

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

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

DOCKETED
USNRC

'84 NOV 28 A8:35

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

SERVED NOV 28 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 0L

PARTIAL INITIAL DECISION RESOLVING FOREMAN
OVERRIDE CONCERNS AND AUTHORIZING
ISSUANCE OF OPERATING LICENSES

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

Robert Guild, Columbia, South Carolina, for the Intervenor, Palmetto
Alliance.

Jesse L. Riley, Charlotte, North Carolina, for the 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.

November 27, 1984

8411290384 841127
PDR ADOCK 05000413
G PDR

I. INTRODUCTION

In this Board's Partial Initial Decision of June 22, 1984, we retained jurisdiction over one relatively narrow aspect of Palmetto Alliance's broad quality assurance contention alleging systematic deficiencies and pressure to approve faulty workmanship at Catawba. The aspect not then resolved has come to be known as "foreman override" and arose from the following circumstances. During the initial hearings, a volunteer Board witness, Howard S. Nunn, Jr., had alleged instances where a foreman had instructed welders to weld in violation of procedures. The Board resolved Mr. Nunn's specific concerns in the Applicants' favor. PID at 232-236. However, Mr. Nunn's concerns had also triggered an NRC Staff investigation which had uncovered further allegations of foreman override from a confidential source, designated as "Welder B", Staff Ex. 27, pp. 27-28. Following further investigation of Welder B's allegations, the Staff requested that the Applicants initiate an extensive inquiry into these foreman override concerns. See, Staff Ex. 31, P.A. Ex. 146. The Board subsequently determined that it could not resolve those concerns on the then-existing record. Accordingly, we left the record open to receive the Applicants' and the NRC Staff's follow-up reports, and to consider further action at that point. PID at 237-238. We conditioned our order authorizing issuance of a low-power license upon:

Demonstration to the Board of a reasonable assurance that the "Welder B" and related concerns described in III.B 48-51 do not represent a significant breakdown in quality assurance at Catawba. Id., at 272.

Upon receipt of the anticipated reports¹, the Board called for comments from the parties and determined that further discovery and hearings on the foreman override concerns on an expedited basis were warranted. Tr. 12,843-44. Consistent with the Commission's "Statement of Policy on Conduct of Licensing Proceedings" (13 NRC 452), this Board has consistently sought to avoid or reduce delays in this licensing proceeding "whenever measures are available that do not compromise the Commission's fundamental commitment to a fair and thorough hearing process." Id at 453. In that regard, Palmetto Alliance's request for discovery and a hearing on foreman override concerns was received on September 17, 1984 and granted, over objection, on September 21, 1984. At that time, the Applicants were predicting that Catawba's Unit 1 would be ready to go critical on October 17, 1984. Affidavit of Warren Owen dated September 12, 1984, and appended to Applicants' pleading of that date. Under the circumstances, and considering particularly the narrow scope of the foreman override concept, the Board put forward a tentative schedule for discovery, hearing, and findings, leading to a Board decision in late October. Tr. 12,845-48. After the parties had had an opportunity to consider the tentative schedule, we called for their comments. Tr. 12,867. Most of the comments concerned whether

¹ Applicants' "Investigation of Issues Raised by the NRC Staff in Inspection Reports 50-413/84-31 and 50-414/84-17", dated August 3, 1984 (App. Ex. 116), and the Staff's Inspection Report Nos. 50-413/84-88, 50-414/84-39, and an accompanying notice of violation dated August 31, 1984 (Staff Ex. 33).

confidential sources should be disclosed. Tr. 12,867-12,905. Apart from a passing reference by Palmetto in that context to a "very speedy truncated process" (Tr. 12,889), no specific objections were made by any party and no alternatives were proffered to the Board's schedule, which was followed. See also Tr. 14,369-70.

The hearing took place in Charlotte, N.C. on October 9-12, 1984. The Board heard (a) a fifteen-member panel of Applicant witnesses and three Applicant rebuttal witnesses, (b) a four-member panel of Staff witnesses, and (c) one expert and six employee (present and former) witnesses called by Palmetto Alliance. In order to provide maximum opportunities for questioning, all four hearing days ran into the evening hours, producing a transcript equivalent to about six hearing days.² The bulk of the time was allocated to Palmetto Alliance for cross-examination of the Applicant and Staff panels and for eliciting direct testimony from the employee witnesses. The Board believes that Palmetto had a fair opportunity to "make its case" on the foreman override concerns. At the conclusion of the hearing, the parties stipulated to a date for filing proposed findings.³ Findings of the

² An average 9-to-5 hearing day usually generates a transcript of about 250 pages. The foreman override hearing generated a transcript of 1,483 pages.

³ At the close of the hearing, the Applicants announced a slip in their criticality schedule from October 17 to November 8, 1984.
(Footnote Continued)

Applicants, Staff and Palmetto Alliance were subsequently received and considered.⁴

II. FOREMAN OVERRIDE -- SCOPE OF THE CONCEPT
AND ULTIMATE ISSUE PRESENTED

"Foreman override" was the term of art defining the parameters of the hearing. In our June 22 Decision, we had described foreman override situations as those in which "foremen would order welders to do work in a manner contrary to prescribed procedures or to the welder's ideas of correct welding." PID at 232. The scope of foreman override was argued by the parties at the beginning of the October 1984 hearing, (Tr. 13,051-71), with Palmetto Alliance urging an expansive view. Tr. 13,066. In order to provide further guidance for the hearing, the Board stated that:

"We don't put this out as a definitive resolution that is designed to answer all questions, because what is or is not foreman override is partly dependent on the facts and circumstances [of] different cases, and it is not something we

(Footnote Continued)

Proposed findings and an anticipated Board decision date were then set with reference to that date. Tr. 14,369-82. By letter dated November 1, 1984, the Applicants reported certain unanticipated problems in Unit 1 and slipped their criticality schedule further, to early December 1984. With the benefit of hindsight, the foreman override hearing could have been held somewhat later than it was. Licensing Boards must, of course, set hearing schedules on the basis of presently available information.

4

Carolina Environmental Study Group (CESG) is listed as co-author of Palmetto's findings. However, CESG was not a co-sponsor of Contention 6 (of which foreman override is a part) and its participation in the foreman override hearing was intermittent. We treat Palmetto as the lead intervenor party in this decision.

can judge down to a very find point in advance [T]he foreman override that we are dealing with basically is situations where an employee is directed, either explicitly or implicitly, to violate established procedures. Now this directive to violate procedures doesn't have to be in so [many] words; [it] can be implicit But we want to emphasize, on the other hand, that the mere fact that a foreman might have applied pressure for production and the employee then decides to bend to that pressure, and one way to bend to it is to violate procedures, that is not what we consider foreman override.

Now, that isn't to say that there wouldn't be situations that are outside our definition that reflect undesirable work practices. We are here to hold a hearing on a rather narrow concept . . ." Tr. 13,159-60.

In addition to this guidance, we took the position -- to which we had adhered throughout our consideration of Contention 6 (e.g., PID at 209) -- that we would not consider alleged instances of foreman override involving work on non-safety systems. Tr. 13,070, 14,081. Such allegations -- for example, involving work in the turbine or administration buildings, or on the grounds -- are remote, if not irrelevant, to nuclear safety issues. See Long Island Lighting Co. (Shoreham Nuclear Power Station), ALAB-788, slip op. p. 68.

Apart from these scope considerations, the focus of the hearing was affected by the ultimate factual issue -- whether foreman override had been sufficiently widespread at Catawba that it represented a significant breakdown in the quality assurance system, such that we could not make the requisite safety findings. See Union Electric Co. (Callaway Plant), 18 NRC 343, 346 (1983). Thus, a few instances of foreman override, or possibly even numerous isolated instances, would be

expected at any nuclear construction site over time, but would not necessarily indicate a serious breakdown in quality assurance.⁵

III. STAFF AND APPLICANT INVESTIGATIONS OF FOREMAN OVERRIDE

A. MRC Investigations

The Staff has described its investigation of foreman override in their proposed finding (PF) 10, as follows: ". . . As documented in the record of the Fall/Winter 1983 hearings, Region II conducted 25 interviews based on the Nunn⁶ allegations and these interviews pointed to Welder B's foreman. See, Staff Ex. 27; Tr. 13,911, Blake. Between early January and the beginning of March 1984, Region II interviewed a total of 53 people, 41 individuals whose interview summaries were provided to Palmetto Alliance on discovery, pursuant to protective order, and an additional 12 individuals, four being confidential sources, who provided information which tended to corroborate the original allegations of Welder B. See, P.A. Ex. 146, Tr. 13,911, 13,883, Blake, Uryc Tr. 13,786, Uryc. These last interviews were summarized in a special inspection report (Staff Ex. 31), and served as

⁵ Similarly, proof indicating multiple instances for foreman override by a single foreman (such as the proof about Foreman Arlon Moore in this case) would not indicate a widespread breakdown in QA and, indeed, could quickly become cumulative in a hearing.

⁶ As noted above at p. 2, Howard S. Nunn, a former Duke welder, had raised the foreman override issue in the first instance.

the basis for the March 13, 1984 meeting between Duke management and Region II officials and the initiation of the Duke inquiry. Id. Based on the twelve interviews, summarized in the special inspection report, Region II found evidence of problems involving: (1) violation of interpass temperatures, (2) removal of arc strikes without paperwork, (3) welding bead sequence [subsequently determined to be within procedure], (4) posting of "look outs" for inspectors while welding procedures were violated, (5) perception of foreman pressure for quantity, and (6) welding without proper documentation. Staff Ex. 31, at 2. The NRC's investigation did not turn up any evidence of such problems other than on Arlon Moore's second shift welding crew. Id. at 3-4; Tr. 13,181, Dick. However, Applicants were advised to begin an immediate review of the issues to independently determine what problems were raised, to investigate the possibility that the activities reported extended beyond the particular second shift welding crew, and to identify the corrective actions required for adequate resolution. Staff Ex. 31, at 2.⁷ Thus, before the Duke inquiry had begun, the Region II

⁷ "The Board notes that the Staff's interviews with Individual B, Individual B-1, Individual B-2, and Individual B-3, contain allegations concerning actions by the second shift foreman, Mr. Moore, which could not be directly explored through cross-examination, inasmuch as their identities were not revealed by the Staff to the other parties. See, Tr. 13,014-15. While the interview summaries in the Staff report (Staff Ex. 31) contain allegations of specific incidents in which Mr. Moore is said to have pressured welders on his crew to violate interpass temperatures (B, B-1, B-2), weld without possession of proper
(Footnote Continued)

investigation had gathered evidence from 78 interviews, and found evidence of foreman override in only one crew."

Palmetto gives scant attention to the Staff investigation in their proposed findings although it asks why the information discovered was not found earlier in routine inspections (Tr. 14,392-93). The Staff attributed this to the fact that their inspections are conducted on a sampling basis. (Blake, Tr. 13,772). The Board also views the fact that these incidents were not found in sampling inspections as one indication of the low frequency of occurrence, as discussed later in this decision. We reject as unwarranted Palmetto's suggestion (Tr. 14,434), that Mr. Nunn's efforts to point the way to further evidence of foreman override have been rebuffed by the Staff.⁸

B. Duke Investigations

As requested by the NRC Staff, Applicants began their own investigation of foreman override, which was monitored by the NRC Staff. App. Ex. 113, p. 7; Dick, Tr. 13,178. R. L. Dick, Vice President,

(Footnote Continued)

paperwork (B-1 [this incident was caught at the time for a missed hold point and written up as an NCI], B-2), and remove arc strikes without paperwork (B-2), it may be noted that similar incidents were explored on the hearing record, and the Board considers these matters to have received adequate consideration."

⁸ See In Camera Witness Statement (Bruno Uryc) dated October 11, 1984, taken in accordance with the Commission's "Statement of Policy, Investigations, Inspections, and Adjudicatory Proceedings," dated Sept. 7, 1984, p. 6.

Construction, was made responsible for investigating production/quality concerns. Mr. Hollins, who was not stationed at Catawba, was designated by Mr. Dick to manage the investigation. A separate board independent of the Construction Department was established by Mr. Owen, Executive Vice President of the Company, to review adequacy of findings and corrective action.

The investigation was to include the following:

- Interviews with craft and management personnel to corroborate and develop information received from the NRC relative to production/quality concerns.
- On a sampling basis, interviews of selected craft personnel to determine if production/quality concerns are broader than a specific crew/craft.
- An evaluation of findings and determination of corrective action programs that address any technical and/or personnel issues, including programs designed to promote open communications on quality concerns.

The investigative methodology and results are set forth in App. Ex. 116.

Duke personnel interviewed 217 people, some several times. These included:

- a. 65 of the 110 welders who had worked for a foreman mentioned frequently in allegations, Arlon Moore.
- b. 69 randomly selected other welders from a population of about 400.*
- c. 48 power house mechanics from about 800.*
- d. 6 steelworkers from about 135.*
- e. 8 electricians from about 300.*

- * These populations were workers employed at the time that foreman override incidents had allegedly occurred and assigned to work in critical areas.

In addition, thirteen line foreman, two general foreman, four OC inspectors and two others who were thought to have relevant information were interviewed. (Hollins, prepared testimony, App. Ex. 115, pp. 2-3). The interviews were structured in that guides and essential questions were supplied to the interviewers. (Dick, prepared testimony, App. Ex. 113, Attach. C, p. 3).

Palmetto attacked the Duke methodology through the testimony of Raymond Michalowski, Ph.D., a Professor of Sociology at the University of North Carolina - Charlotte. Direct testimony ff. Tr. 13,927). Dr. Michalowski's prepared two-page testimony summary (Pal. Ex. 147) was expanded at length in direct examination. (Tr. 13,927-57). His testimony is fairly summarized by the Staff PFFs 13 & 14, as follows:

Dr. Michalowski asserted that ". . . the questions the study set out to answer were not clearly stated, the behaviors associated with foreman override were not initially specified (for example, the perception of pressure, or actual pressure), no criteria were specified in advance for judging significance (e.g., what would be considered "pervasive"), and the sampling was not done to assure appropriate representativeness of the total population being studied. Id., at 13,936-43. He viewed the study's reliability suspect due to the vagueness in the questions asked, the dependency of one question's answer on previous questions, the use of subjective terminology, and the

use of Duke interviewers when seeking "high-risk" information (i.e. - evidence of wrong-doing from one's employee). Id., at 13,945-51."

"While he initially was of the opinion that the study should not be relied on for any purpose, id. at 13,957, he narrowed his criticisms considerably on cross-examination, principally to the inappropriateness of making inferences about foreman override outside the welding craft. Id., at 13,976. First, he conceded the study may have been valid insofar as it undertook to find the extent of perception of violations. Id., at 13,965-67. He also granted that an investigative technique is a valid approach for finding actual violators. Id., at 13,969. He also agreed that if the study were attempting to generalize about the pressure an entire population is experiencing, and the sample was exclusively of sub-populations subject to high pressure, the evidence would likely overstate the incidence of high pressure being experienced by the entire population. Id., at 13,973. Similarly, if increased violations were associated with high pressure, generalizations about the population would tend to overstate the number of violations. Id., at 13,974."

In rebuttal, the Applicants presented the testimony of John E. Hunter, Ph.D., Professor of Psychology and Mathematics, Michigan State University (App. Ex. 120, Direct testimony ff. Tr. 14,278). The Staff has fairly summarized Dr. Hunter's testimony in Staff PFF 15 as follows:

"Dr. John E. Hunter . . . disagreed with Dr. Michalowski's principal conclusion that the data did not justify drawing plant-wide conclusions. By taking the number of instances of foreman override as

10, and comparing that to the estimated number of transactions in which foreman override could occur, Dr. Hunter concluded that it was possible to validly conclude foreman override was a rare event. Tr. 14,342-47, Hunter. He said this would be true even if the sample were limited to the 33 non-welding craftsmen sampled by Duke. Id., 14,347. He also noted that pooling the non-random and random samples as Duke did would be conservative, that is, it would tend to result in overstating the expected occurrences of foreman override, id., at 14,356-57, since the frequency of foreman override in the non-random sample would have been greater. App. Ex. 120, at 8. He also concluded that the questions Duke asked elicited the observations needed to determine whether foreman override allegations were stated, Tr. 14,311-12, Hunter, the questions were appropriately phrased so as to provide the desired information, id., at 14,327-32, App. Ex. 120, at 3-4, the relative power-differential between the interviewers and the craftsmen, and the eliciting of "high-risk" information, did not affect the reliability of the information received, id., and that the data generated provided adequate justification for the generalization made -- i.e., that foreman override is a rare event. Id. at 14,339-42."

The Board finds that the "investigative" approach taken by Duke was not only appropriate, but necessary. We concur with Staff's PFF 17, in that Duke was obligated to pursue each lead. Thus, this was not a pure research project and the resulting sample of interviews would tend to be biased, but in a conservative direction. That is, the bias, if any, would be more likely to reveal a greater number of violations than

would a pure random sample. As a cautionary measure, it was also incumbent on Duke to do some sampling of workers in other critical safety-related areas.

Palmetto was also critical of the size of the sample. Tr. 14,419-14,422. Dr. Hunter conceded that this criticism was partially valid (Tr. 14,356). Sample size goes to the degree of confidence one might have in the result, but does not necessarily negate the results. In this case a larger sample size would have been desirable, but considering all of the circumstances and Dr. Hunter's testimony, the Board finds the sample acceptable.

These academic criticisms of the Duke sample might have been more telling if a rigorous scientific study, with calculated standard error deviations and levels of confidence, had been necessary for Duke's purpose. But such a discriminating tool was not required. Unlike, for example, a finely-tuned survey designed to determine divisions of public opinion within, say, a percentage point of accuracy, Duke was conducting a relatively gross analysis. To put it another way, if one is looking for the footprints of foreman override in a nuclear plant work force, one does not need a magnifying glass, only an open eye.

The Board's inspection of the interviewing guides and review of the testimony also lead us to conclude that Duke's methodology would tend to produce valid information. The Board is mindful of Dr. Michalowski's concern that fear of retaliation had the potential for blocking free expression by employee interviewees. In this regard, the Board noted the extreme anxiety and nervousness of the witness identified as

Individual 31.⁹ I.C. Tr. 2099. However, workers' anxieties seemed to us to flow more from concerns about their immediate supervisors or fellow workers than the Duke management people (See e.g., Affidavit 8, App. Ex. 118). For example, several witnesses had no objection to testifying in public session, so long as the television cameras did not photograph their faces. E.g., Tr. 14,070, 14,095. While the mores of the workers caused them to be reluctant to volunteer information, they responded candidly when asked direct questions, as was done in the Duke investigation (for example, see Carpenter, Tr. 14,233 and Individual 196, 1C 2018, 2084 and 2086).

In sum, the Board's evaluation of the methodology of the Duke investigation considered the testimony and cross-examination of the Duke panel, the expert witnesses, the testimony of workers called by intervenors, the reports, affidavits and exhibits. We also considered the independent investigation of the Staff and the consistency between Duke and Staff results, as well as the monitoring of the Duke investigation by the Staff (Uryc and Blake, Tr. 13,848, 13,865, 13,883).

⁹ On October 2, 1984, the Board issued a Revised Protective Order to protect the names, addresses and telephone numbers of current and former Duke employees provided to Intervenor by either Applicants or the NRC in connection with the foreman override concerns. As a result, references herein to individuals whose identity is subject to non-disclosure under the protective order are made by reference to a number code supplied by Applicants. The Board determined that disclosure of NRC confidential sources, even under a protective order, was not required in order to probe the issues adequately. Tr. 13,014-15.

From all of this we find that the Duke investigative methodology was valid and an appropriate base for making generalizations and conclusions.

Palmetto also criticized Duke's investigation for incompleteness. We essentially agree with the Applicants on these points. The Board (with one wording change) adopts Applicants' proposed findings at "C" pp. 11 & 12, which read:

"Intervenors alleged that the affidavits do not reflect all the matters raised during the interviews (see, e.g., Tr. 13,143). This allegation was not substantiated by the testimony. Of the five Catawba employees called by Intervenors, four stated that the affidavits fully reflected their concerns (Tr. 14,142-43, McCall; Tr. 14,188-89, Braswell; Tr. 14,222-24, Carpenter; IC Tr. 2068-69, Ind. 196). Individual 31 did have two concerns which were not reflected on either of his affidavits, but this was only because he forgot to mention them in that he was a nervous individual and his mind would go blank at times (IC Tr. 2103, 2105, 2118-19, 2130-31 Ind. 31). He stated he was not intimidated by the interviewer, Mr. Bolin (id.). His claim that the interviewer told him "I don't want to hear about harassment" (IC Tr. 2105. Ind. 31) was denied; the interviewer testified that the affidavits of Individual 31 contained all the statements he made (Tr. 14,273-76, Bolin). This Board, having observed the demeanor of these witnesses appearing before it, credits Mr. Bolin's testimony. In any event, Individual 31 said he did not have anything to say about harassment (IC Tr. 2105, Ind. 31), and he had never seen anything involving a foreman

that he thought would adversely affect the safe operation of the plant (IC Tr. 2135-36, Ind. 31)."

"The Board concludes that these affidavits, which were relied upon by Applicants during their investigation, [adequately] reflect the concerns that the employees raised during their interviews. This conclusion is particularly reasonable in light of the fact that the employees themselves read and signed these affidavits and presumably would note inaccuracies (see App. Ex. 118)."

In a similar vein, Palmetto criticized the Applicants for selective omissions. In that regard, the Board concurs in and adopts Staff's PFF 20: "Palmetto also attempted to show that the (Duke) report itself was incomplete, by toning down negative implications or leaving out significant details, particularly concerning the field testing of critical welds from Arlon Moore's crew (e.g., Tr. 13,436, 13,439-40, 13,510, 13,512, 13,514, 13,516, Guild), and concerning Duke's taking personnel action against a dozen supervisory personnel, Tr. 13,376, Guild, rather than the five individuals noted in the August 3, 1984 report. We agree that all the details of Duke's investigation are not contained in its report, which was intended to serve as a summary of a much larger amount of material. See, P.A. Ex. 146 (9/4/84 Memo to File, B. Uryc, J. Blake). However, that is one of the principal reasons the Board ordered further discovery and hearings -- to probe the bases for the Applicants' findings. We are satisfied that through this process the significant details, including those concerning weld testing and personnel actions, were not only made available to Palmetto, but the

subject of extensive cross-examination.¹⁰ In the Board's view, the full scope of information uncovered and persons responsible, was available and the subject of the hearings."¹¹

IV. EMPLOYEE AFFIDAVITS AND WITNESS TESTIMONY

Affidavits from over two hundred employees obtained as part of the Duke investigation were placed in the record as App. Ex. 118. The Board also heard testimony from six present and former employees called by Palmetto. The Board adopts much of the Staff's Proposed Findings as an accurate reflection of the substance of this testimony, as indicated in the following discussion.

A. Instances of Foreman Override. The Applicants conducted follow-up interviews and technical reviews, as appropriate, of allegations contained in the affidavits. Based on that analysis, they concede ten specific instances of foreman override based on first-hand

¹⁰ The proposed employee action plan, which summarized proposed actions to be taken against about a dozen individuals, was fully probed. See, P.A. Ex. 154; Tr. 13372 et seq.; see also, P.A. Exs. 152, 153, 155 (documenting certain personnel actions taken). Moreover, since the criteria for taking personnel action was "inappropriate supervisory action" (Tr. 13220-1, Dick), and not foreman override, the disparity in reporting asserted by Palmetto is of little significance.

¹¹ However, as explained in Section VB below, we find that Applicants could have been more forthright in presenting the results of the field testing of welds.

employee knowledge. (Hollins, Tr. 13,256 and 13,259, also App. Ex. 116, p. 14). The Staff's Proposed Finding 21 identifies thirteen specific instances which appear to meet the definition of foreman override. The instances and foremen involved are:

- 4 interpass temperature violations (Arlon Moore 3, John Gladden 1).
- 4 attempts to mislead inspectors (Halterman, Barker, Gladden, Chrisley).
- 1 lookout for QC inspector (Moore).
- 3 directions to work without process control paperwork (E. Cobb).
- 1 direction to work on a non-conformed item (B. Cobb).

B. Violations of Interpass Temperature

Allegations that the required interpass temperature limit of 350°F for welding on stainless steel (NRC Nuclear Regulatory Guide 1.44; Duke Nuclear Guide 1.31, ¶ 4) was frequently exceeded was the most serious issue raised and received more attention than other issues at the hearing. The Staff's interviews with Welder B (Staff Ex. 31) and the follow-up investigations (Staff Ex. 33, p. 2 and App. Ex. 116, p. I-6, also Llewellyn, Tr. 13,457-58) led Staff to conclude that ". . . at least one welder violated interpass temperature on safety-related systems as a result of (production) pressure from [Foreman] Arlon Moore", (Staff PFF #23, pp. 12-13).

Individual 196 described in affidavits (App. Ex. 118) and testimony three incidents where he believed interpass temperature might have been violated. In one case, a welder had said he was welding too hot because ". . . Arlon said I need to get them done tonight." (Tr. IC 2022, App. Ex. 118, Affidavit 196). On another occasion, Arlon Moore replaced Individual 196 and another welder with two other welders in order to finish work by the end of the shift. Individual 196 believed that "for them to finish those welds so quickly, they had to work outside of procedure." IC 2074-76; App. Ex. 118, Affidavit 196. In a third incident, Individual 196 was concerned that W. M. Carpenter, a former Duke welder, had done work too quickly IC 2034-5, 2073, App. Ex. 118, Affidavit 196. However, Individual 196 did not have personal knowledge whether procedures had been violated (IC 2034), and Carpenter subsequently testified that he had done the job rapidly by an assembly line approach that did not require excessive temperature (Tr. 14,213-14). Mr. Carpenter did relate another incident where foreman Moore had told him to make another pass when he could not "lay his hand on it" (Tr. 14,015).

Welder B informed NRC Inspector Uryc about 12-to-24 welds in the Unit 1 pipe chase that were overheated by Individual 70 and involved Foreman Arlon Moore. Another incident, involving John Gladden, was raised by Individuals 106 and 33. App. Ex. 116, Appendix A, I-2 and App. Ex. 118. The Board concurs in the Staff's PFFs 23-26, which provide more technical details on this subject. We agree that these instances of interpass temperature violations are isolated, involving

only two foremen who have since been removed from supervisory responsibilities.

C. Misleading Inspector/Defeating Inspection Process

The Board adopts Staff's PFFs 29-30, which describe an event involving C. W. Braswell, as follows:

"As noted in the initial tally of allegations of foreman override found in Applicants' report, these were four alleged incidents in which a foreman gave a direction to a craftsman which served to mislead the inspector involved, or to defeat the proper functioning of the QA/QC system for maintaining quality construction. Each involved a different craft foreman. Two were the subject of cross examination".

"C. W. Braswell, a powerhouse mechanic, related that a QC inspector had come to him asking him to identify some redheads (expansion bolts) which had been installed in the number one reactor loop a year before with a torque wrench which was the subject of a deficiency report (R-2A) for being out of calibration. App. Ex. 118 (Braswell); Tr. 14175-77, Braswell. Braswell couldn't remember the exact location, but was able to point out the "loop" involved and the inspector was able to check the redheads on it. Tr. 14176, Braswell. Mr. Braswell said his foreman, Ed Halterman, told him just to point out some redheads; but he could not remember if he was told this before or after the loop was checked, and did not know whether Mr. Halterman was serious or kidding. Id."

Assuming that this event actually occurred, evidence of foreman direction to violate procedures is not clear. The QA program was not

actually defeated. Under all the circumstances, we believe this is a trivial matter.

The Board adopts Staff's PFF 32, describing an event involving Individual 31, as follows:

"Individual 31 related an incident in the Unit 1 pipe chase in which he had repaired the same weld four or five times because the radiograph kept showing a rejectable condition. The last time it came back, Individual 31 discovered that the x-ray department had been sending the wrong weld package. However, instead of telling Individual 31 to inform the Authorized Nuclear Inspector (ANI) that there had been a mix-up, his foreman, H. Barker, told him to tell the ANI that he had found the defect and get the hold point signed off. Rather than do this, Individual 31 told the ANI of the mix-up, and both welds were red-tagged. App. Ex. 118, Ind. 31; I.C. Tr. 2107-2110, Ind. 31. According to Individual 31, Mr. Barker had wanted to get the matter of the mix-up resolved without causing the radiographers involved any trouble (they both received disciplinary "A" violations as a result of this incident). I.C. Tr. 2110-2113, Ind. 31."

This is an isolated incident in the record and represents no pattern of activity or general inclination to deviate from procedures.

Two other incidents involving Mr. Barker were related by Individual 31. We consider neither to involve foreman override. (See Staff's n.13 to PFF 33 for more detail). One incident involved an order to remove a red tag after receipt of resolution papers, which is permitted. The

other concerned a weld Barker approved that had looked acceptable to No. 131, but not to another welder. The weld had "shot" acceptably.

There were two other incidents described in affidavits (App. Ex. 118), but not subjected to cross-examination, which warrant discussion. Staff's PFFs 34 & 35 describe an incident found in the affidavits of two welders, Individuals 72 and 177, which involved ". . . foreman Johnny Chrisley telling the two welders that one of them had done the welds (fastening angle iron clips to ceiling rails in the control room) and someone had to stencil them so they could be signed off. One (Individual 72) said he didn't do them and refused. The other (Individual 177) said he stenciled 35-40 welds which he had not done, but that those he didn't feel comfortable about, he rewelded or repaired. He said he did it (stenciling) because the foreman told him to. App. Ex. 116, App. A, Sec. VI; App. Ex. 118, Inds. 72, 177.

"Applicants concede that, if true, this action violated a Duke, but not a code, procedural requirement. App. Ex. 116. App. A, Sec. VI. This is within our definition of foreman override. In addition, this incident was not detected by the QA program. However, as noted by Applicants, all appropriate inspections were made, all were acceptable, and all Duke welders are qualified to perform the welds in question. Id. The principal rationale for stenciling welds, as we recall from our earlier deliberations in the Fall of 1983, is to assure that if bad welds are made, the welder involved can be traced. If bad welds could not be traced to the appropriate welder, it would be difficult to either remove or retrain the problem welder. . . ."

We also adopt Staff's PFF 36 concerning the affidavit of Individual 94, ". . . in which he discovered that a hold point had been missed, which he verified with a QC inspector. However, his foreman, John Gladden, told him to get another inspector, and that the other inspector might miss the problem and sign off the weld. Individual 84 informed the first inspector, who apparently alerted the second inspector, who told Mr. Gladden he would not sign off the work. Individual 94 considered this direction to violate a procedure. App. Ex. 118, Ind. 94."

A deliberate effort by a foreman to deceive or withhold information from an inspector by his own action or through orders or other guidance to subordinates is a serious matter. If it is not an clear violation of present procedures, it should be treated as such. If a widespread practice, such a proclivity could, if not detected, impair the functioning of the QA program. In this case, however, the record reflects only these isolated incidents, not representative of a pattern of improper actions. In and of themselves, these incidents were of no safety consequence.

D. Direction to Work Without Process Control

The Board adopts Staff's PFFs 39-42 on this subject.

"Applicants' August 3, 1984 report notes five incidents in which craftsmen (Individuals 77, 94, 46, 95 and 88) stated they were directed to work on hangers or to fit up pipe without having the necessary paperwork (process control) in their possession. App. Ex. 116, App. A,

Sec. III. According to the report, four of the five involved one powerhouse mechanic foreman, Ed Cobb, and the other, John Gladden. None of these incidents was the subject of cross-examination, but are discussed in the related affidavits. See, App. Ex. 118. Further, Individual 196 testified he was told by Individual 109 that Arlon Moore told Individual 109 to start welding without process control. The affidavit of Individual 88 (mentioned in Applicants' report) also related an incident in which a welding foreman, Dave Williams, instructed a welder to make a tack weld without paperwork. Individual 88 said that, of his own accord, he watched to see that no one was coming. App. Ex. 118, Ind. 88. Finally, Individual 88 mentioned an incident in which he and Individual 77 had been working on a hanger but Individual 77 left with the paperwork, and in his absence two other powerhouse mechanics finished the work. Id. As noted by Applicants, in the incidents involving Individuals 46 and 95, the paperwork was nearby, App. Ex. 116, 118 (affidavits), and this appeared to be the case in one of the incidents recounted by Individual 88. Individual 94 related that he refused to follow Mr. Gladden's instruction. Id. Individual 77 said, with respect to his own concern, that he talked Mr. Cobb into waiting for the paperwork."

"Applicants acknowledge that craftsmen were required by quality assurance procedures to have possession of the process control information while performing work, so that it is available for reference as necessary. App. Ex. 116, App. A, at III-2. Thus, direction to work without such paperwork is improper, and appears to constitute foreman

override. Second, there is no evidence that these incidents were detected by the OC inspectors, although some craftsmen simply refused to go along with the violation. Third, there does appear to be a limited pattern here, which involves one particular powerhouse mechanic foreman, Ed Cobb. Although three other foremen are mentioned, the incidents appear isolated. The evidence suggests that Mr. Cobb had a practice of keeping the work going, even if paperwork was not with the craftsman, as required. Although both Arlon Moore and John Gladden were the subject of other foreman override incidents, the two incidents related do not demonstrate a proclivity to direct work without process control. The name of Mr. Williams, also mentioned here, does not appear again, to the Board's knowledge."

"If craftsmen were regularly forced to work without being allowed to refer to the appropriate controlling procedures, the opportunity for workmanship error could reasonably be said to increase, and part of the quality assurance program would not be working. Nevertheless, if errors were to occur, defective work would be subject to inspection, as noted by Applicants. App. Ex. 116, App. A, Sec. III. We are not, however, prepared to say that the evidence shows that work without process control was pervasive, based on these few incidents involving mainly just one foreman. Moreover, we are also mindful of our earlier findings that, in general, Applicants' system of process control in the welding area worked rather well."

"The Board therefore finds that although one foreman appears to have had a proclivity to direct that work continue in technical

violation of procedures, this practice was not, in fact, widespread, and, because of the inspection process, is unlikely to have led to the quality assurance program failing to detect faulty work. These incidents do not demonstrate a significant breakdown of the QA program."

E. Cold Springing

The Board adopts Staff's PFFs 47-52:

"Although Applicants included "cold springing" in Appendix B of their report, indicating their view that foreman override was not present, Palmetto Alliance nevertheless attempted to show that foreman override occurred in this activity. Tr. 14095, et seq. (See also Pal. PFF 14413-17). Cold springing, which involves the use of come-alongs and chain falls to force fit mismatched pipe ends so they can be welded, Tr. 13567-68, Mills, was a subject considered and resolved in the initial PID."

"James Boyd McCall, a power house mechanic, alleged that he, a welder, and several inspectors had allowed the force fitting of a pipe using one come-along and three chain falls without first using a dynamometer to determine the force needed and without proper documentation, as required by CP-483. Tr. 14,101, McCall; Tr. 13561, 13564, 13579-80, Mills. The welding foreman, Jim Johnson, was told the pipe could not be hand-fit, but told them to go ahead and pull it over. Mr. McCall contacted Ronald Kirkland, a QC inspector, who went to his supervisor, Bill Deaton, returned, and told them to proceed to make the fit. Tr. 14103-06, McCall."

"The crew members, foreman and QC inspector in this case all believed the cold springing was acceptable, under QA procedure M-4. Tr. 14110, McCall; App. Ex. 116, Attach. B, at III-1. However, NCI 18304 was originated on April 5, 1984, to document the cold spring, id., and it was determined that the force used violated CP-483. Tr. 13574-75, Mills. It appears that the foreman and QC inspector had mistakenly relied on OAP M-4, which states that jacks, jigs and other fixtures can be used to align a fit, but had not considered CP-483, which specifically addresses cold springing. Tr. 14099-100, 14110, 14114, 14135, McCall; Tr. 13574-75, 13580-81, Mills."

"Mr. McCall also related an incident which occurred soon after, involving use of a porta-power hydraulic jack, but no foreman was involved, and, in any event, it was observed by a QC inspector and non-conformed. Tr. 14116-20, McCall."

"While two other cold-springing incidents were mentioned in affidavits, none of these involved intervention of a foreman. Tr. 13561, 13568-9, Mills; App. Ex. 118, Inds. 127, 163, 198, 168. See also, Tr. 13570-74, Hollins, Llewellyn."

"None of the above incidents involve a direction by a supervisor to violate a procedure and thus do not state a case of foreman override. While in the first case, the QA process did not identify the violation, it appears from the second incident shortly thereafter, that a similar violation was indeed caught. In addition, design engineering determined the cold spring to be insignificant from a safety perspective. Tr.

13581-3, Mills. From one isolated case, we cannot draw any inference that a significant breakdown of the QA program occurred."

F. Removal of Arc Strikes Without Process Control

Applicants define arc strike as:

"Basically a welder's mistake. The electrode is inadvertently brought in contact with material to be welded. The welder immediately pulls the electrode away from the material. The material has been quickly heated and cooled with small discontinuity created on the material." (App. Ex. 113, Attach. C, p. 6.)

Witness McCall testified that arc strikes outside the weld zone usually occurred when a welder was dragging his rig from place to place and the tungsten electrode accidentally hit up against a pipe. (Tr. 14,126-28).

The principal concerns associated with arc strikes are that (1) the possibility that a crack in the pipe will result, (2) grinding of a deep strike will substantially reduce the thickness of the pipe, and (3) undesirable material will be left on piping or valves. (Tr. 13,595). For example, Staff witness Czajkowski noted a crack associated with an arc strike on one of the test socket weld specimens sent to BNL for examination. (Pal. PFF TR. 14,410, Staff Ex. 34, p. 5). In response to questions from the Board, witness Van Malssen testified that, with the possible exception of fatigue in piping materials ". . . we would leave arc strikes if they didn't violate the wall thickness of the material. (Tr. 13,652).

Superficial arc strikes in the weld zone that are removed with a few strokes of a file do not violate Duke's process control procedures and do not require additional process control paperwork. (App. Ex. 116, Att. B, p. I-3). Removal of deeper arc strikes or arc strikes outside the weld zone requires proper authorization and documentation on a M-4 Form and QC inspection. (Tr. 13,596). QC inspectors are responsible for noting any questionable areas on a weld, including arc strikes, during the final system inspection. (App. Ex. 116, Att. B, p. I-5). The M-4 procedure includes walkdown inspections of the piping system with the objective of finding any construction damage, including arc strikes. (Tr. 14,144).

This Board adopts portions of Staff's PFFs 53-56:

"Although the allegation that welders were improperly instructed to remove arc strikes from valves and piping without paperwork was raised by the April 1984 NRC inspection report, Applicants treated the matter in Appendix B of their report, based on their finding that there was no foreman override. See, App. Ex. 116, App. B, Sec. I. . . .

"While about a dozen individuals [expressed concerns about arc strike removal], see Tr. 13591, Llewellyn, only one [incident] appeared to be a violation which had not been caught. In that case, Individual 109 stated that his foreman, Arlon Moore, had filed off several minor arc strikes on a valve under the 1-A steam generator and instructed him to do the same. App. Ex. 118, Ind. 109. In a follow-up interview, he said he was unsure of the location of the arc strikes. App. Ex. 116, App. B, at I-2. Another welder, Individual 196 corroborated this

account, but had no direct knowledge if there were any file marks or where they came from, although he had seen what appeared to be file marks on the body of the valve. I.C. Tr. 2038-40, 2060. Applicants conducted a further analysis in order to determine whether improper filing had been done on other valves welded by members of Individual 109's crew and to confirm the location of the valve he identified. Applicants confirmed the location of the valve with Individual 109 and their examination of 19 other accessible valves performed by this crew revealed that any filing or grinding marks outside the weld zones on these valves were performed by the manufacturer. Tr. 13597-98, Kruse; See, also, App. Ex. 116, Attach. B, at I-2. Individual 196 also testified he was satisfied that the marks on the valve, raised in his and Individual 109's concern, occurred at the manufacturer. I.C. Tr. 2061. According to the evidence above, the foreman's decision to remove minor arc strikes was technically correct, since he is responsible for any arc strikes on components welded by his crew."

"Additional concerns raised included: the removal of superficial arc strikes in the weld zone, which is not a procedure violation since no process control is required; the removal of deeper arc strikes or those outside of the weld zone without proper process control, which was detected by OA; or general allegations of arc strike removal in the past about which no specific information was available. App. Ex. 116, Attach. B, at I-3 - I-4; see also, App. Ex. 118, Inds. 5, 37, 102, 131, 168, 176, 186, 191, 194, and 208."

The Board notes only one case where arc strikes were removed at the direction of the foreman. This was not a violation since the arc strike was in the weld area. The other allegations were not confirmed.

G. Scope of Foreman Override Concerns

Palmetto reviewed the employees' affidavits and summarized the results in three tables (Tr. 14,427-30). Table 1 is a basic table that lists worker affidavit number, nature of incident reported, craft, whether a direct witness, and supervisor involved. The other two tables are summaries of different information from Table 1. According to Palmetto, Table 3 shows that "the scope of supervisors implicated in override concerns is well beyond Arlon Moore and his crew" (Tr. 14,429). -- that twenty-three supervisors are implicated in foreman override, compared to the five supervisors implicated by the Applicants. Tr. 14,428-29.¹²

The Board believes that our detailed scrutiny of particular foremen and incidents (at pp. 18-31 of this opinion) is a sounder basis for assessing the extent of foreman override than the corresponding parts of Palmetto's tables. Therefore, in order to assess the incremental significance of the tables, the Board disregarded all

¹² Palmetto erroneously states that Duke found six supervisors involved in foreman override. Tr. 14,428. The Staff implicated eight different supervisors, but five of the eight were associated with only one incident. See Staff PFF 21.

incidents in Table 1 which involved one of the foremen (supervisors) already discussed in this opinion. We then reviewed each of the remaining affidavits in Table 1. In our view, none of the remaining affidavits describes events clearly involving foreman override, although five describe debatable situations.¹³ Of these debatable situations, in one (No. 36) an employee was not required to do improper work, another was based on second-hand information (No. 66), and in the remaining three (Nos. 20, 163 and 182), insufficient information was provided.

Based on our analysis of Palmetto's Tables 1, 2, and 3, we must reject the argument that foreman override at Catawba has been any more widespread than is reflected in the specific incidents discussed in this opinion. We agree with the Staff that those incidents reflect involvement by only eight foreman (among hundreds at the site), and that five of the eight were involved in a single incident, with no indication of patterns of improper conduct. Furthermore, the incidents of foreman override involved principally one foreman, Arlon Moore, while Moore was working for a particular General Foreman, Billy Smith. Both Moore and Smith have been relieved of their supervisory responsibilities. Even

¹³ The Board's reasons for rejecting the remainder included: non-safety related work (e.g., 91, 118, 110, 168), no allegation of foreman override (e.g., 62), no specific incident cited (e.g., 28) person named not a foreman (e.g., 70, 180), bad decision but procedure followed (e.g., 228, 127, 131, 120), no instruction to violate procedures and none violated (e.g., 114).

so, it was appropriate for Staff to issue the notice of violation because even one instance of foreman override could be a serious matter.

V. SAFETY SIGNIFICANCE OF FOREMAN OVERRIDE

A. Introduction

The allegations of foreman override referred to ten different kinds of construction procedures. Serious violations of such procedures could result in substandard work. The procedure that received most attention at the hearing and that was most clearly associated with foreman override was the interpass temperature requirement for welding. We discuss the significance of exceeding prescribed interpass temperatures here.

We have examined the circumstances associated with the other nine construction procedures cited in the record and conclude that although a construction or quality assurance procedure violation was evident in several cases, either those cases were non-safety related or the safety implications were trivial.

B. Interpass Temperature

In order to prevent the base metal of welds from becoming too hot, procedures specify that welds should cool to at least 350°F between

welding passes.¹⁴ Overheating of stainless steel could sensitize it, causing susceptibility to intergranular stress corrosion cracking (IGSCC). (Staff Ex. 34, p. 1). Witness Kruse pointed out that excessive heating of stainless steel can also result in undesirable constriction on the inside of socket welds after the weld has cooled and shrunk, or hot cracking of the weld metal because of the absence of ferrite control (Tr. 13,540).

In view of the many allegations of interpass temperature violations by Welder B and others, Duke undertook a combination of laboratory and field tests to investigate their significance. Duke thought that some of the welds in question might have cooled to 350°F or below, even if the welder thought otherwise. Therefore, one set of tests was made to determine how long it took 2-inch socket welds and 6-inch pipe to cool to 350°F. (App. Ex. 116, p. I-3). From these tests Applicants concluded

¹⁴ None of the technical witnesses could cite a scientific authority for the 350°F "standard." However, it appears to be a tradition in the industry (Tr. 13,538-542; 13,870-872). Staff witness Czajkowski testified that, for the type of welding involved here, interpass temperature is a non-essential variable according to the ASME Boiler and Pressure Vessel Code, Section 9. If the interpass temperature were raised, it would not manifestly effect the mechanical properties of the weld. However, ". . . you would have to worry about the stress corrosion cracking aspect" (Tr. 13,871). Applicants point out that there is no ASME or AWS code requirement regarding interpass temperature for stainless steel and, consequently, ". . . allegations regarding exceeding maximum interpass temperatures do not in themselves represent violations of any code requirements. However, Duke has committed to comply with NUREG-1.44 which recommends a maximum interpass temperature of 350°F for stainless steel welding." (App. Ex. 116, p. I-5)

that several of the interpass temperature violations perceived by the welders had not actually occurred. (App. Ex. 116, p. 1-4).

Applicants also tried to identify specific welds in which an interpass temperature of 350°F had been exceeded by use of an etching technique that evaluates chrome carbide precipitation. This involved adapting ASTM A-262 Practice A to field use. (Tr. 13,634; App. proposed decision, p. 16, Staff PFF 23). Starting with a population of about 2,000 safety-related welds on 2-inch and smaller pipe made by foreman Arlon Moore's crew, (Tr. 13,451) design engineering identified 361 which they considered "critical." Because of time constraints, 23 of the "critical" welds were randomly selected for testing with Practice A (Tr. 13,452). The Staff's consultant, Mr. Czajkowski, recommended that some of Welder B's welds, (where the interpass temperature apparently had been exceeded) also be tested with Practice A (Tr. 13,457) and some welds made by the person Duke believed to be Welder B were added to the sample. (Tr. 13,458). A total of twenty-five sample welds were tested. (Tr. 13,466).

In order to determine whether Practice A could distinguish between welds made with the prescribed interpass temperature of 350°F and welds made without allowing cooling between passes, Duke made sample welds under both conditions. Brookhaven National Laboratory (BNL) tested pieces of eight weld samples under Practice A and concluded that none of them was rejectable. "Even the specimens with no heat input control would be considered acceptable," BNL said. A second BNL conclusion was that, ". . . practice A is a viable method of field metallography for

determination of sensitization of stainless steels." (Staff Ex. 34, p. 5). This Board's interpretation of these BNL conclusions is that Practice A did not distinguish welds that had experienced high interpass temperatures because they did not become sensitized.

Applicants completed the field testing of welds made by Foreman Moore's crew and found at least three with microstructures which would not be acceptable under Practice A. (Pal. Ex. 161, p. 3). One of the welds that did not pass the Practice A test had been made by an individual believed to be Welder B. (Tr. 13,462, Pal. PFF Tr. 14,399). Seeking an explanation for these unacceptable microstructures, Applicants welded four test sockets using pipe with the appropriate heat number and four different interpass temperatures: room temperature (72°F), 250°F, 350°F and uncooled (over 700°F). (Tr. 13,502-503). When tested under Practice A, only the specimen with the 72°F interpass temperature exhibited acceptable microstructure. Even the weld made with an interpass temperature of 250°F (well below the procedural requirement) had unacceptable microstructure. (Tr. 13,503).

Once again, Practice A was shown to be of little or no use in distinguishing between welds made within and in excess of the prescribed 350°F interpass temperature. In contrast to the Brookhaven results, however, the possibility of sensitization to IGSCC at temperatures at least as low as 250°F was indicated. In view of the disparate results produced by the BNL and Duke laboratory tests and the small number of test specimens involved in each case, this Board is not convinced that the results of these tests are dispositive of this matter. Further

testing aimed at determining the validity of the 350°F interpass requirement would be desirable.

Applicants' principal description of the interpass temperature tests is at p. I-6 of App. Ex. 116. Applicants do not distinguish between the early tests, participated in by BNL, and the ones that followed discovery that some welds in the field did not pass Practice A. Applicants' main point is that interpass temperature did not appear to influence the degree of sensitization. Intervenors view this portion of Applicants' report as an attempt to suppress the results of the field tests (Pa1. PFF, Tr. 14,397, 14,401). We find some merit in Intervenors' position. Had the field testing with Practice A showed favorable microstructure in all cases, then safety concerns related to excessive interpass temperature would largely have faded away. When unfavorable microstructure was found in three out of twenty-five welds and also in test specimens made at interpass temperatures below 350°F, the potential for IGSCC could not be ruled out.

Intervenors attempted to show that the field testing of welds using Practice A was insufficient and that the extent of sensitization was more prevalent than reported by Applicants. (Pa1. PFF, Tr. 14,399, Tr. 14,402). We need not reach these questions inasmuch as Applicants ultimately do not rely on the field tests for their conclusion that IGSCC will not be a problem at Catawba (App. PFF, p. 17).

Both Applicants and Staff explain that three factors must be present in order for IGSCC to occur: sensitization of the metal, stress, and a sufficiently corrosive environment. (App. PFF, p. 17-18,

Staff PFF p. 16 n.11). In view of the unfavorable microstructure found on some of the welds examined in the field and also on the laboratory test welds examined by Duke, Applicants do not rely on the absence of sensitization to assure that IGSCC will not occur. Moreover, the second element in IGSCC, stress, may also be present because Duke does not heat treat welds to relieve stress (Staff Ex. 30, p. 2). Therefore, Applicants rely principally on the absence of the third element -- a corrosive environment -- as assurance against IGSCC. (Tr. 13,607).

Applicants' witness Ferdon testified that IGSCC has occurred only infrequently in PWR's. Furthermore, the instances where it has been reported have been associated with aggressive environments, e.g. significant concentrations of oxygen, chlorides or other corrosive materials (Tr. 13,608-14; Staff Ex. 30). See also App. Ex. 116 at p. I-7. Mr. Czajkowski, an expert witness for the Staff, supported Mr. Ferdon and testified that, ". . . despite exceeding interpass temperature and sensitization of welds, IGSCC is not expected to occur [in the primary loop at] Catawba and those welds would nevertheless be safe in service." (Staff PFF p. 16, n.11).

The record on interpass temperature concerns reflects that:

a) Only two (Moore's and Gladden's), or at most a very few, welding crews were subjected to foreman override in respect to interpass temperature.

b) Only a few individuals on Moore's crew (where most of the specific complaints occurred) and only one on Gladden's crew were personally involved in failures to adhere to interpass temperature procedures.

c) Only on rare occasions over their employment history at Catawba did the involved welders violate interpass temperatures.

d) The safety-related welds identified with high interpass temperatures were associated with the primary coolant system that will handle only non-corrosive fluids. We found no pattern of foreman override which would expand the area of concern to systems with aggressive environments.

e) There is a favorable track record of PWR primary loops in respect to IGSCC.

Therefore this Board concludes that foreman override causing violations of interpass temperature requirements has not significantly affected the quality of construction of the Catawba plant.

VI. CONCLUSION

As reflected in the foregoing discussion, the Board generally agrees with the major thrust and conclusions of the Applicants' and Staff's proposed findings. Conversely, we largely disagree with Palmetto's proposed findings. The bases for our disagreements with Palmetto's principal points, although not always labeled as such, are set forth in this decision. We note here one final point of disagreement.

Palmetto alleges that "the true extent and seriousness of the foreman override practices [at Catawba] . . . remain yet unknown" because that practice is "cloaked in an atmosphere of threat and intimidation against those who might disclose its existence." Tr. 14,430. We are told that fear of reprisal has created a "chilling effect" on the expression of safety concerns (Tr. 14,391), and that the atmosphere at Catawba was "clearly repressive." Tr. 14,429. In the context evoked by these allegations, we are asked to recall selectively

some of our findings on harassment allegations in the June 22 decision. Tr. 14,432-33. Having failed to show a pattern of foreman override (or to cast substantial doubt on the Applicants' showing), Palmetto is falling back on the "climate of fear" thesis it advanced unsuccessfully earlier in this case. We reject that thesis once more. We did consider the willingness of the foreman override witnesses to testify, particularly in light of the fact that they were being asked to criticize their supervisors. See p. 15, above. Beyond that, however, broader claims of harassment and intimidation were resolved in the Applicants' favor last June, and are now pending on appeal. For the Appeal Board's information, we add only that we see no basis in the foreman override record for reopening those questions.

The Board summarizes its basic findings of fact and conclusions of law, as follows:

- The Applicants have met their burden of proof with respect to foreman override concerns at Catawba.

- Instances of foreman override at Catawba have been isolated; only one foreman has been involved in a pattern of foreman override; that foreman and his supervisor have been relieved of supervisory responsibilities.

- Instances of foreman override have not compromised plant safety.

o In view of the foregoing, the Applicants have demonstrated a reasonable assurance that foreman override (also referred to as Welder B and related concerns, as described in paragraphs III.B 48-50 of our June 22, 1984 Decision) does not represent a significant breakdown in quality assurance at Catawba.

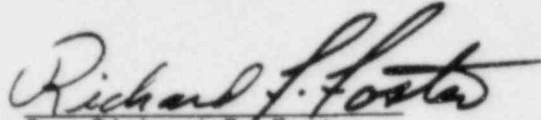
This Board's Partial Initial Decision of June 22, 1984 authorized issuance of operating licenses for Catawba Units 1 and 2, subject to (a) certain findings by the Director of Nuclear Reactor Regulation, (b) fulfillment of certain conditions imposed by this Board, and (c) resolution of certain emergency planning contentions favorably to the Applicants by a separate Board. The major conditions imposed by this Board (concerning foreman override and emergency diesel generators) have now been fulfilled or withdrawn, and the emergency planning contentions have been resolved favorably to the Applicants, subject to fulfillment of certain post-licensing conditions. As a practical matter therefore, this decision paves the way for issuance of full-power operating licenses for the Catawba Nuclear Station. Accordingly,

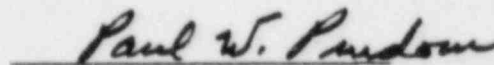
IT IS HEREBY ORDERED, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's rules, that the Director of Nuclear Reactor Regulation is authorized, upon making the findings on all applicable matters specified in 10 C.F.R. § 50.57(a) and upon satisfaction of the conditions in paragraph No. 1, p. 271 of our Partial Initial Decision of June 22, 1984, to issue to Applicants Duke Power

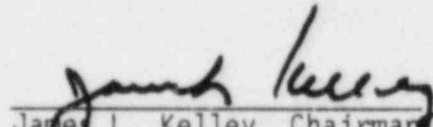
Company, et al., licenses to authorize full-power operation of Units 1 and 2 of the Catawba Nuclear Station.

Upon issuance of this decision, the jurisdiction of this Board will terminate.

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