in the EIS a:

"... reasoned consideration of environmental risks (impacts) attributable to accidents" giving equal attention "... to the probability of occurrence of release and to the probability of occurrence of the environmental consequences of those releases."

18. Applicants for plants where the environmental evaluations were already completed were not required to make a severe accident analysis, and Duke did not make one for Catawba. Tr. 11,588.

19. From the description of severe accident assessment in the FES (§ 5.9.4.5(2), p. 5-36), it is not at all evident whether the Staff separately considered adverse weather conditions or used some sort of an average as they did for design basis accidents. Testimony at the hearing brought out that periods of adverse weather are indeed considered separately, but that this is done in a very complex manner.

20. Our interpretation of the evidence is that:

a. Onsite meteorological data at hourly intervals for one year (August 1, 1976 through July 31, 1977) were provided by Duke to the Staff. App. Ex. 20, p. 11.

b. These 8760 hourly observations appear as two tables in the CRAC computer program used to calculate consequences. One table has data on atmospheric dispersions (stability, windspeed and precipitation), the other is data for a wind rose -- the frequency that the wind blew in each of 16 compass sectors. Id., p. 11-12.

c. Severe accidents were postulated to start at selected times during the year and the concentration of the radionuclides in the atmosphere (and thus the environmental consequences) were calculated for at least the next 120 hours or as long as required for the contamination to travel a selected distance away from the plant. Tr. 11,248.

d. For each accident start, the code assumed that the same wind speed and other atmospheric properties existed in all directions of the compass. Tr. 11,318.

e. In order to cover the full year and, hopefully, all weather conditions of interest, a new accident start was postulated about every fourth day. This resulted in a total of 91 accident starts over the full year. Staff Ex. 20, p. 12.

f. The computer calculates complementary cumulative distribution functions (CCDFs) which are combinations of released radionuclides, meteorological sequences and wind directions. Since four different severe accidents were considered, there were 91 different

start times, and there are 16 compass sectors, a total of 5824 CCDFs resulted. Id., p. 14.

g. Since all hours of the year are used at least once in generating the 5824 CCDFs, adverse weather conditions are certain to be included.

h. The CCDFs are not presented as such the FES, but rather they are a basis for the figures that portray the probability of consequences (FES Figures 5.3, 5.5, and 5.7). Id., p. 14; Tr. 11,268.

i. The curves presented in FES Figures 5.3, 5.5, and 5.7 terminate at points calculated from the single most unfavorable CCDF and thus represent the most extremely unfavorable weather conditions sampled by the scheme which was used. The 10^{-8} probability line of FES Table 5.11 (p. 5-81) also reflects such unfavorable weather. Tr. 11,269-72.

j. The wind rose data are used in relation to the probabilities of certain consequences, rather than as an initial orientation of where the consequences will occur. Tr. 11,181-83.

21. Based on the record developed at the hearing, we conclude that the FES analysis of the severe accident case does include a consideration of extreme, but frequently encountered, weather conditions. The consequences are also related to the probability of occurrence and thus the Staff's analysis is responsive to the Commission's 1980 Statement of Interim Policy.

22. Nevertheless, the scheme which the Staff is using is so complex and computer dependent that the influence of individual

parameters, such as atmospheric stability and wind direction, are hopelessly buried within the computer "black box" and thus not practically available to interested persons.

23. Further, the FES presentations of the serious accident consequences does not adequately portray the influence of adverse weather conditions. Absent the kind of information developed at the hearing, we doubt that very many people would decipher that weather substantially influences the very low probability portions of the consequence graphs.

Conclusion

24. The FES does not adequately take adverse weather into account in the analysis of environmental consequences of design basis accidents.

25. Adverse weather is adequately considered in the analysis of serious accidents, but the FES does not adequately delineate its significance in relation to the accident consequences.

26. We find the FES deficient in these aspects. This deficiency is of minor significance, however. Adverse weather was considered in the SER and the results are presented there. The contribution of adverse weather to the consequences of adverse accidents is incorporated into figures and tables of the FES even though its inclusion is not apparent.

CONCLUSIONS OF LAW

In an operating license case, a Licensing Board is to decide only the issues in controversy between the parties. 10 C.F.R. § 2.760a. Numerous issues previously advanced by the Intervenors were eliminated from controversy by preliminary board rulings or upon summary disposition. The evidentiary hearing focused on a broad quality assurance contention (Palmetto Contention 6) and two technical issues concerning embrittlement of reactor vessels and the effects of adverse meteorological conditions during a severe accident.⁴⁸ Upon consideration of the evidentiary record and in light of the foregoing findings of fact, the Board concludes that --

A. With respect to the Atomic Energy Act of 1954, as amended, and the Commission's rules relating to quality assurance and pressure vessel integrity, and notwithstanding certain findings adverse to the Applicants, the Applicants have met their burden of proof and have demonstrated a reasonable assurance on the following contentions:

1. Palmetto Contention 6. Neither the concerns of the welding inspectors, nor of Messrs. Hoopingarner and McAfee, nor of the in camera

48 A third technical issue became uncontested and was dismissed when the Intervenors failed to file proposed findings of fact on it. See note 1, above.

witnesses evidence systematic deficiencies in plant construction or company pressure to approve faulty workmanship such that the plant cannot operate without endangering the health and safety of the public. This is true notwithstanding certain blemishes on the Applicants' quality assurance performance, notably the retaliatory evaluation of Supervisor Gary (Beau) Ross.

2. Contention 18/44. The amount of material degradation of the Catawba reactor pressure vessels resulting from neutron irradiation damage over the life of the plant can be reliably predicted, Staff's and Applicants' projections of the shift in reference temperature (RT_{NDT}) of the Catawba reactor vessels are conservative, and the Catawba reactor vessels can and will be operated within acceptable safety margins for material degradation.

B. The Staff and Applicants have not met their burden of proof and therefore have not demonstrated a reasonable assurance on Contention 17. In their assessment of the environmental impacts of design basis accidents in the FES, the Staff did not give adequate separate consideration to the effects of extreme meteorological conditions, effects which are not uncommon in the Catawba area. Although their assessment of the impacts of severe accidents did include the effects of adverse weather conditions, this fact is not apparent in the FES. Accordingly, the Staff has not, in the Board's view, fully discharged its obligations under the National Environmental Policy Act of 1969, and the Commission's implementing regulations (10 C.F.R. § 51.23(c)).

However, the legal question is fairly debatable and the NEPA violation is not a flagrant one. The type of assessment for design basis accidents that is missing from the FES would be similar to one that appears in the SER. Furthermore, the Staff's NEPA cost/benefit analysis (FES Part 6) strikes the balance clearly in favor of plant operation. In these circumstances, although this Board has not performed an independent cost/benefit analysis (taking all environmental factors into account de novo), it is inconceivable to us that the lack of a reasonable assurance on Contention 17 (concerning limited aspects of a design basis accident) could significantly effect, let alone shift the cost/benefit balance and change the result. Cf. Philadelphia Electric Co. (Peach Bottom Atomic Power Station) et al., 10 NRC 1517, 1527-1528 (1982)(the "radon case"). In other words, the lack of a reasonable assurance on Contention 17 is harmless error. Therefore this conclusion adverse to the Applicants does not preclude authorization of an operating license.⁴⁹

⁴⁹ Pursuant to 10 C.F.R. § 50.52(b)(3) our findings and conclusions on this issue are deemed to modify the FES and are to be distributed as the FES was distributed. Although the Staff may wish to prepare and issue a supplement to the FES containing a separate assessment of adverse weather under design basis accident conditions, and clarify their presentation about the consequences of severe accidents, we do not condition the license on such a supplement.

ORDER

IT IS HEREBY ORDERED, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's rules, that the Director of Nuclear Reactor Regulation is authorized, upon making the findings on all applicable matters specified in 10 C.F.R. § 50.57(a) and upon satisfaction of the conditions in the following paragraph, to issue to Applicants Duke Power Company, North Carolina Municipal Power Agency Number 1, North Carolina Electric Membership Corporation and Saluda River Electric Cooperative a license to authorize low-power testing (up to 5 percent of rated power) of Unit 1 of the Catawba Nuclear Station. A license to authorize full power operation of Unit 1 is within the jurisdiction of the separate Licensing Board constituted to consider and decide emergency planning conteritions. The Director of Nuclear Reactor Regulation is also authorized, upon the necessary findings and a favorable decision by the emergency planning Board, to issue licenses for fuel loading and operation of Unit 2 upon the completion of that facility.

This Order is subject to the following conditions:

1. Meeting of the obligations imposed by paragraphs IB 61, 145 and ID 25, 47 of our findings to the satisfaction of the Staff, provided that the obligation imposed by paragraph ID 47 may be satisfied by the time specified therein, or prior to full power operation, whichever is later.

2. Demonstration to this Board of a reasonable assurance that the "Welder B" and related concerns described in paragraphs III. B 48-51 do not represent a significant breakdown in quality assurance at Catawba. We are retaining jurisdiction over this issue.

3. Demonstration to this Board of a reasonable assurance that the emergency diesel generators at the Catawba Station can perform their function and provide reliable service with reference to the concerns encompassed by the Intervenors' late contention admitted June 22, 1984. We are also retaining jurisdiction over this issue.⁵⁰

⁵⁰ On June 21, 1984, the Intervenors moved in an on-the-record telephone conference for reconsideration of our previous denials of their diesel generator contentions. See n.3, above. Our reasons for rejecting those contentions still obtain and therefore reconsideration is denied. The Intervenors also moved the admission of a contention -- worded identically to the Board's former sua sponte contention -- to be considered as an intervenor-sponsored, late contention and therefore subject to the five "lateness" factors under 10 CFR 2.714(a)(1). This motion was opposed by the Applicants and the Staff for somewhat varying reasons in the course of lengthy discussion, which included the five-factor balancing process. The transcript was not yet available when this decision was issued.

As a threshold matter, we do not believe that the Commission's Order of June 8, 1984 disapproving our exercise of sua sponte authority under 10 CFR 2.760a has any bearing on the pending motion. The principles applicable here flow from an earlier Commission decision in this case concerning the five-factor balancing process. CLI 83-19, 17 NRC 104. We conclude that the balancing process clearly favors admission of this contention, because: Factor 1 (Good Cause) -- Until the Intervenors received the Commission's June 8, 1984 Order, they had every reason to believe that they would be able to litigate site-specific diesel problems at Catawba under the Board's sua sponte contention. Furthermore, had the Board not raised that contention back in

(Footnote Continued)

Effectiveness and Review of Initial Decision. This Partial Initial Decision is effective immediately and will constitute the final decision of the Commission 45 days after the date hereof, unless a party appeals

(Footnote Continued)

February, we believe that the Intervenors would have proffered a similar contention at that time. Therefore, good cause has been shown. Factors 2 and 4 ("Other Means" and Interests Represented by Existing Parties) -- Both of these factors favor admitting the contention. A section 2.206 petition is no substitute for litigation here because such petitions are discretionary with the Director of NRR; the Staff properly disclaims the notion that it will represent the Intervenors' interests. Factor 3 (The Intervenors' Contribution to the Record) -- As we have made clear in the past, we do not believe the present Intervenors can make a substantial contribution to these technical issues unless they are prepared to present expert testimony or at least have expert assistance in their cross-examination. The Intervenors have repeatedly indicated that they will be able to produce experts; so far, however, they have not done so. Now that the Intervenors have in hand the Applicants' report on site-specific problems at Catawba, they should be in a position to move quickly to obtain the appropriate expert assistance. In these circumstances, our admission of this late contention is conditioned upon the Intervenors' serving by July 6, 1984 their designation of a named diesel generator expert or experts, along with a description of qualifications (resume). Failure to meet this condition will result in dismissal of this contention. Conversely, if this condition is met, Factor 3 will favor admission of the contention. Finally, Factor 5 directs us to consider resulting delay. We see no reason why there should be any resulting delay. As far as this Board is concerned, the Applicants already have all the authority they need to load fuel and conduct pre-criticality testing. Under their present schedule (which has slipped several times recently) they will not need a full power operating license until September 14, 1984. If a hearing is necessary on the contention we admit today, we expect to complete it and decide the issues well before mid-September.

Generally, the Board proposes to follow the schedule agreed to in the May 21, 1984 telephone conference. Tr. 12,643-47. Specifically, discovery is to recommence on this date (June 22, 1984) and to continue until terminated by the Board, probably in

(Footnote Continued)

or seeks a stay. Pursuant to 10 C.F.R. § 2.762, an appeal from this Partial Initial Decision may be taken by filing a notice of appeal with the Atomic Safety and Licensing Appeal Board within 10 days after service of this decision. A brief in support of an appeal must be filed within 30 days after the filing of the notice of appeal (40 days if the appellant is the NRC Staff). Within 30 days after the period for filing and service of the briefs of all appellants has expired, any party not an appellant may file a brief in support of or in opposition to the appeal. The NRC Staff may file a responsive brief within 40 days after the period for filing and service of the briefs of all appellants has expired.

(Footnote Continued)

late July. The Intervenors should serve any interrogatories they may have on the Applicants' recent site-specific report as soon as possible. As represented to us by Staff counsel, we expect the Staff to issue its supplemental SER on the Catawba diesels about July 15, 1984. Should a hearing be necessary, it is tentatively scheduled to commence on August 6, 1984, in Charlotte, N.C., the exact time and place to be specified later.

Subject to the foregoing discussion, the Intervenors' motion is granted and the following contention is admitted:

Whether there is a reasonable assurance that the TDI emergency diesel generators at the Catawba Station can perform their function and provide reliable service because of the problems that have arisen in the course of testing and inspection of such generators, such as the problems reported in the Applicants' letter to the Board of February 17, 1984.

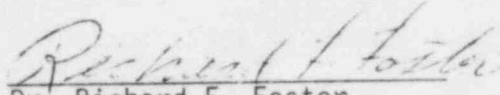
Any party may apply to the Appeal Board for a stay of this Partial Initial Decision pursuant to 10 C.F.R. § 2.788.

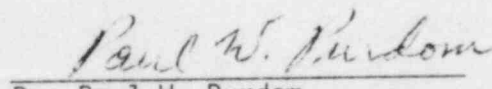
Report by Office of Investigations. The Commission's Office of Investigations ("OI") initiated an investigation of certain quality assurance issues at Catawba during the evidentiary hearing in this proceeding. The Board denied several motions to postpone the hearing pending completion of the investigation. OI recently informed the Board that its investigation is nearing completion and that its report will be available to the Board and parties (subject to possible deletions to fulfill pledges of confidentiality) in the near future.

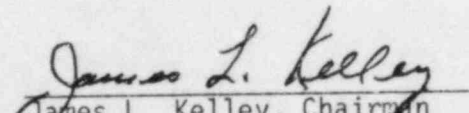
This Partial Initial Decision is based solely on the evidentiary record in this case. The Board has not had access to or considered the upcoming OI report in any way. We expect, however, that in view of its scope as described in the initial Board Notification that report will cover some of the same concerns addressed in the evidentiary record, and that a party or parties may seek to reopen the record on that basis. Should that happen after a notice of appeal has been filed and jurisdiction has passed to the Appeal Board, that Board may consider

such a motion itself, or it may remand it for consideration by this Board in the first instance.⁵¹

THE ATOMIC SAFETY AND
LICENSING BOARD


Dr. Richard F. Foster
ADMINISTRATIVE JUDGE


Dr. Paul W. Purdom
ADMINISTRATIVE JUDGE


James L. Kelley, Chairman
ADMINISTRATIVE JUDGE

Bethesda, Maryland,

June 22, 1984.

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Appendix C to the Staff's SER addresses the status of unresolved safety issues, as required by the Appeal Board's decision in Virginia Electric and Power Co. (North Anna Station), 8 NRC 245 (1978). The Staff discusses in some detail a number of such issues that are applicable to the Catawba facility and explains why the licensing of those units to operate should be allowed before a generic solution to the problem is found. We have reviewed these Staff explanations and find them to be adequate.