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RELATED CORRESPONDENCE

DUKE POWER COMPANY

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August 3, 1984

James L. Kelley, Chairman
Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Richard F. Foster
Administrative Judge
P. O. Box 4263
Sunriver, Oregon 97702

Dr. Paul Purdom
Administrative Judge
235 Columbia Drive
Decatur, GA 30030

Re: Duke Power Company, et al.
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414 /oc

Gentlemen:

Enclosed is Duke Power Company's "Investigation of Issues Raised by the NRC Staff in Inspection Reports 50-413/84-31 and 50-414/84-17". This report was prepared for NRC's Region II office in response to concerns raised by the NRC Staff in its investigation of the allegations of "Welder B". In accordance with the Board's direction in its June 22, 1984 Partial Initial Decision, and in the July 16, 1984 conference call in this proceeding, this report is also being served upon the Board and the parties in the Catawba licensing proceeding.

Sincerely yours,

A. V. Carr, Jr.

Albert V. Carr, Jr.

AVCjr/dm

c: Service List
James P. O'Reilly

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DUKE POWER COMPANY'S

INVESTIGATION OF ISSUES RAISED BY

THE NRC STAFF IN

INSPECTION REPORTS 50-413/84-31

AND 50-414/84-17

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I. PURPOSE

The purpose of this report is to respond to the concerns raised in the Nuclear Regulatory Commission (NRC) Staff Report Nos. 50-413/84-31 and 50-414/84-17. These concerns involve issues raised in connection with Unresolved Action Items 413/84-31-01, 414/84-17-01 (fabrication of Socket Welds) and 413/84-31-02, 414/84-17-02 (Unauthorized Removal of Arc Strikes). Some, but not all, of these concerns relate to foreman override. This report will also be served upon the NRC Atomic Safety and Licensing Board (Board) and the parties in the Catawba operating license proceeding, in accordance with the Board's direction that it be served with the Applicants' and the Staff's reports resolving the "foreman override" issue.*

II. CONCLUSIONS

The principal findings of Duke's investigation are (1) quality construction standards at Catawba are being met and (2) that foreman override is not a problem at the Catawba site.

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*In its Partial Initial Decision of June 22, 1984, the Board stated:

> 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.

Duke Power Company, et al. (Catawba Nuclear Station, Units 1 & 2), LBP-____, 19 NRC ____ (June 22, 1984) (slip op. at pp. 237-38) (hereafter "Partial Initial Decision"). See also Tr. 12,727 (7/16/84).

The Board in this proceeding has defined foreman override as actions by supervision that "resulted in defective work or a violation of QA procedures." Partial Initial Decision, slip op. at p. 238. Although a few allegations of foreman override were made, there is no evidence that there exists, or has existed, at the Catawba site a pattern of supervisory pressure on craftsmen to violate procedures, to perform less than adequate work, or to sacrifice quality of work in order to meet production schedules. This conclusion is supported by two primary factors resulting from the extensive investigation performed.

The first of these factors is the extremely small number of supervisory personnel implicated during the investigation. The investigation included interviews with 217 individuals representing approximately 10,000 work years of experience on well over 1 million work items at the Catawba job site. In the interviews conducted with 217 employees, less than a dozen specific incidents of possible foreman override were mentioned. None stated that such incidents reflected a widespread pattern or practice. Since each supervisor has literally hundreds of interactions with the subordinates on his crew each day, it is clear that the alleged instances of foreman override were extremely isolated. Significantly, less than 6 incidents could be even partially substantiated and each of those represented violations of procedures which everyone involved agreed were not intended to and could not have resulted in work below acceptable standards. In any event, all allegations regarding foreman override were thoroughly investigated and the results reflected that all work was acceptable.

The second factor supporting this conclusion is that the incidents alleged do not fit any pattern which would suggest that they support an allegation of pervasive foreman override. That is, the incidents determined to be foreman override do not fall into any pattern of regularity or repetition supporting

allegations that supervision and/or management persistently overrode quality considerations in pursuit of construction schedules. Rather, the incidents reflect isolated instances which could be viewed as foreman override or perhaps be attributed to miscommunication by the supervisors in question or misunderstanding of instructions by the craft.

In sum, because an extremely limited number of foremen were involved and the incidents of foreman override were isolated and random in nature, Duke believes that foreman override is not a problem at Catawba.

III. BACKGROUND

During an August 3, 1983, conference call among the parties and the Board in the Catawba licensing proceeding, Intervenor Palmetto Alliance alleged that unnamed persons had brought to its attention serious Quality Assurance deficiencies in addition to those already being litigated under Contention 6 which would compromise the public health and safety. Duke Power Company, et al. (Applicants) sought an immediate identification of the persons and the alleged deficiencies. The Intervenor failed to provide this information. The Atomic Safety and Licensing Board in this proceeding subsequently required that Palmetto Alliance divulge this information to Applicants. (See the Board's Memorandum and Order of September 14, 1983 (pp. 6-8), ruling on Applicants' motion for the production of names and facts concerning this matter.) Palmetto Alliance failed to respond to the Board's order. In its Memorandum and Order of September 30, 1983 (pp. 4-5), this Board advised the Intervenor of the availability of the in camera process.

On October 11-12, 1983, during the safety hearings in this case, both Palmetto Alliance and the Government Accountability Project (a nonparty to this

proceeding) alleged that there were persons with information on the Quality Assurance contention who wished to come forward, but who had requested the protection in an in camera Board hearing for protection of their identities. In response to these allegations, on October 12, 1983, the Board ruled that it would issue a notice to Applicants' present and former employees which would be posted at the Catawba site and published in the news media. This notice informed interested persons of an opportunity to raise Quality Assurance concerns confidentially in an in camera proceeding. The notice required that any individuals who wished to avail themselves of the Licensing Board procedures notify the Board by October 21, 1983.

Four former employees testified in camera in response to the Board's invitation. (The testimony of two of these individuals was subsequently made public at their request.) The Board heard the initial testimony of these in camera witnesses on November 8-10, 1983. Some of this testimony was later supplemented by affidavits. Subsequently, after parts of these witnesses' in camera oral testimony and affidavits were struck by the Board, several in camera hearing sessions were held in December, 1983 and January, 1984 to address the issues raised in the remaining testimony.

One of the issues raised in the in camera hearing session was "foreman override." One in camera witness alleged six specific incidents which he characterized as foreman override, wherein a foreman allegedly told a welder either to do work which the welder thought was unnecessary or to do work in violation of procedures. The Board expressed a concern only with the latter category and defined "foreman override" as a situation in which a foreman orders a craftsman to do work in violation of procedures. Partial Initial Decision, slip op. at pp. 236, 238. All six of the specific incidents of

foreman override alleged in camera were subsequently resolved in Applicants' favor. See id. at 238.

In January 1984, NRC Region II conducted an investigation of the allegations raised during the in camera hearings. This investigation included an examination of procedures at Catawba, a review of representative employee records, interviews with a selected group of welding personnel, and observation of activities in progress. Within the scope of this investigation, no violations or deviations from procedure were identified. Staff Exh. 26. However, certain allegations were raised during this NRC investigation by an individual identified by the NRC as "Welder B."

During the NRC interviews conducted as a part of its investigation, Welder B provided information about an incident involving foreman that appeared to fall into the category of "foreman override." The Staff noted its intention of further investigating this incident but stated that its interviews to date indicated that there is not a pervasive problem with foreman override at Catawba and that there have been only isolated incidents involving this issue. See NRC Inspection Report Nos. 50-413/84-03 and 50-414/84-03. Staff Exh. 27.

After hearing the final testimony on the in camera issues on January 30-31, 1984, the Board closed the record on each of these issues. Tr. 12418-419, 1/31/84. However, the Board left the record open solely for the purpose of receiving the the Staff's follow-up investigative report on the foreman override incidents raised by Welder B. Tr. 12,553, 2/17/84.

Meanwhile, finding no evidence of widespread foreman override, the Region II Staff narrowed its investigation to focus upon Welder B's allegations of possible irregularities by a particular foreman and his crew. Additional interviews were conducted by Region II both on-site and off-site. Information

developed during these interviews indicated that certain isolated irregularities had allegedly occurred. It should be noted that not all of these allegations involve foreman override. As characterized by the NRC in its letter to Duke Power Company of March 26, 1984, the alleged irregularities were as follows:

1. Welders working on stainless steel sockets may have violated interpass temperatures.
2. Arc strikes may have been removed from a valve without proper documentation.
3. Socket welds may have been made out of procedure in that one side of the socket was completely welded and then the other side welded.
4. The lead man on the crew reportedly acted as a "look out" for licensee QC inspectors when welding procedures were being violated.
5. Welders perceived the foreman to be applying pressure for quantity.
6. The foreman allegedly instructed welders to weld without being in possession of proper welding documentation.

At this point, Region II decided to inform Duke Power Company of these allegations since safety related systems at Catawba could have been involved and immediate follow-up was warranted. Accordingly, on March 13, 1984, a meeting was held in the Region II office during which Duke management representatives were informed that the above allegations had been made. At this meeting, Duke was advised to begin an immediate review of these issues in order to determine what problems might have resulted, whether the alleged activities extended to other crews, and what corrective actions would be required for adequate resolution. Duke indicated that it would keep the NRC Staff informed on the progress of its investigation and the corrective actions planned. The Region II Staff advised Duke that it would monitor the licensee's

activity in this area closely and that Region II would continue its own independent inspection activity to review the technical implications of these allegations.

Duke was advised that several of the individuals interviewed requested and were granted confidentiality during their interviews and that the Staff would not release the identity of these individuals. The identity of the foreman in question was provided to the licensee during this meeting inasmuch as he was the focal point of the investigation and indicated that he had no objection to being identified to Duke Power.

Two months after the issuance of the NRC Staff's follow-up report on the Welder B allegations (Inspection Report Numbers 50-413/84-31 and 50-414/84-17, dated April 23, 1984), the Board issued its Partial Initial Decision, dated June 22, 1984. In that decision, the Board resolved the foreman override allegations raised by the in camera witness in favor of the Applicants. Partial Initial Decision, slip op. at p. 238. The Board found that on the record before it, the foreman override issue raised by Welder B appeared to be an isolated, atypical incident and not an indication of a site-wide problem. Id. However, the Board left the record open on the foreman override issue pending receipt of the investigation reports from Duke Power and the NRC, and noted that its decision on this matter was subject to its later resolution of the Welder B concerns based upon these reports. Id., slip op. at pp. 237-38.

IV. INVESTIGATION METHODOLOGY

As stated previously, the NRC informed Duke of the identity of the foreman in question, whom they identified as "Individual A." He is identified hereafter as Individual 142. The NRC also identified the general foreman who

supervised Individual 142 during the time Individual 142 was alleged to be ordering work to be done in violation of procedures. This general foreman is identified by the NRC as as "Individual D." He is referred to in this report as Individual 184. No other individuals were identified by the NRC.

In response to the March 13, 1984 meeting with the NRC staff, W. H. Owen, Duke Power Company Executive Vice President, Engineering & Construction, charged R. L. Dick, Vice President Construction, with the responsibility of managing Duke's investigation. Mr. Owen also appointed a review board to oversee and monitor the investigation. The review board was comprised of Wayne Coble, Manager of Internal Audit; L. C. Dail, Vice President Design Engineering; and G. W. Grier, Corporate QA Manager. G. W. Grier served as Chairman. Mr. Owen also directed that the investigation of these concerns include the following:

1. Interviews of craft and supervisory personnel associated with the crew of Individual 142, to corroborate and develop information received from the NRC relating to production/quality concerns.
2. Interviews of other selected craft personnel on a sampling basis to determine whether production/quality concerns were broader than a specific crew or craft.
3. Technical review of concerns raised, to include evaluations of documentation, codes and procedures; testing of materials; and independent contractor analysis, as unnecessary.
4. Evaluation of findings and implementation of any corrective action necessary to address any technical and/or personnel issues raised during the interviews.

R. L. Dick appointed A. R. Hollins to direct the investigation. An investigation plan was developed and approved by the review board. It was implemented as described below.

A. <u>Conduct of Initial Interviews</u>

To begin the investigation, Duke Power selected the following categories of individuals still employed at Catawba to interview: (1) all of the welding crew members and lead men who had ever been assigned to the foreman identified by the NRC (Individual 142) from the time he became a foreman until the present, (2) all of those general foremen who had supervised Individual 142 since his employment as a foreman, (3) all of the other foremen who ever worked for the general foreman (Individual 184) in charge of Individual 142. In addition, workers in the following crafts were interviewed on a random basis: powerhouse mechanics (pipe fitters, millwrights and support/restraints and instrumentation craftsmen), electricians, steelworkers, and welders not included in group (1), above.

The crews from which the random interviewees were taken were selected in the following manner. First, a list was compiled of all of the supervisors (foremen) for each craft. Each craft's superintendent reviewed the list of foremen with A. R. Hollins and indicated which crews were working in critical areas of the plant on safety related items. For each such area, the crew with the numerically lowest designation* was picked, except for welding crews. For the welding crews, an individual from each crew that was working in a critical area was then sampled.

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*Each crew has a numerical (crew number) designation.

The individual crew members interviewed were selected as follows. The employment supervisor supplied a list of crew members and the date that each became a craftsman. The first craftsman on each crew roster that had become a craftsman in early 1980 or before was chosen to be interviewed. If the individual thus selected had previously been interviewed, was not at work, or was on loan to another site, the next craftsman on the list who met the length of service criterion was selected.

The interviews were performed by skilled employee relations interviewers trained in interviewing techniques. Before the interviews were conducted, a training session was held with the interviewers to familiarize them with the technical terms they might encounter and the issues to be investigated. During the interviews, the interviewers sought to determine whether the craftsman had any production/quality concerns, and whether or not such concerns involved foreman override. They were encouraged not to minimize any concern expressed during an interview, but rather to get as much specific information as possible, identifying people and hardware involved.

The following groups of employees were interviewed during the first round:

1. Individual 142, a welding foreman, and Individual 184, a general foreman (2 individuals).
2. Those Duke welders who were supervised by Individual 142 during 1980-81 (33 individuals).
3. Those Duke welders (not included in 2, above) who were supervised by Individual 142 for any appreciable amount of time (19 individuals).
4. The current crew members (including helpers, etc.) of Individual 142 (8 individuals). (These individuals did not overlap with groups 2 and 3, above.)

5. 68 additional, randomly selected employees, including 19 powerhouse mechanics, 8 electricians, 6 steelworkers, and 35 additional welders (68 individuals).

6. Other individuals whose names arose during interviews and were thought to have information that would be useful to the investigation (16 individuals).

A total of 146 individuals were interviewed on the first round. The records of ten exit interviews of former employees who had worked for Individual 142 were also reviewed. After this effort was complete, a list of employee concerns was prepared and initial interviews and evaluations were conducted to respond to and resolve these concerns.

B. Subsequent Rounds of Interviews

Each individual who had a technical concern was reinterviewed. The second interview was performed by the original employee relations interviewer and an individual who was technically competent in the area of concern. There were 38 individuals who had at least one subsequent technical interview. Follow-up questions from an employee relations standpoint were also raised at this time by the original interviewer.

During the first round of interviews, a few other supervisors had been named in connection with a concern. The concerns related to these individuals were investigated during this second phase if, in the Investigation Director's judgment, additional information was needed to resolve them. If a time frame for the concern could be established, the craftsmen on the implicated supervisor's crew at the time of the incident were interviewed. When a time frame could not be established, the present craftsmen on the supervisor's crew were interviewed. This round of interviews followed the same sequence as the

initial interviews; a screening interview was performed followed by a technical interview if necessary.

An additional 71 individuals were interviewed during the subsequent rounds. Thus a total of 217 employees were interviewed during the company's investigation, some more than once.

C. Data Assembly and Evaluation

The concerns expressed during the interviews were divided into categories. Each category was then assigned to a competent technical individual (in almost all cases an engineer) to conduct the necessary evaluation. The individual who performed the technical evaluation was normally the same individual who had performed the technical interviews relating to that particular concern. All necessary technical analyses, evaluations, and documentation were performed under the direction of the assigned technical individual. The results were compiled and are included with this report in the form of two attachments. Attachment A addresses issues related to foreman override. Attachment B addresses other safety related issues, almost exclusively technical, raised by employees during Duke's investigation. While these additional issues are unrelated to foreman override, they have been included here for the sake of completeness. (In no instance did these concerns require any hardware modifications.)

V. FINDINGS OF THE INVESTIGATION

A. Overview

Before summarizing the findings of Duke's investigation, we believe that the "foreman override" allegations should be placed in perspective. The construction of the Catawba Nuclear Station, like that of any nuclear plant, is

a massive undertaking. As in all construction projects, there are deadlines to be met and, accordingly, there is some degree of pressure to meet these deadlines. For the most part, the employees interviewed appreciated this fact, and appeared to accept a certain degree of production pressure from their supervisors as a normal and understandable part of the job.

It is the obligation of supervisory personnel to insure that the individuals under their direction work efficiently as well as competently. Accordingly, the fact that Duke supervisory personnel do not allow their work crews to waste time, and the fact that they may direct that work be done in a manner which some employees disagree with or that some employees believe (erroneously) violates procedures. should not be viewed as improper production pressure or as an attempt to "get by" with anything less than quality work. This is not "foreman override." The Atomic Safety and Licensing Board in this proceeding has recently noted that: "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." Partial Initial Decision, slip op. at p. 238.

Such actions by supervision may, however, create friction, resentment and overt conflicts between foremen and crew members, particularly when the individuals involved were construction workers accustomed to expressing their own opinions. Such conflicts are not unusual given the size and nature of the Catawba work force and we would be naive to expect all employees to be compatible. Unfortunately, this tension can lead to poor communication, misinterpretation of a foreman's instructions, and a perception that production pressure is being allowed to affect the quality of the work. However, while these inherent job-related and personality-related conflicts are regrettable, they do not constitute foreman override. Rather, the Board has indicated that

what it considers foreman override are actions by supervision that "resulted in defective work or a violation of QA procedures." Partial Initial Decision, slip op. at p. 238.

The investigation included interviews with a total of 217 Duke employees, including the following: 134 welders, 48 powerhouse mechanics, 8 electricians, and 5 steel workers; 13 foremen; 2 general foremen; 4 QC/QA inspectors; and 3 other individuals. Virtually all individuals interviewed have worked at Catawba for 4 or more years, some having been assigned at Catawba for as many as 8 years. Significantly, the individuals interviewed represent approximately 10,000 work years of experience on the Catawba job site working directly on over one million individual work items. In short, these figures indicate that the investigation was exceedingly thorough.

In the interviews, less than a dozen specific incidents of possible foreman override were mentioned, i.e., incidents wherein it was alleged that a procedure was violated or the quality of specific work on safety related equipment may have been below acceptable standards because of direction from supervision. None stated that such incidents reflected a widespread pattern or practice. Since each supervisor has literally hundreds of interactions with the subordinates on his crew each day, it is clear that the alleged instances of foreman override were extremely isolated. Significantly, less than 6 incidents could be even partially substantiated and each of those represented violations of procedures which everyone involved agreed was not intended to and could not have resulted in work below acceptable standards. In any event, all allegations regarding foreman override were thoroughly investigated and the results reflected that all work was acceptable.

Significantly, the majority of incidents of possible inappropriate action by supervisors related to one foreman, Individual 142. In addition, three

other supervisors were named in connection with isolated events that reflect a need for supervisor counseling. The corrective action taken by Duke with respect to these supervisors, as well as the communication sessions to be held for ·aft and supervisors, are discussed in Section VI, below.

In sum, the allegations raised during Duke's investigation do not reflect a pervasive or widespread problem with regard to foreman override.

In addition to foreman override issues, during the interviews some employees raised technical concerns regarding safety related equipment. While these concerns were raised, virtually all of the individuals interviewed believed that the quality of the work was still above acceptable standards. Most of these concerns were isolated instances and investigations revealed that in all cases the equipment or system involved was of acceptable quality.

When assessing the implications of these findings, it should be recalled that in evaluating the _in camera_ allegations of foreman override, the Board in this proceeding has focused upon whether such occurrences are indicative of a pervasive "pattern of foreman pressure to 'get the job done' without regard to quality." Initial Decision, slip op. at p. 238.Evidence of a widespread pattern of behavior could call into question the safety of the plant. In this regard the Board stated:

> 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.

_Id._, slip op. at p.33. The Board concluded that there was no such compromise of quality with respect to the Contention 6 allegations discussed in its Partial Initial Decision. The same conclusion applies to the foreman override allegations discussed herein. The incidents of foreman override that did take place were isolated both in the number of occurrences and in the number of

foremen implicated. They do not indicate widespread attitudes or practices by supervisory personnel. Nor do they reflect a Duke Power Company policy that work quality is less important than quantity, or that deficient work should be approved in order to meet construction deadlines. Further, where potentially deficient work was done, it was evaluated and found to be acceptable.

B. NRC Issues

The six issues raised by the NRC staff in Inspection Reports 50-413/84-31 and 50-414/84-17, and the results of Duke's investigation of these issues, are summarized below. We note that not all of these issues involve foreman override. For the sake of completeness, however, they are all discussed in this report.

1. "Welders working on stainless steel sockets may have violated interpass temperatures."

Of the 134 welders interviewed, five alleged that they had heard rumors of interpass temperature violations and five alleged that they knew of specific incidents of such violations. Of the five alleging specific incidents, only three were based on the welders' direct knowledge; in all three cases, production pressure/foreman direction was stated to be the root cause. The allegations focused on stainless steel welds where the requirement is that the weld must be allowed to cool to 350°F between passes. Significantly, in each of the specific incidents, the investigation concluded that maximum interpass temperature had not been exceeded. The welders apparently felt that before they could commence a subsequent weld pass, they must be able to touch the weld with their hand for a second or two. While this is a conservative practice, it is not the requirement. Tests reflected that the time necessary to wait for the weld to cool below 350°F was in all cases less than the time the welders alleged they were allowed to let welds cool. In any event, evaluation and

testing reflected that, even assuming the allegations were true, no welding code was violated and there would have been no adverse impact. In short, the allegations do not appear to raise an issue of safety significance. However, because the perception of inappropriate foreman action was present (and for other reasons set forth in this report), the foreman principally implicated has been removed from a supervisory position. In addition, interpass temperature requirements will be re-emphasized to craft and supervision. (A detailed discussion of this issue is included in Attachment A, Section I.)

2. "Arc strikes may have been removed from a valve without proper documentation."

It is not a violation of procedure for either the welder performing a weld or his foreman to remove arc strikes without obtaining additional paperwork (process control), provided the arc strikes are located in the area of the weld and are sufficiently superficial to be removed with a few strokes of a file. The mistaken belief by some welders that approval and additional paperwork must be obtained for this process led to expressions of concern by Individual B-2 (in the NRC investigation) and by other welders (in Duke's investigation) that one foreman and several welders had acted improperly in removing an arc strike without process control. Investigation revealed that no process control was in fact necessary. Thus no procedures had been violated. Other specific incidents recalled by other welders, in which arc strikes were improperly removed without process control (apparently because the arc strikes were outside of the weld region, or because the weld had already passed final QA inspection) were detected by QA during visual inspection. The removal of arc strikes does not raise any concerns with respect to the quality of the welds or the safety of the system of which they are a part. (A detailed discussion of this issue is included in Attachment B, Section I.)

3. "Socket welds may have been made out of procedure in that one side of the socket was completely welded and then the other side welded."

In NRC Reports 50-413/84-31 and 50-414/84-17, one welder ("B-3") stated that in confined locations he had used an improper technique of welding one side of a socket weld and then the other side. One of the 134 welders interviewed mentioned a similar technique. Analysis indicated that such a technique was not in violation of procedures and was acceptable. Further, any unacceptable defects would have been detected by QC inspection. In that this allegation does not raise a safety issue, no action is required. (A detailed discussion of this issue is included in Attachment B, Section II.)

4. "The lead man on the crew reportedly acted as "look out" for licensee QC inspectors when welding procedures were being violated."

Six craftsmen alleged that they had seen individuals act as lookouts for QC inspectors while welding procedures were purportedly being violated. In only one of the incidents described was the activity actually a violation of procedures, i.e., a welding foreman was welding with borrowed welding rods, in violation of the rod issue procedure. Since the foreman was qualified for this work and used the correct type and batch of filler material, this violation raises no safety concern. This foreman, Individual 142, has been removed from his supervisory position. (A detailed discussion of this issue is included in Attachment A, Section II.)

5. "Welders perceived the foreman to be applying pressure for quantity."

As noted above, a certain degree of production pressure is an inherent part of any construction job, and does not necessarily indicate that inadequate attention is being paid to the quality of the work. To determine whether excessive production pressure was being applied (i.e., pressure to complete work without proper attention to quality), all employees interviewed by Duke

were asked whether they believed that the quality of their work had been adversely affected by production pressure, and if so, whether they could describe the work in question. Of the 195 nonsupervisory craftsmen interviewed, less than six related specific incidents where the quality of specific safety related work could be unsatisfactory because of foreman pressure for quantity or speed of production rather than quality work. The specific incidents in which production pressure allegedly affected work such that quality above acceptable standards was not maintained are described in Attachment A, Section I and VIII.

Investigation of these incidents revealed that even assuming that there was excessive production pressure, there was no effect upon the quality of the work and, accordingly, upon the safety of the hardware in question. It is also possible, as one welder suggested, that some of these complaints about production pressure may be attributable to a craftsman wanting more "slack time" between weld passes.

However, whatever the actual motivation or intent of the craftsmen and foremen involved, Duke's investigation treated these craftsmen's allegations of foreman pressure as being made in good faith. In addition, appropriate corrective action is being taken with respect to the supervisory personnel implicated in these complaints. This action is described in Section VI, below.

The personnel actions taken to correct this situation are described in Section VI, below.

6. <u>"The foreman allegedly instructed welders to weld without being in possession of proper welding documentation."</u>

Several workers alleged that they had heard rumors or had been involved in incidents where supervisors directed them to perform work without having process control documentation in their possession. The investigation revealed

that the only specific instances where the workers alleged direct knowledge were (1) two incidents where the workers were told by their supervisors to perform the work but were not required to do so when they explained to the supervisors that they had no documentation in their possession, and (2) three incidents where workers performed work (for a short several minutes) with documentation either in the work area (such as with the fitters) or near the work area, but not in the actual possession of the worker. While this may have represented a violation of the literal language of a procedure, no one even implied that the intent of the procedure (i.e., that the workers know what must be done) was violated. In none of these cases were there concerns expressed regarding the adequacy or acceptability of the work. In short, these allegations do not raise safety concerns. However, the supervisors implicated are either no longer in supervisory roles or will be counseled. (A detailed discussion of this issue is included in Attachment A, Section III.)

C. Concerns Involving Foreman Override

Based on the 217 interviews conducted, eight categories of concerns relating to foreman actions, including foreman override, were identified. While virtually all of the concerns were found to be unsubstantiated and none raised technical issues which would have adversely affected safety, each concern was thoroughly investigated. These concerns, which are discussed in detail in Attachment A, are summarized below. Three of these categories (1, 2, 3) are the issues raised by the NRC, and were summarized in the previous section.

1. Interpass Temperature. (Attachment A, Section I)
2. Employee Acting As Lookout. (Attachment A, Section II)
3. Process Control. (Attachment A, Section III)

4. Work on Nonconformed Items.

One welder alleged that he had heard others state that a supervisor had directed his crew to continue work on a specific nonconformed item prior to resolution. This is a violation of procedure. The NCI regarding this incident was identified. Another NCI on the work item dated the same date reflected that work had proceeded, prior to resolution of the NCI, had been detected by QC and appropriate corrective action taken. No member of the supervisor's crew at that time corroborated the allegation and the supervisor denies it. The incident demonstrates that the QC program works. However, there are no indications that the foreman directed the crew members to act improperly. In any event, if the foreman acted improperly, this is an isolated incident with no safety significance. (A detailed discussion of this issue is included in Attachment A, Section IV.)

5. Interaction with Inspector.

Of the literally thousands of interactions between supervisors, workers and inspectors, only three allegations were raised of instances where supervisors had allegedly instructed craftsman (either in a serious or joking manner) to give inspectors misleading information. In each instance the craftsmen declined to do so. The three instances do not raise a technical concern. The only supervisor whose actions appeared to be clearly inappropriate (he told the craftsman to get another inspector to inspect a defective weld) had been removed from a supervisory role well before this investigation, for reasons unrelated to this allegation. (A detailed discussion of this issue is included in Attachment A, Section V.)

6. Stenciling of Welds.

One welder stated that his supervisor had directed him to stencil 35 to 40 welds on cable tray grid structures that he did not perform. No other welder

on the supervisor's crew corroborated this allegation. Further, another welder related his impression of the incident, which seemed to reflect that the supervisor was not trying to get the welder to stencil welds he had not performed. In any event, it clearly is an isolated instance which has no safety consequences. (A detailed discussion of this issue is included in Attachment A, Section VI.)

7. Repair of Drill Holes.

One instrument craftsmen stated that in a conversation with an unknown hanger craftsman, the hanger craftsman was complaining that his unnamed supervisor had told him to install a concrete anchor in a recently repaired hole in an unidentified concrete surface that had been filled the previous day. This would violate CP-830, which requires that the compound used to fill unused drill holes be allowed to cure for seven days. Even if this incident occurred as alleged, the craftsman torques each anchor when installed and would know if the anchor is properly set. Also, the QC inspector torques every anchor to assure that it is properly set. Since the implicated hanger foreman could not be identified, all remedial personnel action will be accomplished through the general instructions to be given to craftsmen and their supervision, as described in Section VI. No corrective action is necessary from a technical standpoint because two different individuals check the torque on every concrete anchor. (A detailed discussion of this issue is included in Attachment A, Section VII.)

8. Vertical Stiffeners.

One welder stated that due to production pressure by an unnamed foreman, other unnamed welders made some fillet welds on containment vertical stiffeners which may have contained some imperfections. The welder could not identify the welds in questions. The welder indicated he did not know if the welds had been

repaired. Significantly, Section III of the ASME Code recognized such welds as structural attachments and required not only a final visual inspection but also a magnetic particle examination of the welds. All such welds received these inspections and were found to be acceptable or were repaired. In addition, the containment vessel (including the stiffeners) have successfully passed a structural integrity test in excess of design pressure. Accordingly, while the validity of this allegation could not be determined, even if if valid it does not raise a safety concern.

D. Other Safety Related Concerns

During the course of the interviews, additional concerns unrelated to foreman override or other supervisory action were raised as to the adequacy of safety related systems and equipment. (Two of these concerns, items 1 and 2, were also issues raised by the NRC). Investigation revealed that none of the concerns reflected instances where work quality was below acceptable standards, and no hardware modifications were required. These technical concerns are addressed in detail in Attachment B.

E. Non-Safety Related Concerns

In response to Duke's investigation, some non-safety related concerns were also raised by employees. For the sake of completeness, these concerns and their resolution have been summarized herein. These non-safety related concerns include the following areas:

(1) The quality of some vendor welds on non-safety related components was questioned. (It was found that each was acceptable or had previously been identified.)

(2) Fit up of socket welds on a Class G system, which is non-safety related, was alleged to be improper. (It was found that acceptable technique was used.)

(3) Expansion loops were left out of a class G instrumentation system. (It was found that this had been previously identified by normal inspection process and corrected).

(4) One class G weld bevel preparation was allegedly incorrect. (The bevel was corrected at the time the weld was done, before this investigation.)

(5) Some class G standpipe support welds were alleged to be incomplete. (It was found that these were previously upgraded to nuclear safety related and had been replaced.)

(6) The method of straightening of concrete expansion anchors in the turbine building and settling pond was alleged to be inappropriate. (A technical evaluation found these acceptable, as is.)

(7) An inspector made a class G weld in the turbine building. (This was unsubstantiated. Moreover, workmanship of the weld was not an issue.)

(8) Melt through of a class G piping welds may have occurred. (It was found that the weld was appropriately repaired from the inside surface during fabrication prior to this investigation.)

VI. CORRECTIVE ACTIONS

A. No Hardware Corrections Necessary

As previously noted, the investigation included interviews with 217 individuals representing approximately 10,000 work years of working experience on well over 1 million work items at the Catawba job site. Significantly, during interviews with these individuals, they raised only specific instances involving technical concerns with safety related work. Further, in virtually, every case the person raising the concern stated that the concern raised no

safety problem with the plant and the quality of construction was acceptable. In any event, after thoroughly investigating each technical allegation and concern raised, it was determined that based on technical considerations no modifications or corrections of hardware were required. As the employees interviewed had stated, the quality of construction at Catawba is above acceptable standards.

B. Personnel Actions

Based on the 217 interviews conducted, it is clear that the craftsmen, supervisors and QC personnel at Catawba are well trained, dedicated, quality conscious, and proud of the workmanship at Catawba. It is also clear that there is no company pressure to approve faulty workmanship in order to meet construction schedules, and no resulting deficiencies in plant construction which would affect the Board's finding of reasonable assurance that Catawba can operate without endangering the health and safety of the public. Partial Initial Decision, slip op. at pp. 268-69.

However, Duke's investigation did identify isolated instances in which a few supervisors' words or actions were perceived by some workers as inconsistent with Duke's commitment to quality work. In virtually all cases, the individuals who related these incidents did not believe that these incidents had resulted in work quality below acceptable standards.

Another indication that some Duke supervisors may have been perceived as applying excessive production pressure was that twelve of the 217 employees interviewed indicated that they would be hesitant to express to their supervisor concerns over the quality of particular work. The majority of these twelve individuals stated that they would only hesitate to express such concerns to Individual 142 and Individual 184, not to other supervisors. Significantly, all twelve individuals stated that if they believed any work

would potentially jeopardize safety, they would assure that proper individuals were notified even though they might not tell their immediate supervisor. These welders mentioned some of the many other avenues through which they could raise safety concerns, such as talking to QC personnel, other supervisors, Duke Management, and the NRC staff. Notwithstanding that fact, however, Duke has determined that the corrective action described below is warranted in order to eliminate this perception.

Duke's evaluation of the foreman override allegations was complicated by the fact that several employees stated in their interviews that other employees were "out to get" several of the supervisors and would use this investigation for that purpose. However, for purposes of investigation, each such incident was assumed to be true. In any event, it is Duke's view that the fact that the perception (whether valid or invalid) of inappropriate supervisory action was present among even a few Duke employees is unacceptable, and reflects, at a minimum, poor communication skills and a lack of sensitivity by certain supervisors. Consequently, Duke determined that corrective action for these supervisors was appropriate.

Significantly, the vast majority of both the technical and the employee relations concerns raised relate to one supervisor, Individual 142. This supervisor's communication skills appear to fall short of that required by Duke Power Company. Based on the foregoing and upon other unrelated incidents deemed to bear upon this supervisor's managerial capability, he is being removed from a supervisory position and reassigned to a non-supervisory position with Duke.

In addition, because of his unsatisfactory performance in allowing one of his welding foremen to create the impression among some workers that quality may in some instances be second to production, the general foreman over

Individual 142, Individual 184, is also being removed from a supervisory position and will be reassigned to a non-supervisory position with Duke. Individual 184's supervisor will be formally counseled regarding supervision of supervisors under him.

Craftsmen under three other supervisors (Individuals 64, 217 and 218) related isolated instances where the supervisors' words may have been taken as reflecting an insensitivity to quality of construction. These three other supervisors will be formally counseled as to those incidents.

Finally, to assure that all Duke supervisors and craftsmen understand the seriousness of these actions, communication sessions will be held to re-emphasize Duke's commitment to quality and its expectations of both craft and supervision in this regard. In addition, an individual will be assigned to Catawba for the primary purpose of providing an additional means for employees to discuss quality concerns.

ATTACHMENT A: Issues Involving Foreman Override

I. INTERPASS TEMPERATURE

II. EMPLOYEE ACTING AS A LOOKOUT

III. PROCESS CONTROL

IV. WORK ON NONCONFORMED ITEMS

V. INTERACTION WITH INSPECTORS

VI. STENCILING OF WELDS

VII. REPAIR OF DRILL HOLES

VIII. VERTICAL STIFFNERS

I. INTERPASS TEMPERATURE

A. Statement of Concern

Ten welders had concerns regarding potential violations of maximum interpass temperature requirements for welding on safety related systems. Plant procedures require that between welding passes the temperature be allowed to decrease below the maximum interpass temperature (350°F for stainless steel and 500°F for carbon steel) prior to starting the next pass. The concerns of the ten welders are as follows:

1. While four of the ten welders knew of no specific instances of violations, three (Individuals 6, 12 and 81) felt there may have been unintentional violations by other welders (not themselves), and one felt that he could possibly have at one time also unintentionally violated interpass temperature requirements (Individual 38). Two of the four individuals (81 and 38) felt that these unintentional violations might be due to production pressure by foremen. However, all of these individuals felt that the violations, if they occurred, were minor and had no impact on the quality of the welds.

2. Six welders stated that they knew of specific instances of violations of interpass temperature requirements.

(a) One welder (Individual 36) alleged that he was directed by Individual 142 to make the fourth pass on a stainless steel weld after the metal had cooled for about 10 minutes. He stated that at this point he could hold his hand on the weld for only 1 second. The welder speculated the temperature was still above 350°F. The welder stated that the weld was later cut out.

(b) One welder (Individual 106) alleged that he was directed by his foreman (Individual 78) to climb back up a scaffold and make the second pass on a stainless steel weld after the weld had cooled for over 3 minutes. During this time the welder had climbed down a scaffold and began talking to another worker, while his foreman had climbed up the scaffold and with his hand checked the weld temperature. Again, the welder was speculating that the temperature was still above 350°F.

(c) Two welders (Individuals 70 and 196) stated that they and other welders were directed by their foreman (Individual 142) to make between 12 and 24 stainless steel socket welds in the Unit 1 pipe chase as fast as possible without regard to interpass temperature requirements. Significantly, welder 196 described the situation and production pressure as follows:

"On interpass temperature, [foreman 142] told us when we were working on stainless steel to keep using the temp stick and the minute the pipe was cooled below 350 degrees to start back on the weld. Someone asked the question if this procedure would affect the fitting and [the foreman] said that in his opinion, it would not."

(d) One welder (Individual 192) "heard" of welding conducted by another (Individual 67) after an inspector had determined the weld joint was still too hot to weld. Significantly, when interviewed, Individual 67 knew nothing of the incident. (Foreman override was not alleged.)

(e) One welder (Individual 14) knew of a weld in the "pump structure" where interpass temperature may have been violated. However, he stated that the weld was later cut out. (Foreman override was not an issue and he felt the violation was unintentional.)

B. Investigation

The investigation consisted of interviews with welders and supervisors, review of appropriate codes and procedures, testing of weld samples, and an evaluation of the chemistry of Catawba's process fluids with regard to stress corrosion cracking.

1. Interviews

All welders interviewed were specifically asked if they had any knowledge of interpass temperature violations. Of the 134 welders interviewed, only the ten noted above raised concerns regarding violation of interpass temperature requirements. Further, of these ten welders only six had heard of specific incidents and only four stated that they had direct knowledge of interpass temperature violations. Further, those who alleged direct knowledge did not use a temp stick or other positive method of determining whether interpass temperature requirements had been violated; rather, they speculated that the maximum interpass temperature specified by procedure may have been exceeded. Indeed, two of the four appear to have had a very conservative impression of what the maximum interpass temperature requirements were. Significantly, many welders stated that with stainless steel you had to let it cool below 350°F or it was difficult to. It should be noted that if this difficulty resulted in unacceptable indications they would be detected in the subsequent QC inspection).

2. Testing of Cooling Times

Duke conducted tests to investigate the two welders' allegations (noted above) that (1) a delay of about 10 minutes between the third and fourth pass of a 2 inch stainless steel heavy wall socket weld and (2) a delay of over 3 minutes between the first and second pass of a stainless steel weld on a 6 inch schedule 40 pipe were insufficient times for the welds to cool below the

350°F interpass temperature required for such welds. Testing was performed on numerous samples of various sizes (including those noted above) to determine the length of time it took for the temperature of the weld joint to drop below 350°F.

The test results reflected that for the heavy wall 2 inch socket weld, the maximum cooling time required for the temperature to drop below 350°F for any pass was 7 1/2 minutes; for the third to fourth pass the time was 4 1/2 minutes - much less time than the 10 minutes which the welder stated had elapsed. In short, in this instance maximum interpass temperature requirements were not exceeded.

The test results for the 6 inch schedule 40 weld reflected that the required cooling time was 2 1/2 minutes between passes 1 and 2, 3 1/2 minutes between passes 2 and 3, and 6 minutes between pass 3 and the final pass. The welder had stated that 2-3 minutes of cooling time had elapsed when the welder was directed by his supervisor to continue welding. To continue welding, he had to wait for his foreman to climb down from a 5 foot scaffold, climb the scaffold, and prepare himself to weld before he actually started. Thus, before he started welding at least 3 minutes time had elapsed. This is greater than the 2 1/2 minutes cooling time needed for the interpass temperature to drop below 350°F between passes 1 and 2, as reflected by the tests noted above. Accordingly, in this instance the weld was also well below the 350°F maximum interpass temperature.

The fact that several of the welders making allegations felt that they needed to be able to place their hands on the weld for one - two seconds without pain before they considered it safe to weld, reflects the conservative misconception of some welders at Catawba. Clearly, a welder would not be able to hold his hand on a weld joint that was at 350°F for a second or more

without severe skin blistering. This misconception in all likelihood accounted for some, if not all of the allegations. Significantly, this misconception reflects the conservative approach of the Catawba welding program.

3. Code Requirements

The only ASME or AWS code requirements regarding maximum interpass temperature relates to welding on material subject to charpy impact testing. The subject of the few specific concerns raised in this area were exclusively related to stainless steel. Stainless steel does not require impact testing, and thus there is no code requirement regarding interpass temperature. No one alleged any specific instances of maximum interpass temperature violations on any other type of material (much less on material subject to charpy impact testing). In short, the few 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.

4. Testing of Stainless Steel

Duke Nuclear Guide 1.44, paragraph 6.0, requires that a maximum interpass temperature of 350°F be observed for welding on stainless steel to minimize the weld heat affected zone sensitization area. Weld heat affected zone sensitization is manifested as a precipitation of chromium carbides at the grain boundaries of the stainless steel material. If this condition occurs and is severe, the stainless steel will be more sensitive to corrosive attack in certain aggressive environments. (As will be discussed later, such aggressive environments are not present at Catawba.)

To determine the effect on stainless steel of exceeding the interpass temperature requirement, Duke conducted tests consisting of welding stainless steel samples using interpass temperatures ranging from 250°F to over 750°F (well above the 350°F specified by procedure). Significantly, one of the test samples was welded by the welder (noted above), who alleged that 12-24 such welds had been welded in violation of interpass temperature requirements. The welder attempted to recreate the worst case condition he had experienced.

A metallurgical evalaution was performed on the test sample to determine whether the degree of sensitization was significantly affected by the range of interpass temperatures used in the tests. The results reflected that there was no appreciable difference in the severity of sensitization for these ranges of interpass temperatures, i.e., 250°F - 750°F. These results were confirmed by subsequent field testing.

In order to further substantiate these results, J. A. Jones' Applied Research Laboratory (an independent organization) employed the electrochemical potentiokinetic reactivation technique on the test coupons. Their conclusions were:

a. Test results were consistent with the aforementioned test results.

b. That for these test coupons, interpass temperature did not appear to influence the degree of sensitization.

c. The heat affected zone did not appear to be significantly different from unaffected base material conditions.

5. Evaluation of Catawba's Process Fluids

Even assuming that severe sensitization of the stainless steel occurred, the corrosive environment necessary to lead to intergranular stress corrosion cracking ("IGSCC") (the potential adverse consequences of such sensitization) is not present at Catawba.

Stainless steel is susceptible to stress corrosion cracking when exposed to the correct aggressive environment. In a nuclear power plant the relevant possibly aggressive environment is the reactor coolant or process fluid with the presence of an active anion corrodant. Examples of such active anions are oxygen, chlorides, fluorides, sulfides and sulfate ions. Simply the presence of these anions is not enough to cause IGSCC; they must be present in significant concentrations.

The specifications for Duke's McGuire Nuclear Station coolant chemistry are attached as Enclosure 1 to the discussion. The Catawba specifications are currently in the process of final drafting, so they are not available for attachment to this report. However, they will be the same as McGuire, or in some cases more conservative. Significantly, in every case, concentrations of potential corrodants in the Catawba aqueous environment which could lead to IGSCC are well below the critical concentrations identified by experience and research.

In sum, process fluid chemistry and impurity controls at Catawba create an aqueous environment which will not result in IGSCC. However, even assuming that IGSCC occurs, a major LOCA would not be expected. Any form of stress corrosion cracking in ductile austenitic stainless steel would lead to a leak before break event. With the leak detecting capabilities designed in the Catawba Systems, any leak would be detected before critical loss of coolant or process fluid occurred.

In summary, because the designed normal operating environment at Catawba is not aggressive in terms of IGSCC, the possibility of sensitized welds does not significantly increase the probability of stress corrosion cracking at Catawba.

C. Resolution and Conclusion

Of the 134 welders interviewed, as set forth above, only 4 welders (3 incidents) alleged direct knowledge of interpass temperature violations on safety related systems. Further interviews and testing demonstrated that in all likelihood these allegations were not actual violations. In short, there is little evidence to confirm the allegations that interpass temperature was exceeded by craft. In any event, if interpass temperature requirements were violated, it is clear that the practice was not widespread, but consisted of isolated instances. Moreover, if interpass temperature requirements were violated as specifically alleged, tests and research reflect that it would not have had an adverse impact on the integrity of the welds in question. It should be noted that in no case did a foreman direct a welding to violate interpass temperature requirements. Rather, the few welders who raised this concern felt that the communications with the foreman left the impression that they were to rush at the expense of quality. The two foremen directly implicated by the allegations have either previously been removed from a supervisory position for reasons unrelated to this investigation (Individual 78) or will be so removed (Individual 142) for reasons stated in this report. (See Section VI of the main report.)

Sample Point	pH	O_2 ppb	Cl^- ppb	F^- ppb	Li ppm	Al ppb	SiO_2(j) ppb	Sus. Sol ppb	Boron ppm	H_2 cc/kgm	Tritium uCi/ml	GeLi (k) Liq. (k)	Gas (k)	Crud	I-131 D.E. uCi/ml	Gross Spec Activity	Spec. Act. (GeLi Beta Gamma Only)	Others
NC - Rx Coolant Hot Leg #1 or #4								≤1000		25-50 (a)		N/S (T)	N/S (T)	N/S	<1.0 (T)	<100/E (T)		E-Bar N/S (T), Sr & Fe N/S, Cond N/S
NC - PZR Liquid	4.2-10.5	<5 (T)(b)	≤150 (T)	≤150 (T)					0-2000									
NV - Letdown Hx Out NV BIX	4.2-10.5	<5 (T)(b)	≤150 (T)	≤150 (T)	0.7 2.2(c)	<50	≤1000		(d)0-2000									Ca <50 ppb Mg <50 ppb
NV - Boronometer Reading Verification									± 10 NV BIX									
NV - Mixed Bed IX Out NV AIX			<150	<150							N/S (T)	N/S		N/S				
KC - Component Cooling Loops A & B	>8.7		<500	<500								N/S						(e)
NV - Boric Acid Tanks A & B			<450	<450		<220	<700		7000-7700 (T)			N/S						
KF - Spent Fuel Pool	4.0-7.0		≤150	<150			N/S		≥2000			N/S						Turbidity < 1 FTU
KF - Spent Fuel Pool IX Out			<150	<150								N/S						
NI - Accumulators A,B,C,D & UHI	4.0-7.0		<150	<150					1900-2100 (T)									
NB - Rx Makeup Water Storage Tank	4.0-8.0	<100	COMBINED <100			<20	<100 (f)	<100	<10		≤2.5	N/S					0.00? (g)	Cond. <2.0 μmhos
FW - Refueling Water Storage Tank	4.0-7.0		<150	<150		<80	<300	100	2000-2100 (T)			N/S						
WG - Waste Gas Tanks 1 - 8																		(h) Inservice Tanks Only
NB - Recycle Holdup Tanks A & B	4.2-10.5	<100	<150	<150				N/S	N/S		2.5	N/S						
NR - NR Chillers 1,2, & A	>8.7		<500	<500								N/S						(e)
NF - Mix Tank & Pump Discharge	7.8-9.2																	(i)
WZ - Groundwater Sump C																		Gross Beta ≤ BKG
NC - Pressurizer Relief Tank																		<4.5 $\%O_2$
NC - NCDT Gas Space																		<4.5 $\%O_2$

KEY: (T) - Technical Specification
N/S - No Specification

NOTES:
a. H_2 must be reduced to <5 cc/Kg as the unit is shutdown.
b. Tech Spec for O_2 is <100 if NC is >250°F.
c. See 3.5.5 Page 8 of 30, Li dependent on B.
d. 2000 ppm during refueling.
e. Turbidity <30 FTU, Conductivity <5000 μmhos, Bacteria <200,000 Col/ml, Corrosion Inhibitor 2000-3000 ppm (as CS), BZT 20-80 ppm.
f. Total SiO_2.
g. Specific Activity not to include Tritium.
h. $\%N_2$ - N/S, $\%H_2$ - <4%, $\%O_2$ - <2%, Contact Radwaste Chemistry promptly with all results.
i. Turbidity <30, Conductivity N/S, % Glycol 48-58 W/W%. Turbidity limits if for the difference in the turbidity betweeen the sample before and after filtration through a 0.45μ filter.
j. Silica Limits are "Administrative Limits".
k. NC and NV GeLi samples should be counted with 1 hour ± 10 minutes of sample time and must be counted within 2 hours of sample collection time if data will be used for Technical Specification reporting. If data to be used for demineralizer decontamination factor then the sample should be counted 4 - 8 hours after collection.

Enclosure 1

UNIT 1 & 2
SECONDARY CHEMISTRY SPECIFICATIONS

SAMPLE POINT	pH	Cond. μmhos	C Cond. μmhos	O_2 ppb	Na ppb	N_2H_4 ppb	Cl ppb	Sus. Sol. ppb	SiO_2 ppb	Total Fe ppb	Cu ppb	NH_3 ppb	Tritium μCi/ml	GeLi Isotopic	I-131 D.E. μCi/ml	Gross Spec. Activity μCi/ml	Gross Beta μCi/ml
BB - Steam Generator Blowdown A-D	8.5-9.3		≤0.4		≤5	N/S	≤20	<1000	≤300	<1000		<250					
SM - Main Steam A-D	8.8-9.3	1-6	<0.3		<3												
CM - Hotwell Pump Discharge	8.8-9.3	1-6		≤5	≤3				<20								
CM - Polisher Influent			<0.5					N/S		<20	<5						
CM - Polishing IX Effluent			≤0.2		<1.5			<10	<20	<20	≤2						
CF - Feedwater	8.8-9.3		≤0.2	≤[illegible]	<5	(a)		<10	<20	≤20	≤2	100-1000	≤BKG (T)	≤BKG (T)	≤0.1 (T)	≤BKG (T)	
CM - Polishing IX Cell Effluent			≤0.2						<20								
HW - C Heater Drains	8.8-9.3				<5			<10			<5						
HW - G Heater Drains	8.8-9.3			<10	<5			<10			<5						
CS - Condensate Storage Tank	6.0-9.3	0-12			<5				<20								≤MDA
HS - MS Drain Tanks 1A1 - 1C2	8.0-8.7				<10						<5						
SC - Main Steam Crossover	8.8-9.3				<3												
CM - Condenser Hotwell 1A1-1C2					<5		<50		<20								
HS - 1st - 2nd Stage Reheat Drain Tanks											<5						
CM - Aux Boiler Feedwater, A or B	8.8-9.3					(b)		<100 (c)									
CB - Aux Boiler Blowdown, A or B		30-57						<2000									
CM - Spent Resin Sample														≤BKG (T)			

(a) 3 x DO or as required to maintain pH in Final feedwater, but do not routinely operate with >200 ppb.

(b) N_2H_4 = to hotwell if feeding from hotwell (ie. deaerated)
= to 8-20 ppm if feeding aerated water.

(c) < 250 ppb not to exceed 1 hour Transient Condition

BKG is abreviation for background count rate

ENVIRONMENTAL CHEMISTRY SPECIFICATIONS

SAMPLE POINT	Flow gpm	pH	Cl_2 mg/l	DO mg/l	Set. Sol. ml/l	Tot. Sus. Solids mg/l	Vol. Sol. %	Iron mg/l	Copper mg/l	BOD mg/l	Fecal Col. Colonies/ 100 ml	Gross β μ Ci/ml	GeLi Isotopic	Other	Comments
RC - Raw Water (Plant Intake)															
WC - WO Sys. Eff. (WWTS)	N/S (T)	6.0-9.0(a)				<30		<1.0 (b)	<1.0 (b)				≤BKG (c)		Oil and Grease <15 mg/l by Physical Sciences Lab.
WWCB Eff.	N/S	6.0-9.0										≤BKG			
WT - WT Sys. Eff.	<100	6.0-9.0	≤1.0	>1.0		<30				<30	N/S	≤BKG			
WT - Lagoon Eff.		6.0-9.0	0.5-1.0	≥5.0		<30				<30				(f)	
WT - Lagoon Cells 1-3		6.0-9.0(g)		≥1.0 (g)		N/S				N/S (g)					
WT - Chlorinator Eff.			≥0.5												
WC - WC IHP Eff.		N/S													
WC - WC FHP		(d)				(d)							≤BKG (c)	(e)	
WC - WC Set. Pond A/B Mix		(d)				(d)							≤BKG (c)	(e)	
WF - Unit I Turbine Bldg. Sump													≤BKG (c)		
WP - Unit II Turbine Bldg. Sump													≤BKG (c)		
RN - SNSWP Overflow to WWCB												≤BKG			

a. If pH is out of specification while discharging, secure discharge and determine alkalinity and acidity prior to adjusting pond pH.
b. Required when treating metal cleaning waste (but not Trisodium Phosphate waste).
c. If radioactivity present, do not discharge without approval of Health Physics.
d. Must meet WC Effluent Specifications prior to release.
e. Boron <1 ppm at discharge to river. If >1 ppm in pond to be released, dilution from WWCB required to obtain ≤1 ppm.
T - Technical Specification. BKG - Background count rate.
f. Turbidity N/S; Temperature N/S
g. These Specifications apply to Lagoon Cell #1 only.

SECONDARY SYSTEM
WET LAYUP SPECIFICATIONS

Duke Power Company
McGuire Nuclear Station

SAMPLE	pH	CAT COND. µmhos	VERIFY N_2 OVERPRESSURE	O_2 ppb	NH_3 ppm	N_2H_4 ppm	Cl^- ppb	OTHER
STEAM GENERATOR B.D. A	9.8-10.5	<10.0	YES OR NO	<100	5-30	75-250	<1000	
STEAM GENERATOR B.D. B	9.8-10.5	<10.0	YES OR NO	<100	5-30	75-250	<1000	
STEAM GENERATOR B.D. C	9.8-10.5	<10.0	YES OR NO	<100	5-30	75-250	<1000	
STEAM GENERATOR B.D. D	9.8-10.5	<10.0	YES OR NO	<100	5-30	75-250	<1000	
HOTWELL	9.8-10.5					40-50 (1)		

(1)If outage is planned to last > 1 week, 40-50 ppm hydrazine residual is to be established. If outage is planned to last < 1 week, 20-30 ppm hydrazine residual is to be established.

WATER TREATMENT SYSTEM SPECIFICATIONS

SAMPLE	pH	TURB FTU	FREE Cl_2 ppm	COND µmhos	SOLUBLE SiO_2 ppb	Na^+ ppb	TOTAL Fe^{+3} ppb	Al^{+3} ppb	TOTAL ORGAN. CARBON	MILL SUS SOLIDS ppb	OTHER	COMMENTS
RAW WATER	6.0-9.0	<65		N/S			N/S				Boron (N/S)	
REACTION TANK		<65	0.2-2.0									
"A" YF FILTER EFF.	6.0-9.0	<1.0								<10		
"B" YF FILTER EFF.	6.0-9.0	<1.0								<10		
YF HEADER					N/S				N/S	<10		
YD HEADER (TAP)	6.0-9.0	<1.0	0.2-1.0								Total Coliform (By Env. Lab)	
"A" CAR FIL EFF	6.0-9.0	<1.0	0						N/S	<10		
"B" CAR FIL EFF	6.0-9.0	<1.0	0						N/S	<10		
YM HEADER (WTR)	6.0-8.0			(a) <0.1	<20 (b)<100	<3	<10	<20		<10		
YM TAP (LAB)	6.0-8.0			<0.5								
YM VAC DEGAS "A"											Dissolved Oyxgen <100 ppb	
YM VAC DEGAS "B"											Dissolved Oxygen <100 ppb	
RF Pressurizer Tank			1-3									

(a) As per respective demineralizer conductivity bridge.
(b) Total SiO_2 - <100 ppb

II. EMPLOYEE ACTING AS A LOOKOUT

A. Statement of Concern

Six employees alleged that they had seen others act as lookouts for inspectors while welding procedures were allegedly being violated. While several others stated that they had heard of this occurring, they had no direct knowledge.

3. Investigation

1. Individual 168, a welder, alleged that his foreman (Individual 142) wanted to weld for awhile. The foreman borrowed Individual 36's welding rods and began welding. The foreman told the crew: "Keep an eye out for the QC inspector." The underlying technical concern raised in this situation is the fact that the foreman had welded with filler material issued to another individual. This violates QA Procedure H-3. This raises no safety concern in this instance, however, because the filler material is the same as that used by the welder assigned to make the weld. Additionally, the investigation confirmed that the foreman was indeed procedurally qualified to perform the welding.

2. Individuals 168 and 196 described an incident where the foreman, again Individual 142, asked for someone to watch for the inspector while he ground out a repair on a backing ring in a Class G pipe. No procedure precludes a foreman from grinding a backing ring on a Class G (non-safety related) weld.

3. Individual 191 alleged that an unidentified powerhouse mechanic crew had a lookout during a cold springing operation five and one-half years ago. Significantly, this operation was not performed in violation of the

procedures. The technical issue of cold springing is addressed in Attachment B, Section III.

4. Individual 46 alleged that a welder has asked another welder to look out for an inspector while he made a tack weld when the appropriate documentation was around the corner with a fitter. As set forth more fully in Attachment A, Section III, this is not a violation of procedures.

5. Individual 177 alleged that a welder would ask another welder to act as a lookout when they "buddy welded" (that is, when one welder welded one side of a pipe and the other welder later welded the other side). As set forth more fully in Attachment B, Section II, this is not a violation of procedures unless documentation is not properly made. In any event, this does not raise a significant safety issue.

6. Individual 70 alleged that on one occasion his welding senior, Individual 28, told him, "Be careful, here comes the inspector." Individual 70 did not identify any improper work being performed. The foreman of the crew was Individual 142.

It is not clear whether welders' comments on the job about "looking out for inspectors" were even intended to be taken seriously. As related by several individual interviewed, the craftsmen frequently joke about "looking out" for inspectors.

C. Resolution

The common thread in these incidents is that on a few isolated occasions, foremen or workers allegedly posted a lookout while they performed work which they believed violated procedures. As discussed above, only the first situation summarized (involving Individual 142) actually involved work in violation of procedures.

If this attitude on the part of these craftsmen is held seriously, it needs correction. It is entirely inappropriate to post watch, however infrequently, for inspectors. The role of craftsmen is to do the job right, and as such, craftsmen should welcome any inspector to watch him working. As described in Section VI of the main report, corrective personnel action has been taken with respect to Individual 142 (the one foreman implicated), and a program reemphasizing Duke Power Company's expectations for quality work has been undertaken.

D. Conclusion

Significantly, of all the interviews conducted, only a very small number of actual "look-out" incidents were reported. Further, in virtually all incidents reported, the actual incidents alleged were not violations of procedures, and no technical problems are raised by the one actual procedural violation which was alleged. While even one incident will not be tolerated, this is clearly not indicative of a wide spread problem. In any event, strong corrective action against the one supervisor involved will be taken (see Section VI of the main report).

Further, meetings will be held with supervisors and craft to reinforce Duke's continuing policy that quality work is everyone's job, and actions such as alleged here are clearly unacceptable.

III. PROCESS CONTROL

A. Statement of Concern

Ten craftsmen raised concerns about foremen directing workers to perform work without having adequate process control documentation in their possession.

1. Five individuals had no direct knowledge of such incidents, but stated that they had heard talk of specific instances of this. Each instance except one where a rumor was heard is either addressed below, or an interview with the worker who was thought to be involved reflected that the instance was simply a rumor and did not occur. (With regard to the one exception the worker who was named by another as being involved no longer worked at Catawba and could not be interviewed.)

2. Two individuals (Individuals 77 and 94) stated that although they had been directed by their foremen (Individuals 217 and 78, respectively) on several instances to begin work without process control documentation, when they told their foremen that the documentation was not in their possession and this was contrary to procedures, they were not made to start the work.

3. Two individuals (Individuals 46 and 95) were directed by their supervisor (Individual 217) to work on several hangers without having the documentation directly in their possessions; the documentation was near the work area (such as in the fitter's possession) and they were aware of what process parameters applied.

4. One individual (Individual 88) stated that he had been directed by his foreman (Individual 217) to work without documentation in his possession. He did such work. He had no concerns with the quality of

the work. (Subsequent interviews revealed that in all likelihood (as with individuals 46 and 95, above) the documentation was near the work area.)

B. Investigation

The investigation consisted of asking each of the nearly 200 craftsmen interviewed if they had related concerns, interviewing supervisors, and reviewing appropriate documentation regarding this issue.

Process control is used to detail work processes, define parameters which should be followed to assure quality work, require quality inspections or hold points as work progresses, record materials used in this process, and to provide an inspection of the final product. Quality Assurance Procedure F-9, Process Control for Preassembly and Installation of Piping Systems (ASME) and Quality Assurance Procedure M-51, Component Support, both require the craft person responsible for the work to maintain the process control documents and inspection records at the work location while craft work is in progress so that craft can refer to the document as necessary during construction.

Significantly, of the over 200 individuals interviewed, only the ten noted above raised this issue at all. Further, of these ten individuals, only three had direct knowledge of incidents where the work was actually performed without process control in the workers possession. Where the work was performed without documentation in the actual hands of the worker, the following circumstances were present. The documentation had been in the worker's possession when a problem had been noticed which required a decision from the Technical Support staff. The Technical Support staff technician had come to the work area, resolved the problem and had taken the documentation to another technician for a review signature. (Many times two technicians would be in the general vicinity of the work area for such problems.) In such a

circumstance, the documentation was out of the work area for only a short period of time. While it was gone, the supervisor, in some instances, directed the worker to perform minor preparation activities associated with the work. In each such instance, the worker knew what parameters were to be followed. Accordingly, while the literal words of the procedure may have been violated, the intent (i.e., the worker knowing what parameters to follow) was met.

C. Resolution and Conclusion

Based on the results of the interviews conducted, it is clear that if work is ongoing without appropriate documentation in the work area, it is not a widespread problem. Further, as noted above, the incidents alleged did not appear to have resulted in violation of the underlying intent of the procedure. In any event, in all instances, the workers knew what the important work parameters were even though they did not have the specific documentation physically in their possession. (It should be noted that any defective work arising from such an incident would have been detected by QC during subsequent inspections.)

To assure that workers and supervisors understand the exact procedural requirement in this area, meetings will be held on the topic. In addition, the one remaining supervisor mentioned in specific instances of direct knowledge (Individual 217) will be counseled regarding the perception created with subordinates regarding this issue. (Individual 78 was previously removed from a supervisory position well prior to this investigation.)

IV. WORK ON NONCONFORMED ITEMS

A. Statement of Concern

One welder (Individual 27) alleged that during the spring or summer of 1979, while he was working as a welding helper, a welding foreman (Individual 48) directed several welders (but not the individual making the statement) to continue work on an item that had been nonconformed by a welding inspector. This incident occurred in the spent fuel pool cask pit near embedded angle welds A-14 or A-525. While this concern was not substantiated by individuals who were on the foreman's crew during this time, it was investigated, assuming it was true.

B. Investigation

Significantly, in response to specific questions in the area to all employees interviewed, Individual 27 was the only one who raised an incident where work was alleged to continue on a non-conformed item in violation of procedures. The first step in Duke's investigation of the allegation was to identify any NCIs written on work in this area during this time. An extensive review of relevant NCIs revealed that NCI 5,641, dealing with an embedded angle very near welds A-14 and A-525, was written on 5/16/79 by the welding inspector named by this individual. This NCI indicated that an ironworker had improperly ground on a completed weld without additional paperwork while preparing to install one of the liner plates. Since no other NCI could be located that fit the welder's description, it is believed that this must have been the nonconformed item that he recalled others having been told to work on in violation of procedures.

The next step in Duke's investigation was to determine whether the welder's concern had previously been detected and addressed by QA. Further

reviewing of NCIs revealed that it had indeed already been addressed. NCI 5,648, also dated 5/16/79, was written by another QA inspector based upon work being performed on the nonconformed embedded angle being welded to the liner plate. This NCI was properly resolved by requiring that welding craft be trained on QA Procedure Q-1 (Nonconforming Items).

Copies of these two NCIs were shown to the welding foreman in question. He does not recall anything about the incident. In response to questioning, the foreman further stated that when an item has a Q-1B (NCI) tag, work stops on that item until the extent of the NCI can be determined. If the NCI allows work to continue, or if the item being worked on is not within the scope of the NCI, work may continue. These statements demonstrate a good working knowledge of QA Procedure Q-1. Moreover, the foreman indicated that he has never instructed any of his employees to work on a nonconformed item without ascertaining instructions on the NCI. It should also be noted that there were from 1 to 3 QA welding inspectors assigned to the spent fuel pool area during the period in question. These inspectors moved constantly from weld to weld, making it virtually impossible for someone to work on a nonconformed item without the inspector's knowledge.

C. Resolution

The individual who made this allegation is the only employee to raise this concern. As previously noted, he was not directly involved but only reported on what he remembered hearing. Significantly, none of the individuals on the affected crew remember any such incident. It was accordingly determined that if the incident occurred at all, it was an isolated incident, and not a widespread or ongoing problem. Moreover, since the item in question was detected by QA and nonconformed, and since personnel

training was conducted on the issue of working on nonconformed items, additional action is not required.

D. Conclusion

The situation was handled correctly when it occurred and is acceptable as is. It should be noted that after interviewing the craftsmen on the foreman's crew during this time period, no individual indicated that they had ever personally been directed by the foreman to work on a nonconformed item. In addition, no other allegations of this type were made about any foreman. Thus, although work did incorrectly proceed in the one instance documented by the NCI, it is not clear that the named foreman was responsible. Moreover, this was clearly not a recurring or widespread problem and needs no additional corrective action.

V. INTERACTION WITH INSPECTORS

A. Statement of Concern

Three craftsmen questioned whether their supervisors had given them inappropriate instructions in dealing with inspectors.

B. Investigation

The facts associated with each of the three incidents are noted below:

1. Torquing of Redheads: In early 1983 one powerhouse mechanic (Individual 25) was installing concrete expansion anchors ("redheads") and torquing them to the required valve. During the subsequent routine QC test of the torque wrench, it was determined that the craft wrench was not within calibration limits. Accordingly, an NCI was prepared.

The NCI (16168) had as an attachment the area location of the redheads which had been torqued with the nonconforming wrench. Approximately 1 year later when the action was taken to resolve the NCI (QC to recheck the redheads), the craftsman involved (Individual 25) could not remember the exact redheads at issue. He alleged that his supervisor (Individual 87) either in a serious or joking manner implied that since Individual 25 could not remember the exact redheads, he should show the QC inspector any redheads. The craftsmen, however, with the aid of the description of the location provided in the NCI was able to point out the loop on which the redheads were located (though not the exact redheads). The inspector checked all redheads on that loop. Significantly, all redheads either had been or would have been checked, in any event, by QC during turnover of the system prior to testing.

2. Repair of Weld: A radiograph had detected a defect in one weld. A welder (Individual 31) began repair work on the wrong weld. As is the practice, he slowly removed the weld material to locate the defect. Obviously

he found no defect and rewelded the joint. (It is not uncommon to fail to locate the defect, as it may be removed without seeing it).

Again the radiograph showed a defect. The welder (with a mindset as to which weld he should be working on) went again to the wrong weld and went through the same process. This happened several more times. The ANI became curious as to this mysterious defect and began to inquire on several occasions if the defect had been located. During approximately the fifth attempt to find the defect on the wrong weld, the ANI again asked if the defect had been found. The welder stated that his foreman (Individual 223) told him to tell the ANI that the defect had been found, perhaps joking or to get the ANI off his back. The welder did not do this. Eventually, it was pointed out that the welder was working on the wrong weld, and the two welds are now repaired.

3. One welder (Individual 94) stated that when arriving for work on the second shift, he detected that a holdpoint on a weld repair had been by-passed. The welder brought this problem to the attention of an inspector. The inspector agreed that the holdpoint had been missed.

When the welder informed his supervision of this problem, his supervisor (Individual 78) told him to approach another inspector for the inspection. The welder alleged that his supervisor stated that another inspector might not detect the problem.

Instead of doing as his supervisor instructed, the welder returned to the original inspector and informed him of what the supervisor had said. The inspector informed the other inspector in the area of the problem. The second inspector when performing the inspection also rejected the weld.

It should be noted that the supervisor in this concern has been removed from his supervisory position well prior to and independent of this investigation.

C. Resolution and Conclusion

1. There is no technical concern over the torquing of the anchors. They have been properly torqued and inspected. However, there is a question concerning the foreman's direction to Individual 25 to point out redheads that were improperly torqued. It should be pointed out that the craftsperson was not sure if his supervisor was serious in this request. In an interview with the supervisor, he stated that he had not directed anyone to point out redheads as alleged. Based on the technical acceptability of the torque values and the uncertainty of the direction by the supervisor, this item has been adequately resolved.

2. There is no requirement to inform the ANI when defects are removed. Only if the ANI marks repair NDE (nondestructive examination) as a holdpoint is he required to be notified; this notification would be made by the NDE inspector. However, the ANI made no such request in this instance.

Nevertheless, the welder properly refused to inform the ANI that the defect was found when his supervisor directed him to do so. The welds in question were properly repaired and inspected. Based on the technical adequacy of the welds and the circumstances surrounding this isolated incident, this item has been adequately resolved.

3. In this case, the missed holdpoint was detected, an inspector notified and the welding stopped. This sequence was in accordance with the QA program. In this instance, there is little question what the supervisor's intent was and the instructions were definitely improper. This individual is no longer a supervisor. The personnel action removing this individual from a supervisory position took place well prior to and independent of this investigation.

Significantly, all of the individuals interviewed during this entire investigation have been involved in literally thousands of independent interactions between foremen, workers and inspectors. Out of all these interactions, only these three incidents have been raised. In addition, none of the incidents raised clearly represent action which would have led to a safety issue. In short, this is not a widespread problem. In any event, meetings will be held with craft and supervisions to reinforce the point that training of craft and supervisors will reinforce Duke's position that care should be taken to assure that inspectors are not misled, even if in a joking fashion.

VI. STENCILING OF WELDS

A. Statement of Concern:

One welder (Individual 72) stated that he remembered an instance in late 1978 or early 1979 where one of his supervisors (Individual 42) had directed him to stencil 35 - 40 welds on the cable tray steel grid system that he had not welded. The welder stated that this was done prior to the QC inspection. Further, the welder stated that he repaired all welds he was concerned about before stenciling.

B. Investigation

To investigate this allegation, Duke questioned the supervisor in question and each craftsman on this crew who still remained at Catawba. In addition, the appropriate code and procedural requirements were reviewed.

Neither the supervisor in question nor any other member of this crew stated that the supervisor had directed them to stencil welds that they had not welded. One member of the crew (Individual 177), however, remembered the incident. This second welder recalled that while he and Individual 72 were welding in the control room, the supervisor approached them and stated that one of the two of them had made welds on clips in the control room and had failed to stencil them. The second welder stated that he told the supervisor that he had not made the welds and walked off. He doesn't know what Individual 72 did.

C. Resolution

It cannot be determined whether the supervisor actually did direct the welder to stencil welds he had not performed. However, in the investigation of this matter, the allegation was assumed to be true. Even if this incident did occur, however, it is clear that the problem was not widespread.

In addition, even assuming that this isolated incident occurred, there would have been no adverse impact on the plant safety, nor any violation of applicable welding codes. The type work in question is governed by Duke Power's Design Specification CNS-1121.00-1, which refers to the AWS D1.1 Code for welding. AWS D1.1 does not require a welder to stencil his work. It is a Duke procedural requirement only.

This type of work receives a visual inspection only and no specific weld numbers or process control travellers are assigned to each joint. In addition, each structure of this type receives a documented final inspection in accordance with QA Procedure M-18, which does verify that all required inspections have been made. By the welder's own statement, all unacceptable welds were repaired prior to stenciling. This information, along with the final visual inspection which was conducted after the stenciling, indicates the joints in question are acceptable.

It should be noted that the initial welding or repair of these welds could be done by any welder who held a L-154 Performance Qualification. The initial welder who performed this work would have had to have at least a L-154 Performance Qualification (the first qualification received by each Duke welder is L-154). Accordingly, every welder in the plant would have been qualified to make the welds in question.

D. Conclusion

It is not clear if the intent of the foreman was to require a welder to stencil welds that he did not make. Other individuals on that crew indicated that the supervisor did not take such actions. However, if he did, the foreman acted incorrectly. As only one welder had this concern, and only one foreman was implicated, it is concluded that if it occurred at all, this is an isolated case. In addition, all welds were found acceptable by the required

visual inspection; therefore, there is no reason to doubt the quality of these joints or any other similar joints at Catawba. In any event, meetings will be held to reinforce with craftsmen and supervisors the need to adhere to all plant procedures.

VIII. VERTICAL CONTAINMENT STIFFNERS

A. Statement of Concern

One welder (Individual 192) alleged that due to production pressure by an unnamed foreman, other unnamed welders made fillet welds on vertical stiffners on the containment vessel which may have contained imperfections. He could not identify any specific welds.

B. Investigation

The investigation consisted of interviews with welders and a review of documentation, procedures and codes.

The welds in question are attaching the vertical stiffners to the containment pressure boundary. Their function is to provide the free standing containment vessel with structural stiffness.

As such the stiffner welds are required by ASME Section III to be examined by visual inspection and magnetic particle examination. The visual inspection and the magnetic particle examination along with other in process inspections such as fitup and preheat assure the integrity of the welds.

During fabrication, these welds are continually monitored by qualified inspectors using in process travellers to document the inspections. In addition random walk through inspections are performed at unannounced periods.

After all of the inspections are completed they are documented in accordance with Duke QA Procedure (M-19). This documentation is reviewed for completeness and correctness. In short, all containment vertical stiffner welds were inspected as noted above and found acceptable or repaired.

In addition, the containment (and associated stiffners) successfully passed a structural integrity test where the containment is tested in excess of its design pressure.

D. Conclusions

In that no other welder raised such a concern and the welder in question could furnish no specifics, the concern, if valid, is isolated. In any event, inspections of the welds in question reflected that they were acceptable. Accordingly, this issue does not raise a safety concern warranting corrective action.

ATTACHMENT B: Technical Issues Not Involving Foreman Override

I. REMOVAL OF ARC STRIKES

II. SEQUENCE OF MAKING SOCKET WELDS

III. COLD SPRINGING

IV. VENDOR WELD QUALITY

V. SYSTEM FLUSH

VI. PREHEAT

VII. WELDING WEAVE WIDTH

VIII. ADVANCE DISTRIBUTION OF TESTS

IX. MISSING NUT ON STRUCTURAL STEEL

X. MELT THROUGH OF BACKING RINGS

XI. WELDING TEMPERATURE ON PLUG VALVES

XII. PAINTING BASEPLATES

XIII. EXCESS PENETRATION

XIV. STAINLESS STEEL FILLER MATERIAL

XV. REWORK AFTER HOLD POINT

XVI. BUILDING WALL CRACK

XVII. DEFECTIVE WELD

I. REMOVAL OF ARC STRIKES

A. Statement of Concern

In NRC Inspection Report Numbers 50-413/84-31 and 50-414/84-17, the person identified as Individual B-2 expressed concern that on one occasion his foreman had removed arc strikes from valve 1NI398 in the Unit 1 reactor building. The welder viewed this as a violation of procedure.

B. Investigation

During second shift, Individual B-2 noticed several arc strikes on a valve on which he was preparing to complete some welds left incomplete by the first shift. He asked his foreman to look at the valve so that the foreman would be aware that arc strikes were present. The foreman filed the arc strikes off of the valve and allegedly instructed the welder to do likewise, if the arc strikes were "not too bad." In subsequent interviews with other welders, Individual 109 related a nearly identical incident on valve 1NI395. Individual 196 verified this incident. Both this valve and that mentioned by Individual B-2 are located under the 1-A steam generator about ten feet apart. They are identical in size and appearance.

Both of these valves were examined. Indications of filing were found on both valves, but only on the weld region of the valve, which is the area where filing of arc strikes would normally be expected during the course of fabrication. There were also grinding indications on the valve body. However, discussions with the manufacturer revealed that grinding is performed on the valves during manufacturing to remove surface irregularities. The grinding marks lacked the luster of filed regions, indicating that they were done during manufacture. No evidence of filing (as opposed to grinding) was found on the body of either valve.

A subsequent interview with Individual 109, who related the incident regarding valve 1NI395, revealed that he was welding on the valve at the time the filing incident occurred. Therefore, process control authorizing cleanup of the valve socket area (by filing if required) was in the possession of the welder. (The paperwork that authorizes the weld also authorizes the removal of arc strikes within the weld area.) This welder further stated that he could not recall exactly where on the valve the filing was done.

In order to determine whether improper filing had been done on other valves, all valves in critical socket weld systems welded by the welders of Individual 109's crew were identified; a total of 24 valves were identified. Those that were accessible were examined for indications of filing on the valve body. This examination revealed that of the 19 valves that were accessible, eight of the valves had ground regions which were done by the valve manufacturer. This grinding is a normal step in the manufacturing of the valves. One valve (1NC-019) had numerous ground regions. Six of the valves had filed regions, but in all six cases the filing was confined to the socket region of the valve (i.e., the area of the weld). There were no file marks found outside the weld region. As explained below, this indicates that no violations of procedure occurred.

C. Resolution

The decision by the foreman to remove minor arc strikes was technically correct. The socket area of the valve is considered the weld zone and the supervisor would be responsible for any arc strikes on components welded by his crew. Procedures governing the process control for erection of this system permit the welder to remove arc strikes in the weld zone. Whether one crew or another created the arc strikes makes no difference, as the supervisor who last works on the system is responsible for insuring the system is ready for

inspection. Thus, Individual B-2 and Individual 109 were correct in bringing the arc strikes to the attention of their supervisor and the supervisor was correct in removing them. (Individual B-2 or Individual 109 could also have properly removed the arc strikes.) While interaction between these welders and their supervisor may have been poor, causing the welders to misinterpret the intent of the supervisor's direction and incorrectly assume that the foreman was violating procedure by acting without process control, in actuality no procedures were violated. Therefore, no corrective action was necessary.

To avoid such misunderstandings in the future, meetings with craft supervision will be held to reinforce include the need to make communications with their subordinates clear and consistent.

D. Conclusion

An examination of all of the accessible valves welded by Individual 109's crew during construction revealed filing on six valves. However, this filing was confined to the weld area (valve socket) and is believed to have been done during fabrication by the manufacturer. It is therefore considered authorized. Moreover, no procedures were violated by the foreman when he filed minor arc strikes from the weld area of the valve. Since the foreman was responsible for the welding of that portion of the piping system, he or his subordinates had M-4A process control to perform the work. This process control permits removal of arc strikes in the weld zone. If the arc strikes can be removed "with a few strokes of a file" they will be surface indications only and will not have penetrated the surface of a component. Their removal is considered the responsibility of the welder. This concern was a result of poor communication between supervision and craft. It does not represent a violation of procedure.

During this investigation several other welders voiced some more general concerns in regard to the removal of arc strikes. Individuals 5 and 186

indicated that they were each aware of an incident wherein another welder (unnamed) had removed an arc strike without proper approval and had been issued a violation for doing so. (These arc strikes were apparently not in the weld region or the weld had already passed final inspection.) Individual 176 related another incident several years ago in which an inspection documented an arc strike which was removed without proper process control. Individual 102 stated that several years ago employees (unnamed) had removed arc strikes but that he had not observed this more recently. Individual 168 stated in his interviews that he had observed other welders (unnamed) remove arc strikes without process control, but that these were surface arc strikes usually near the weld, which were "easily removed with several strokes of the file." Individual 131 stated that he had in the past seen arc strikes outside of the weld zone that had been filed off without paperwork, but that he had not observed this recently. He observed that welders are now taking care to prevent this problem. Individual 191 indicated that he had removed superficial arc strikes which could be removed with several strokes of a file without checking with his supervisor. As stated above, process control permits this. Individuals 37, 194 and 208 had heard of an incident several years ago in which a QA inspector saw a deep arc strike on a pipe and red tagged it. During a subsequent shift, the arc strike was removed and the pipe rewelded, without process control. An NCI (#14,120) was issued.

These additional incidents involve either (1) the removal of superficial arc strikes in the weld zone for which no process control is required (not a violation of procedure); (2) the removal of deeper arc strikes or arc strikes outside of the weld zone without proper approval, which was detected by QA; or (3) allegations of arc strike removal in the past about which no specific information is available. As to this last category, we note that any

questionable areas on a weld would be detected during the final system inspection required by QA. Accordingly, none of these additional incidents raise safety concerns, and none would have affected the overall quality of the plant.

II. SEQUENCE OF MAKING SOCKET WELDS

A. Statement of Concern

In NRC Reports 50-413/84-31 and 50-414/84-17, a person identified as Individual B-3 alleged that on difficult socket welds in the Unit 1 pipe chase (such as those in a tight location or awkward position which required the use of mirrors to weld), he had completely welded one half of the weld, capped it, then completely welded the other half and capped it. He estimated that he had completed 60 or 70 welds, primarily on one inch or smaller sockets, in this manner. While no one had instructed him to use this procedure, Individual B-3 indicated that he felt he had to use it in order to work on or repair difficult welds that he had been given to complete. Individual B-3 stated that he felt all of the welds were good, but was concerned because he believed that this technique was not a qualified Duke procedure. He stated that the "foreman never told him to work in violation of procedure."

B. Investigation

This individual failed to identify any specific socket welds as having been welded in the manner described above (i.e., by completing approximately 180° of the weld joint before the other half was begun). This is not significant since the technique that Individual B-3 described is neither required nor prohibited by ASME or Duke Power Company procedures. In fact, it is a viable method for making difficult welds. Individual B-3's belief that he had violated procedure was therefore incorrect. Such a progression is, however, seldom used by craft in the production of piping systems as it is not normally required. A similar technique, the block (or step, or cascade) welding method is used to control distortion of weldments and is considered beneficial on large welds, where close tolerances are demanded.

In the subsequent interviews with the 134 welders, only one raised this welding sequence issue. He questioned whether this technique should be used by two welders on the same weld, and, if so, if in such instances proper filler material procedures were followed and whether both welders stenciled the weld in question. While he stated that he always followed procedures, he was not sure of others.

As previously noted, sequence welding is not contrary to procedures even if done by two welders on the same weld. With regard to the additional and related concerns raised, use of filler material issued to another welder is not permitted (QA Procedure H-3). While this welder stated that he had never violated filler material requirements with regard to this issue, even if some violations existed, the use by a qualified welder of filler material issued to another welder would not adversely affect weld quality.

In addition, any second or assisting welder must assure that entries for his welding appears on the appropriate documentation and his stencil appears in the vicinity of the weld. While the welder stated that he did this, in any event, if it is not done it should not adversely impact weld quality. In that the final weld must pass the appropriate final QC inspection any resulting defects would be detected and corrected, as appropriate.

C. Resolution

Welding of first one side and then the other does not constitute a violation of Duke welding procedures, process specifications or applicable code requirements. It is up to the craftsman to decide when such a procedure should be used in order to maintain weld quality. Moreover, there have been no documented failures of socket welds made in this manner. Thus, there is no need to adopt any procedural changes that would direct craft not to use this option.

It was determined, however, that some action should be taken to correct the perception that use of this procedure was improper. Accordingly, craft will be reminded that such techniques are not contrary to procedures. In this regard, however, craft will also be cautioned to assure conformance with appropriate related procedures covering weld filler material and documentation.

D. Conclusion

Since this technique is not specifically prohibited in guidance documents and it is a viable method for making difficult welds, there is no need to change this aspect of the welding program. As the plant becomes more congested, craft must turn to such techniques to make difficult welds so that the desired quality can be achieved. There is no reason to question the quality of welds produced using this sequence technique. If residual stresses due to the welding progression were too great, distortion would occur. Distortion would be detected at the final visual examination. The "half side" progression would not produce a residual stress condition that would differ from that produced by the usual progression.

The employee's perception that this welding technique was a violation of procedure was incorrect.

III. COLD SPRINGING

A. Statement of Concern

One welder alleged during the initial interviews that a powerhouse mechanic foreman and several inspectors had allowed a cold spring to occur on a piping reducer in the nuclear service water ("RN") system at weld 2RN-114-4, in September 1981.

B. Investigation

To investigate this concern, further interviews were conducted with the foreman and three other members of his crew as well as the implicated welding inspector, the welding inspector leadman, the welding inspector's supervisor, and the authorized nuclear inspector ("ANI").

Significantly, all individuals interviewed who were directly involved stated that this instance of cold springing did occur on a 12" line. All directly involved individuals (i.e., the crew members, foreman, and QC inspector) felt that for this particular instance, the cold springing fell within the provision of QA Procedure M-4 and Welding Process Specification L-200 for alignment and was acceptable. Upon evaluation, it was determined that the cold springing action was in violation of Construction Procedure CP-483. Accordingly, an NCI was generated on April 5, 1984.

Significantly, of all the individuals interviewed, only two other individuals remembered other specific instances of cold springing that could possibly be in violation of procedures. The other two instances were previously documented on NCI's and appropriately dispositioned. In short, cold springing is not a common occurrence at Catawba.

C. Resolution

Based on the interviews, there is no conclusive evidence that any other situations exist where cold springing was used and not properly evaluated. It

should be recognized that handling piping, especially of a large diameter, sometimes requires extensive rigging when hoisting and moving material into position, especially when valves or other concentrated weights are part of the assembly. Also, configurations which contain offsets and vertical risers create forces which must be overcome. It is quite possible to see someone jacking or pulling pipe to overcome these forces alone and suspect they were cold springing pipe when in fact they were not. It should also be noted that CP-483 does allow a force to be applied to piping in order to achieve fit-up. This can amount to forces in excess of 1,000 lbs. on large diameter or heavy wall pipe.

As a result of the welder's concern, NCI 18304 was originated on April 5, 1984 to document the cold spring he had witnessed. However, Design Engineering's evaluation determined the cold spring to be insignificant from a safety standpoint. As a conservative measure, however, prior to this engineering determination, the pipe was cut-out and the joint in question was refitted.

D. Conclusion

The weld joint in question was reworked and now meets design requirements. No other instances of uncorrected cold springing were identified. The impact of cold springing has been thoroughly discussed in previous testimony in the operating license proceeding for Catawba. See e.g., Apps. Exh. 95, Ray and Underwood, pp. 14-15; IC Tr. 724-25, 734, 646-63, Ray and Underwood, 12/15/83.

IV. VENDOR WELD QUALITY

A. Statement of Concern

Five craftsmen expressed concern over the appearance of four weld areas on safety related equipment welded by vendors.

B. Investigation

During the interviews, four craftsmen expressed concern over the appearance of particular vendor welds on safety related equipment in four locations. Of the four weld areas identified as concerns, three were nuclear safety-related (Unit 2 air locks, Unit 2 containment plate penetration sleeves, and the Unit 1 letdown heat exchanger), and one was subject to QA Condition III (fire protection) (electrical cabinets outside Unit 1 diesel generator room).

C. Resolution

All areas of concern were investigated to determine if the welding specifications had been met. All welds of concern were evaluated. These evaluations revealed that in all cases the welds met the specifications.

The Vendor QA Program was explained to each of the four craftsmen interviewed. No additional action of a technical or nontechnical action was required.

D. Conclusion

The welders interviewed expressed their concern in the form of a question: "Why don't some of the vendor welds look as good as Duke's welds?" In no case did they observe a vendor weld that they thought might be unsafe. Duke's investigation did not find any weld to be unsatisfactory.

V. SYSTEM FLUSH

A. Statement of Concern

One welder stated that he was "not confident" with the adequacy of the flush of the Waste Gas system due to the way the technician in charge handled the work.

B. Investigation

The investigation consisted of a review of the documents pertaining to the flush for the Waste Gas (WG) system and interviews with individuals associated with this work. The investigation revealed that the flush procedure was extremely complex, involving approximately 1900 separate valve positions that required verification. There were numerous individual flushes of sections of the system. This flush procedure spanned a total of almost two months, at times running seven days per week, 24 hours per day. In short, it is understandable that a craftsman could be somewhat concerned over the entire operation.

In addition, a review of the flush procedure revealed that it was not very efficiently planned. This planning caused extra valve manipulation and reflushing of the same area of piping more than once. Several situations were encountered when a flow path was completed, but instead of flushing the lines which branch off this path, the procedure instructions were to set up another flow path in a different area. The branch lines that were omitted at this time were flushed at a later time. While this reflushing is not harmful, it would have been more efficient to flush the particular path, then flush all the branch lines before moving on to another area.

In addition, there were a few cases of errors in the procedure (such as valve numbers being incorrectly listed), causing difficulties in initially

aligning some flow paths. These errors in the procedure were a source of some confusion as the field work proceeded.

It should be noted that it is Duke's normal practice to conduct a final review of all cleaning and testing procedures prior to final turnover to Nuclear Production Department. The review of the WG system flush procedure had just begun when the individual came forward with his concern.

C. Resolution

It should be noted that when the system was turned over to the Nuclear Production Department for operational testing, there were no problems at all with system cleanliness, indicating that the flush was thorough and effective. Further, the technician involved with the flush was not responsible for other safety related flushes. A review was performed on all other flushes with which the technician was involved. The quality of these flushes was not compromised. For reasons unrelated to these flushes, the technician is no longer employed by the Company.

No corrective action is required because of the absence of technical or personnel problems.

D. Conclusion

The Waste Gas system did in fact receive an adequate cleaning. All of the other flushes on which the implicated technician was involved were carried out adequately. (It should be noted that the technician is no longer employed at Duke.) It is also a standard practice to review completed flush procedures prior to final turnover of systems to Nuclear Production.

VI. PREHEAT

A. Statement of Concern

One welder stated that he had seen other welders preheat weld joints (for the QC inspections), then allow the weld joints to cool prior to starting to weld. However, he could not relate any specific welds on which this occurred. Significantly, the welder stated that whenever supervisors would learn of this they would "get onto the welders and have it fixed."

B. Investigation

The investigation consisted of discussions with the one welder concerned and others who may have known of the problem, as well as a review of the pertinent requirements and documentation associated with the issue.

The circumstances described by the welder related to the use of a rosebud heating torch for preheat. In using a rosebud heating torch, natural heat transfer in the steel would create a thermal gradient where the temperature was highest at the weld joint. Inspectors, when verifying preheat, use a temperature indicating crayon a small distance from the weld so as not to contaminate the weld. Temperature, in the region checked by the inspector, would then be slightly below the weld joint temperature. This would provide the welder craft needed time to start welding, with the assurance the joint itself will be at the proper preheat when welding began.

Even assuming that some violations of preheat requirements, as alleged, did occur, the likelihood that such violations would have adversely impacted the weld is remote. To explain, Duke welding procedures are qualified in accordance with ASME Section IX. Ambient temperature (60°F) was used for the preheat during tests qualifying these procedures, with the exception of heavy sections of material which require elevated preheat above 60°F (only a very small number of the Catawba welds require elevated preheat). Paragraph

QW-406.1 of the ASME Code lists preheat as an essential variable which allows for a reduction up to 100°F below the qualified preheat temperature. Considering this paragraph, the vast majority of ASME field welds (those requiring only 60°F preheat) would have to encounter a base metal temperature well below 0°F before requalification of the weld procedure would be required.

Table 4.2 of the AWS D1.1 Code used for Catawba's structural steel addresses minimum preheat temperatures. Prime importance is placed on not welding structural steel material below 32°F base metal temperature. Given the fact that virtually all welding occurs in enclosed buildings, it is very unlikely that the base metal temperature of any weld joint would drop below 32°F.

It should be noted that Duke Quality Assurance Procedures for welding require the inspectors to perform random inspections of in-process welding to assure compliance with procedures, to include preheat requirements. These inspections would minimize the possibility of violations of preheat requirements.

Finally, even assuming that preheat requirements in limited instances had not been met, the likely adverse impact, if any, would have been cracking in the weld joint. Such cracks would have been detected in the subsequent QC inspections required for all safety related welds.

C. Resolution and Conclusions

Based on the fact that of all the employees interviewed only one had a concern about preheat and this concern was very general in nature, if preheat violations occurred, they were isolated instances. Further, in review of the above investigation results, even if this situation had occurred the likelihood that such violations resulting in an adverse impact on the quality of the welds

at Catawba is extremely remote. Accordingly, no corrective action is required. However, the requirement to preheat will be reinforced with welders.

VII. WELDING WEAVE WIDTH

A. Statement of Concern

One welder stated that he had heard of (but not actually witnessed) second shift welders weaving too wide on weld joints in violation of welding procedures. However, he stated that the quality of the joints was not affected because the welds passed radiography. When the welder was questioned concerning details such as the type of weld, location, and material used, he stated the only things he could remember hearing were (1) the welds were in the Reactor Building and welded with the SMAW (Stick) process, (2) the bead widths were probably 1/8" to 1/4" too wide, and (3) the joints passed radiography.

B. Investigation

To investigate the incident, Duke reviewed all past NCI's regarding welding weave width, talked to other knowledgeable individuals regarding the concern and reviewed the basis for the welding weave width requirements.

Restrictions on weld bead width (weave width) are imposed to control heat input for materials requiring charpy impact testing and to limit the possibility of slag inclusions and lack of fusion.

From the investigation it was determined that the second shift crew on which this welder was a member has historically been assigned pipe, pipe hanger, and structural steel work. Since the only structural steel requiring radiography was completed prior to implementing the second shift and pipe hanger welds are not radiographed, the welds in question must have been pipe welds. At Catawba no piping systems contain materials requiring charpy impact testing. Since the welding in question occurred on piping systems, excessive weave width (even if it occurred) would not be a concern as related to controlling heat input for charpy impact material considerations.

The only remaining potential concern with excessive weave width would be the possibility of slag inclusions and lack of fusion. When the weld bead is too wide, the slag from the welding process can solidify on the sides of the bead before the arc returns to the side reheating the slag in the immediate area of the weld deposit. When this happens, there is a chance of trapping slag at the edges of the weld deposit and not completely fusing the weld metal to the base metal. Any such defects however would have been detected during radiography. Since the welder stated that all the joints passed radiography, the technique used proved to be acceptable for the joints in question.

Duke Power's welding program requires QC to monitor all welding techniques. NCI's have been written concerning excessive weave width. Of the 16 NCI's located concerning weave width, none was found dated later than 1982; only 1 in 1982, 3 in 1981, and the remainder prior to 1981. The number of NCI's concerning weave width is insignificant when compared to the over 200,000 piping welds in Unit 1 alone.

C. Resolution and Conclusions

The welder's allegations are based on things he "heard" and not personal knowledge. In that no other welder raised this issue, there is little support for the belief that excessive weave welding in these areas occurred. However, even if they did occur, charpy impact tested material was not involved, and, accordingly the only possible concern would have been fusion and slag inclusions. However, radiography of the joints (as noted by the welder making the allegations) demonstrate that this was not a problem and the welds were acceptable. The small number of NCI's regarding excessive weave width illustrates that any problem regarding this area is not generic, widespread, or ongoing. Therefore, there is no reason to question the welding quality of Catawba's piping welds due to weave width violations.

VIII. ADVANCE DISTRIBUTION OF TESTS

A. Statement of Concern

An instrument craftsman alleged that he and his crew were given copies of the expansion anchor certification test by their foreman before they took the test.

B. Investigation

All other craftsmen on this crew were interviewed and none of them corroborated this individual's allegation. However, in the investigation of this incident it was assumed to be true.

It should be noted that the qualification test for personnel to install anchors is a Duke Power Company requirement that is over and above code and regulatory requirements. This test has two parts: a technical examination, which tests the worker's knowledge of relevant construction procedures and their ability to find applicable information in their manuals, and a practical examination, in which the worker must demonstrate his ability to correctly install expansion anchors. The manner in which the technical examination is administered has changed periodically. Initially, it was given verbally; later, a written test was used. Several different written tests were used at various times.

Prior to taking th t, each individual is given instructions in this area by his foreman. Copies of tests were made available to foremen to use as guidance in their instruction. However, it was not contemplated that the test which would later be taken by the individual would also be shown to the individual preparing to take the test. If the foreman did, as alleged, show the test to this individual, such action was improper.

Even assuming that this action did take place, however, there is no indication that it improperly enabled this craftsman to pass the practical

examinations during which the individual must demonstrate his knowledge. Further, the foreman had reviewed the relevant construction procedure (#115) with the crew and the individual making the allegation felt knowledgeable on this procedure prior to the test. (He stated that he would have done well on the test regardless.)

C. Resolution and Conclusion

Based on the investigation, this incident, if it occurred, is clearly an isolated case. Further, even assuming that it did occur, work must still be inspected by a QC inspector, and, if deficient due to unqualified individuals, repaired. In short, this issue does not raise a safety concern. Accordingly, no other corrective action is warranted.

IX. MISSING NUT ON STRUCTURAL STEEL

A. Statement of Concern

One welder alleged that a structural steel column anchor bolt was missing a nut on a column in the reactor building.

B. Investigation

A welder stated that he saw a nut missing from one of the four anchor bolts which hold a vertical support column to the floor in the reactor building pipe tunnel (the "pipe chase"). The welder alleged that the bolts on this column were later boxed in with stiffener plates so that the bolts were not accessible.

While he could not give the specific location of the exact column, he narrowed it to three columns in the reactor building pipe tunnel. After physically trying and failing to see if all the anchor nuts were in place by looking through drilled holes in each of the stiffener plates, radiographs were taken. It was determined that out of all the nuts on the three columns, one was missing. NCI 18,333 was written and sent to Design Engineering for resolution and evaluation for reportability.

C. Resolution

As detailed in NCI 18,333, Design Engineering performed calculations that demonstrate that the missing nut is without structural significance. Indeed, the calculations demonstrate that any combination of missing nuts (including all four nuts being absent) is structurally acceptable because of the loading conditions on this vertical support column. Additionally, Duke has previously conducted a random reinspection of over 2000 bolted structural steel connections to assure that all nuts were in place. In no instance was any nut found missing.

D. Conclusion

This allegation was substantiated; however, an evaluation by Design Engineering concluded that the missing nut is of no safety significance. In view of the previously noted inspection for missing nuts and the fact that there were no other missing nuts discovered during this investigation, it is concluded that the allegation is one isolated instance and clearly not reflective of significant safety concern. Accordingly, no further action is warranted.

X. MELT THROUGH OF BACKING RINGS

A. Statement of Concern

Three welders stated concerns regarding melt through of safety related piping welds or backing rings, and improper fitting of backing rings.

B. Investigation

The investigation consisted of interviews with the individuals involved and a review of the appropriate documentation.

1. One welder had completed a root pass and one fill pass on a 16 inch diameter ASME class C GTAW (gas tungsten arc welding) open root joint with SMAW (shielded metal arc welding) fill. A fitter and a helper accidentally fell into the welder's scaffold. This caused the welder to fall into the pipe, which in turn caused his welding rod to go into the root of the joint. The welder could not recall whether the joint was fit open butt or with a backing ring. The welder wanted to cut the joint out and reweld it. However, he was told by his lead man to repair the area. To repair the area, the welder stated that he beveled a cavity around the area, leaving some metal in the bottom of the hole, and rewelded it with an E7018 SMAW electrode. This welder was able to identify the joint and specific area in question; it is weld joint 1RN147-8. The specific area approximately five inches above and below the joint was radiographed and evaluated. Film interpreters could not detect any rejectable indications in the area identified by the welder as the melt through area. In fact, the identified area cannot be differentiated from any other area on the film.

2. This same welder and one other stated that he had seen several small holes in backing rings. To the welders' knowledge, these were not repaired. However, neither welder could locate the weld joints in question.

3. One welder stated that in some instances on class E, F and G welds backing rings may not have been fit tight enough, and the weld metal may have penetrated the backing rings resulting in excessive penetration. Significantly, the welder knew of no specific instances where this occurred and was speculating if excessive penetration occurred.

The purpose of a backing ring is to assist pipe fitters and welders in making quality welds. Backing ring joints are usually easier and faster to complete than open root joints. For fitting purposes, the backing ring provides an easy method of aligning and spacing the weld joint. For welding, the backing ring does nothing more than act as a dam for the molten weld metal of the root pass. Even though the backing ring is normally left permanently in the joint, it serves no purpose whatsoever after the joint is welded. In fact, it is acceptable to remove a backing ring after the joint is welded. Accordingly, the presence of small unrepaired holes in the backing ring is not contrary to procedures and would have no bearing on the quality of the weld.

C. Resolution

1. ASME Class C GTAW Open Root Joint : The welder stated that the melt through was beveled leaving metal in the bottom of the cavity, indicating that the area was properly repaired. Had no metal been left in the bottom of the cavity, the repair would have been made with the GTAW process. As explained above, radiography performed on the joint revealed no melt through or defects. Thus, although the welder would have preferred to cut out the affected area and reweld it, the repair that he performed was acceptable. Similarly, the lead man's instructions that the defect was repairable and need not be cut out were proper. In short, this concern does not reflect a violations of procedures or acceptable welding techniques.

2. Welder Seeing Holes Blown in Backing Rings: The two welders who made this allegation could supply no specifics and were the only two welders with this concern. Considering this fact, it was determined that unrepaired backing rings are not widespread. However, even if small holes were welded over without repair, the unrepaired backing ring would have no effect on the quality of the joint. Indeed, a Duke construction procedure allows welding over openings in backing rings of up to 1/8 inch in size. The backing ring would have served its purpose once the weld was made and could be discarded in total without adverse effects. In short, this issue does not raise a safety concern or reflect violations of procedures.

3. No other welder stated a concern regarding tightness of backing rings that was not found acceptable during QC fit up inspections. Accordingly, if backing rings did not fit tightly in some instances, this was clearly an isolated concern. It should be noted that the welder's allegations centered on class E, F and G welds. Accordingly, even assuming that excessive penetrations were present, it would not affect the operability of these systems. Class E, F, and G systems are those systems whose continued operation do not affect the safe operation of the plant. The code of construction for these systems (ANSI B31.1) recognizes this factor and does not require the types of inspections (volumetric) that would detect excessive penetration. Accordingly, excess penetration on these systems (such as the type that would occur with a misfit backing ring or blow through) would have no adverse impact. In short, this issue does not reflect a significant safety concern.

D. Conclusion

The three concerns have been evaluated and as noted above, present nothing detrimental to welding quality. Since quality of the joints in question has not been affected and the concern is not widespread or ongoing, there is no reason to doubt the quality of backing ring joints at Catawba.

XI. WELDING TEMPERATURE ON PLUG VALVES

A. Statement of Concern

One welder alleged that some welders exceeded the 200°F temperature limit set by procedures while welding plug valves (sometimes referred to by craft as "teflon" or "Tufline" valves).

B. Investigation

Welders place a temperature sensitive indication ("temp-stik mark") on the body of plug valves before welding the valve into the piping system. These valves have a ultra-high molecular weight polyethylene sleeve which is sensitive to heat. These valves are used in low pressure, relatively low temperature systems. If the temp-stik mark melts during welding, this indicates that the 200°F temperature limit for this type of valve set in Construction Procedure 187 (CP-187) has been exceeded.

The welder who raised this allegation described the techniques he was aware of being used by himself and other welders in welding valves. He described them as follows:

(1) The technique the welder used

For each complete pass, weld a quarter pass, then weld another quarter pass 180° opposite from the first quarter pass; stop and let the weld area cool to hand comfort, then finish the other two quarters, stop and let cool to hand comfort before beginning the next sequence to apply the second and third passes. Sometimes he would weld on the other end of the valve before going back to the first end to complete a pass.

(2) Other techniques the welder observed

Weld a complete pass, allow to cool to hand comfort, then apply a second pass, allow to cool to hand comfort, then apply the third pass. Sometimes, the cooling time was somewhat shorter between passes.

The welder's concern that 200°F temp-stik marks melted during welding indicates that the temperature in the temperature sensitive areas of the valve may have exceeded the 200°F established limit. To determine the significance of this concern, the following investigations were performed:

(1) Welding tests of five sample valves to determine the heat received at the valve critical areas.

(2) Research of previous correspondence between Catawba Construction and Design Engineering and between Design Engineering and the valve manufacturer.

(3) Statistical sample of "leak through" problems discovered by Nuclear Production as a result of mechanical system testing and operation.

(4) Evaluation by Design Engineering Systems group of impact of minor leakage through the seats of plug valves during plant operation.

1. Welding Tests

The purpose of these tests was to determine the actual temperatures received at the valve critical areas using the techniques described by the individual.

A sample valve was welded in the test shop using quarter pass welding (as did the individual making the allegations) with cooling to 100°F interpass. A 1/2" carbon steel valve was used during this test. Instead of marking the valves critical area with temp-stiks, thermocouples were tack welded to the critical area so that temperature readings could be taken continuously throughout the welding processes. The maximum temperature reached at the

critical areas was 190°F. So, the 200°F limit was not exceeded from this welding technique.

Additionally, using more extreme welding techniques than those described by the welder making the allegations, four more plug valves were test welded. Four different valves were selected as samples: 1/2" carbon steel plug valve; 1/2" stainless steel plug valve; 2" carbon steel plug valve; and 2" stainless steel plug valve. These were welded to one foot sections of schedule 40 pipe of the same diameter and type of steel.

These valves were selected because they represent the greatest potential for overheating. The 1/2" valves have the shortest distance from the weld zone to the critical area. The 2" valves require the most weld metal and welding time. Also, the welding techniques used represent extremes. Essentially, the four valves were welded as fast as possible. Each weld pass was completed without stopping, and the only interruptions that occurred were brushing the welds between passes, lunch break, and afternoon break.

Results:

Valve	Max. Temp. Reached in Critical Areas
1/2" Carbon Steel	315° F
1/2" Stainless Steel	270° F
2" Carbon Steel	260° F
2" Stainless Steel	200° F

These results indicate that "worst case" welding techniques produce temperatures that exceed the 200°F limit established by CP-187. In addition, the UHMW polyethylene sleeves in each valve were examined afterwards. Only one of the sleeves was damaged. The 1/2" carbon steel valve sleeve did show a slight detectable deformation.

To explore the significance of the deformation, the 1/2" carbon steel valve was leak tested by Catawba's Flush/Hydro group. The test yielded a leak rate of 0.0074 gallons per minute. Design Engineering indicates that this is an insignificant amount. Also, the 1/2" stainless steel valve was leak tested. Zero leak rate was observed. So, only slight leakage past the sleeve was discovered for the 1/2" carbon steel valve, and no leakage was observed for the 1/2" stainless steel valve. The tests were conducted at 150 psig.

2. Research of Previous Correspondence

A search of previous correspondence among the Catawba Construction Department, Duke Power Design Engineering, and the manufacturer established that the 200° F temperature limit of the critical areas was established based on tests conducted by both Duke and the manufacturer. This limit was decided to be a safe parameter to prevent any possible damage. The correspondence also shows the development of CP-187 in 1978. CP-187 established necessary welding technique controls to prevent the critical areas from exceeding 200°F on 2" and less socket weld plug valves.

3. Sampling of "Leak-Through" Problems Discovered by The Nuclear Production Department

There are approximately 2077 plug valves installed in Catawba Unit 1 that have been "turned-over" to Nuclear Production for testing prior to Unit 1 Fuel Loading. Nuclear Production maintains their work request information in a computerized history file. The history file was searched to determine the number of plug valves that Nuclear Production had discovered seat leakage in and repaired. A 90% sample was used (approximately 1866 of the 2077 valves) and only 9 cases were discovered. This indicates that Nuclear Production has found problems with only 0.5% of the Unit 1 teflon seated plug valves.

Although Nuclear Production does not perform a leak test on each of the valves, this provides same indication that plug valve leakage is not a problem at Catawba.

4. Impact Evaluation of Potential Plug Valve Leakage by Design Engineering

Catawba Construction requested that the Design Engineering Systems Group evaluate the impact of possible leak through of the plug valve. Design Engineering's evaluation established that minor leak through of plug valves, such as was produced in the one "extreme case" test, does not produce any unacceptable effects.

C. Resolution

As seen in the manufacturer's information and Duke Power's testing in 1978, the 200°F temperature limit is a sound precautionary limit to prevent damage to the sleeves found in the majority of Catawba Nuclear Station plug valves. It is significant that the test valve welded by the technique described by the welder raising this allegation did not exceed 200°F in the critical areas.

Under the "worst case" welding tests conducted during the investigation of this concern, it is apparent that the valve critical areas can reach temperatures above 200°F. However, examination of the test sample sleeves after welding revealed that only one of the sample valves (one of the four "worst case" valves, a 1/2" carbon steel valve) showed any detectable sleeve deformation and that the leak-test for this 1/2" carbon steel valve indicated only minor leakage past the valve sleeve. Significantly, the actual technique the welder observed allowed cooling to occur between passes whereas the worst case testing did not.

Nuclear Production's history file records indicate that only a small number of plug valves (9 out of 1866 reviewed) were discovered to have leak through problems. Design Engineering's evaluation of potential leak through problems shows that the worst case valve leak rate does not present an unacceptable impact on safety related functions.

The investigation results show that there is a possibility of sleeve deformation on some plug valves, but any deformation that has occurred is minor and will not have a significant impact on the safety related functions during plant operation. No corrective actions need to be performed on the valves that have been installed to date.

To prevent any future possible reoccurrence, the Catawba Construction Department will develop more stringent controls in CP-187 to eliminate the alleged welding activities or develop a device or method that physically prevents the plug cavity area from receiving 200°F or greater temperatures. Management will stress to employees their responsibility to follow procedures and to bring problems to management attention.

D. Conclusion

The welding of plug valves is a slow process, and the welder raising this allegation observed others who took it upon themselves to shorten the process. Assuming welders violated this heat limit, this action probably created a minor amount of damage to some valve sleeves. However, the Company's investigation revealed that the questioned 2" and smaller valves installed at Catawba are acceptable as is and meet the intended service requirements.

XII. PAINTING BASEPLATES

A. Statement of Concern

One powerhouse mechanic expressed a concern that some of the 2-hole anchor baseplates on instrumentation supports did not meet the gap requirement, and that thick coatings of paint were applied to close the gap to an acceptable tolerance.

B. Investigation

The two-bolt base plate was bolted to a floor or ceiling as part of the support for instrumentation. In that it had only two bolts, it was necessary for the plate to fit relatively flush against the bolting surface to prevent excessive rocking motion. The individual making the allegations stated that he thought painters put a thick coat of paint on the back of the baseplate. The baseplate was then pressed against the wall or floor so that it would appear to cover any excessive gap between the baseplate and the concrete surfaces. (It should be noted that this individual erroneously believed that the gap requirement was .001 inch, when in actual it was .01 inch, a significant difference). The only individual specifically named who was alleged to have asked a painter to do this is no longer employed by Duke and was not available to be interviewed.

A field trip was made with the individual to inspect baseplates in the pipe tunnel, accumulator room, and containment ventilation room, which were the areas he was concerned with. These baseplates were inspected by stripping the epoxy coating along the mating surface between the concrete and the baseplate. Significantly, no excessive coating between the concrete and any baseplate was observed, and all gaps were within tolerance limits.

In addition, two painters and one painter foreman who had been in the area for the past five years were interviewed individually. They explained that due

to the type of paint, the paint on the baseplate could only be built up 6 mils. Further, they stated that even if a thicker coating could be applied, the coating would shrink between the two mating surfaces and would crack at the edge, thus exposing the gap.

C. Resolution

The erection requirements for two-bolt baseplates found on drawing CN-1499-MI20.1 are the same as those for process pipe supports. The contact requirements for two-bolt plates are intended to assure reasonable stability of the plate about an axis through the bolt centerlines. It is recognized that complete mating surfaces for baseplates and concrete walls and floors is neither achievable nor required. A 10 mils maximum gap is allowed in judging two surfaces as being in effective contact. Such a small maximum allowable gap, along with the anchor bolt torque, will achieve the designer's intent. The most paint buildup achievable behind a plate is considered to be about 6 mils. Engineering calculations reflect that in addition to this 6 mils of paint, a 10 mil gap will not impact the structural adequacy of the baseplate. Significantly, the gap is an order of magnitude greater than what the individual making the allegations thought was acceptable and substantially greater than what was observed in the previously noted inspections of the baseplates with the individual.

In the other interviews conducted, all personnel were aware of the gap and coating requirements and had no knowledge of any specific violations. It thus appears that this practice, if it occurred at all, was isolated.

D. Conclusion

The allegation could not be verified and if the incidents occurred at all, they were isolated. The evaluation of this incident by Duke's Design Engineering department indicates that even if the maximum amount of paint was

applied, this would not affect the stability of the plate. The field investigation conducted also revealed no deficiencies. In short, this allegation does not reflect a quality or safety concern.

XIII. EXCESS PENETRATION

A. Statement of Concern

One welder alleged that he informed his supervision about excessive penetration on a weld and appropriate action was not taken.

B. Investigation

The investigation consisted of interviews with appropriate individuals; review of documentation, codes and procedures; and a technical review of the relevant issues.

From the investigation it was determined that the weld in question along with others, was the subject of an NCI resolution process which required a radiograph of the weld.. The radiograph was analyzed by a a qualified Level III inspector and it was determined that the only unacceptable defect was lack of penetration in one area of the weld. The welder in question ground out the defective area and, upon looking through the weld to the other inside surface, saw what he alleged to be excessive penetration.

Upon seeing what the "excessive penetration" the welder brought it to the attention of supervision. His supervisor knew that the weld was the subject of and NCI resolution process which, based on radiography, was determined to be acceptable except for the lack of penetration. Accordingly, the foreman correctly informed the welder that the alleged excessive penetration had been determined to be acceptable based on the radiograph and NCI resolution process.

Subsequently, the ANI happened to see the alleged excessive penetration and directed that the weld be repaired. In all likelihood the ANI was not aware of the previously noted NCI resolution. As is generally the case, prompt action was taken on the ANI's direction and the weld was repaired.

C. Resolution and Conclusion

Duke maintains that although the supervisor may not have properly communicated to the welder the reason for not having to correct the alleged excessive penetration on the weld, the technical position of the supervisor was not contrary to procedures or unsafe. The alleged excessive penetration identified by the welder was repaired. In addition, the welder stated that he had no knowledge of any repairs that were not made properly. Accordingly, no technical corrective action is necessary. However, the supervisor will be counseled on the need to be more sensitive in communications with subordinates.

XIV. STAINLESS STEEL FILLER MATERIAL

A. Statement of Concern

One welder stated that he has seen welders add a drop of stainless steel filler material to approximately six welds on carbon steel piping in order to fill in porosity on the welds. The welder could not specifically identify any of the welds. No other employees interviewed voiced a concern in this area. In addition, the welder did not believe this presented a safety problem.

B. Investigation

No other welder raised this issue. Also, there was no indication that any supervisor had any knowledge of this practice being used. Accordingly, Duke was unable to establish whether it actually occurred or not. The investigation assumed that it was a valid, though isolated concern. This concern raises three issues all related to the ASME Code, i.e., (1) procedure qualification, (2) performance qualification, and (3) filler material traceability. The following testing and research have been performed in addressing these issues.

1. Procedure Qualifications:

Welding at Catawba is performed in accordance with welding procedures which have been qualified by testing. Tests include destructive examinations of weld coupons (sample welds) made in accordance with the parameters as described in Section IX of the ASME Code. If the allegation noted above occurred, the resulting welds are outside the qualified procedures.

As a result of this issue, a 6" diameter Schedule 160 carbon steel pipe coupon was welded, adding a complete pass of stainless steel filler material in lieu of the small drops of stainless steel filler as stated by the welder. After welding, the coupon was then subjected to all

destructive tests required by ASME Section IX for qualification of weld procedures.

All tests (bend and tensile) required by ASME Section IX were performed on the test coupon. The four side bend tests exhibited no sign of cracking and the ultimate tensile strength of the two specimens were 79,250 PSI and 89,500 PSI, both well above the required minimum of 60,000 PSI. In short, all tests were acceptable. In addition, a radiographic examination was performed with acceptable results.

With the test coupon, a complete pass of stainless steel was added, compared to the small "drops" alleged to have been added in the field. The weld sample coupon thus represents a much more severe condition than that alleged. This is because the dilution of the stainless steel pass by plain carbon steel would produce a region where the deposit is essentially an alloy steel with a higher yield strength, hardness, and proportionally lower ductility. If a few drops of stainless steel were added in the weld joint, the dilution by subsequent passes would produce a low alloy deposit whose properties would not differ significantly from the rest of the weld deposit.

2. Performance Qualification:

Even though Duke's welding program requires welders to obtain separate performance qualifications for stainless steel and carbon steel gas tungsten arc welding filler material, it is not an ASME Section IX Code requirement. Both filler materials used (E70S-2 and ER308) are "F" number 6 as classified in QW-432. Therefore, in accordance with Section IX, any welder qualified to weld with E70S-2 material would also be qualified to weld ER-308 material and vice versa. Any of Catawba's welders making a carbon steel joint with the GTAW process would have at

least one carbon steel GTAW certification. In accordance with ASME IX, this would qualify the welder to use ER-308 material.

3. Filler Material Traceability:

Section III of the ASME Code requires traceability of all filler material used in welded joints. No filler material entries would be made for the small amount of stainless steel filler material in question. However, Duke's program (QA Procedure H-3) requires all material to be ordered, received, inspected, stored and issued to the field under strict procedural requirements conforming to the ASME Code. Since all of Catawba's stainless steel filler material is nuclear safety related and has been controlled as described above, any of the stainless steel materials available for use in the field would be acceptable for use in any code class application.

C. Resolution and Conclusion

In that only one welder out of the numerous interviewed stated that a drop of stainless steel filler material may have been added to carbon steel welds, whether or not this ever occurred cannot be determined. However, if it did occur, it is clear that the practice was not widespread. In addition, as stated above, all tests and research reflect that the impact, if any, of such action on welding quality at Catawba is insignificant. In any event, Catawba's Welding Technical Support Group will hold meetings with the welding craft to reinforce to all the welding craft that this practice is not acceptable.

XV. REWORK AFTER HOLD POINT

A. Statement of Concern

One welder alleged that he had seen another welder (who was not identified) inadvertently bypass a hold point (such as a fit-up inspection), and, upon realizing the mistake, grind out the work and return the joint to its original condition. This welder also alleged that he had heard of other welders doing this.

B. Investigation

Because no specific welds were identified, no field examination could be conducted. Moreover, the welder stated that the final welds that he observed were good and passed the QC inspection.

C. Resolution

The intent of procedures M-4 and M-51 is to insure that if a hold point is missed, even mistakenly, work must stop and the item must be nonconformed. Accordingly, if this incident occurred as described by the individual who had allegedly observed it, the actions constituted a procedure violation. However, from a technical perspective even if the actions of the welder were as described above, there would have been absolutely no adverse impact on the final quality of the weld. The final weld in question passed all relevant inspections and was found acceptable. In short, the quality and integrity of the final product would not suffer from a violation of a hold point as described by the concerned party.

D. Conclusion

It appears that the craftsman realized that he had made a mistake and tried to get back to the starting point by putting the weld in the original condition so that appropriate inspections could be made. The situation

described does not jeopardize the integrity of the final product from a functional standpoint. Moreover, since this allegation was made by only one individual, it clearly is not a pervasive problem.

XVI. BUILDING WALL CRACK

A. Statement of Concern

One welder was concerned because he had allegedly seen a crack in the reactor building wall.

B. Investigation

The welder expressed concern about a crack in the reactor building wall which he observed sometime between 1979 and 1981. The welder was concerned that it may not have been repaired. A field trip was made to identify exactly where the crack was located.

The crack identified was actually located in the auxiliary building along the AA line between column lines 50 and 51 from elevation 594 to 611. The concrete crack had been coated over and there was no indication that the coating was cracked.

C. Resolution

Construction Procedure CP-847 was previously generated to provide a method to identify and evaluate concrete cracks. In addition, CP-848 provides instructions concerning identification of concrete cracks or damage during the final walk-through inspection.

This concrete crack referred to by the welder, along with other concrete cracks on the AA line, was identified in 1980 to Design Engineering on NCI 9975 for evaluation. A team of three engineers from Design Engineering inspected the walls and determined that the cracks are from concrete shrinkage and do not affect the structural integrity of the building. The cracks are indicated on site-originated drawing CNFO 1112.03. No additional remedial action is required.

D. Conclusion

The concrete crack which was the subject of this concern was previously identified and evaluated on an NCI. A team of engineers has examined and evaluated the crack, determining that no corrective action was needed.

XVII. DEFECTIVE WELD

A. Statement of Concern

One welder (Individual 20) alleged that while he had never been "pressured to sacrifice quality to put out higher production," he had produced a defective weld because he was out of practice welding a specific process and his supervisor (Individual 218) told him to complete a weld in a confined area while using a full face shield instead of a half face shield. The defective weld was cut out the next day.

B. Investigation

The welder was attempting to make an open-butt weld on a stainless steel class C pipe on a line running about three inches from the concrete wall and ceiling. The welder stated that he had not performed such a process in a while and wasn't "broken in" as he felt he should be. Further, the welder stated that his visibility was limited by the location of the pipe. Accordingly, he stated that he asked the foreman for a half-size welding face shield to try to see more easily. The foreman felt that the welder could complete the weld as well with the full face shield and asked him to continue working to complete the weld. He did so. Before the QC inspection on the next day, the pipe was cut down for other reasons. His weld was noticed and judged to be defective. As a result, he was counseled. The welder felt bitter and thought that the supervisor shared some of the blame.

Significantly, the welder explained that he was tired and he believed this had a lot to do with the incident. The welder stated that he should not have attempted to make the weld knowing his visibility was limited. The welder did not feel that the foreman was attempting to make him sacrifice quality due to production pressure.

C. Resolution and Conclusion

In that neither this welder not any other welder related a similar type incident, it appears to be an isolated case. Further, the welder himself does not attribute the incident to production pressure. Indeed, all parties recognized that the final weld had to undergo a QC inspection, and if it was determined to be unacceptable during the inspection, it would have to be repaired. In this case, the weld was cut out before the inspection. In short, no procedures were violated, and the incident does not raise a continuing technical concern.

While the supervisor's judgement may be questioned in hindsight, the incident does not raise a serious question regarding the adequacy of the supervisor. However, the supervisor will be counseled as to being more sensitive to positive communication skills and the needs of his subordinates.