UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

'83 APR -8 A10:59

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	
UNION ELECTRIC COMPANY	)	Docket No. STN 50-483 OL
	)	
(Callaway Plant, Unit 1)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicant's Brief in Opposition to the Exceptions of Joint Intervenors to the Partial Initial Decision of the Atomic Safety and Licensing Board" were served this 6th day of April, 1983, by deposit in the U.S. mail, first class, postage prepaid, upon the following:

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SHAW, PITTMAN, POTTS & TROWBRIDGE

Thomas A. Baxter, P.C.
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Counsel for Applicant

April 6, 1983

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I. INTRODUCTION AND GENERAL ARGUMENTS

On December 13, 1982, the Atomic Safety and Licensing Board in this proceeding ("the Licensing Board") issued a Partial Initial Decision (Operating License). Union Electric Company (Callaway Plant, Unit 1), LBP-82-___, 16 N.R.C. ____ (1982).1/ Seventy exceptions to that decision were filed with the Atomic Safety and Licensing Appeal Board on January 31, 1983 by the Joint Intervenors (Coalition for the Environment, St. Louis Region; Missourians for Safe Energy; Crawdad Alliance). On March 2, 1983, Joint Intervenors filed their

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1/ Subsequently cited as "PID", with page references to the slip opinion.

"Brief in Support of Exceptions to the Partial Initial Decision of Atomic Safety and Licensing Board."2/ Applicant Union Electric Company herein submits its brief in reply to Joint Intervenors' brief and in opposition to the exceptions.

Joint Intervenors have challenged the Licensing Board's decision in five of the subparts,3/ and on the cumulative import, of the contention "Failure of the Quality Assurance Program." See PID, Appendix II, for the language of the contention. In their brief, Joint Intervenors principally argue that the Licensing Board did not weigh the evidence before it properly in reaching its conclusions on their contentions. Since Applicant's reply to this appeal must be devoted largely to a discussion of the evidentiary record which supports the Licensing Board's decision, we have not attempted to utilize the traditional format of an appellate brief. Rather, most of the legal issues raised by Joint Intervenors' Brief are addressed at the outset, followed by Applicant's reply on embedded plates, honeycombing in the reactor building base mat, SA-358 piping, SA-312 piping, preassembled piping, and the conclusion on the overall quality assurance contention.

2/ Referred to hereafter as "Joint Intervenors' Brief."

3/ No proposed findings were filed with the Licensing Board, and no exceptions were taken with the Appeal Board, on part I.C.2, Honeycombing in Reactor Building Dome. In addition, Joint Intervenors have not appealed from the Licensing Board's earlier decision on parts I.B (Cracks in Concrete) and I.D (Concrete Cover) through the grant of motions for summary disposition. See Licensing Board Memorandum and Order (Motions for Summary Disposition), November 13, 1981 (unpublished).

A. The Licensing Board's Disposition of the Contentions is Based upon a Preponderance of the Evidence and Should be Affirmed.

Licensing Boards are bound to base their decisions on the preponderance of the evidence adduced in the record. Duke Power Company (Catawba Nuclear Station, Units 1 and 2), ALAB-355, 4 N.R.C. 397, 405 n.19 (1976); Consolidated Edison Company of New York, Inc. (Indian Point Station, Unit No. 2), ALAB-188, 7 A.E.C. 323, 356-57 (1974). Ascertaining what constitutes a preponderance of the evidence is a judgmental exercise. In this case, however -- where Joint Intervenors presented no testimony and attempted to make their case solely on the basis of their own interpretation, unconfirmed by any witness, of the uncontradicted evidence presented by Applicant and the NRC Staff -- that exercise is not particularly difficult.

As Applicant's analysis below will demonstrate, the Licensing Board's disposition of Joint Intervenors' contentions on the quality assurance and quality control programs employed in the design and construction of the Callaway Plant is based upon a clear preponderance of the record which warrants the result reached. Giving the Licensing Board's conclusions the probative force they intrinsically command, those conclusions should be affirmed. See Niagara Mohawk Power Corporation (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 N.R.C. 347,

357 (1975); accord, Northern Indiana Public Service Company (Bailly Generating Station, Nuclear 1), ALAB-303, 2 N.R.C. 858, 867 (1975), and cases cited therein.

While Applicant strongly endorses the Licensing Board's ultimate conclusions on Joint Intervenors' contentions, there are a few instances where Applicant disagrees with subsidiary findings made. While not pivotal to the case, some of those findings, which are addressed below in Applicant's discussion of the record,4/ may warrant modification by the Appeal Board.5/

Exceptions may not be filed unless a party is aggrieved by the result reached below. Toledo Edison Company, et al.

4/ Those findings are:

(a) That Applicant's testimony -- to the effect that Union Electric and Bechtel were not aware of Daniel's inspection results on manually-welded embeds at the time Bechtel performed its engineering analysis -- is implausible; and that any failure to communicate such data represents a violation of Criterion XVI of Appendix B to 10 C.F.R. Part 50. See infra pp. 23 25; PID at 19-20, 26-28.

(b) That there was a failure to obtain documentation of the Cives reinspection of manually-welded embeds, which was used in a Bechtel engineering analysis, and this failure violated Criterion XVII of Appendix B to 10 C.F.R. Part 50. See infra pp. 18-20; PID at 26, 28.

5/ The Appeal Board has the authority to make factual findings on the basis of record evidence which are different from those reached by the Licensing Board, and to issue supplemental findings of its own. Public Service Company of New Hampshire, et al. (Seabrook Station, Units 1 and 2), ALAB-422, 6 N.R.C. 33, 42 (1977), aff'd, CLI-78-1, 7 N.R.C. 1, 29 (1978).

(Davis-Besse Nuclear Power Station), ALAB-157, 6 A.E.C. 858 (1973). In circumstances, however, where a party is satisfied with the result but, at the same time, does not subscribe to some of the findings contained in the initial decision, that party will be free to challenge any or all of those findings or conclusions in defending the result (should it be appealed by some other party which is seeking a different result), even though it would normally be precluded from taking an independent appeal. Consumers Power Company (Midland Plant, Units 1 and 2), ALAB-282, 2 N.R.C. 9, 10 (1975), and ALAB-691, 16 N.R.C. ____, slip op. at 13, n.8 (Sept. 9, 1982); Public Service Company of Oklahoma, et al. (Black Fox Station, Units 1 and 2), ALAB-573, 10 N.R.C. 775, 789 (1979).

B. The Licensing Board Adequately Confronted the Evidence and Arguments Advanced by Joint Intervenors.

In these days of lengthy and complex NRC licensing proceedings, each typically with a multitude of parties and contested issues, it is rare that a distinct hearing and partial initial decision are devoted to a single subject area raised by one party, as was the case here with Joint Intervenors' Contention No. 1 and its subparts. The 111-page Partial Initial Decision under review reflects the thoughtful and careful examination the Licensing Board gave to Joint Intervenors' case.

Yet, Joint Intervenors complain, in a most general way, that the Licensing Board did not articulate clearly its reasons for rejecting the positions advanced by Joint Intervenors. See Joint Intervenors' Brief at 4, 5. A licensing board does have a duty not only to resolve contested issues but to articulate in reasonable detail the basis for the course of action chosen. Northern States Power Company (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-104, 6 A.E.C. 179 (1973). Nevertheless, as the Appeal Board acknowledged in Public Service Company of New Hampshire, et al. (Seabrook Station, Units 1 and 2), ALAB-422, 6 N.R.C. 33, 41 (1977), aff'd, CLI-78-1, 7 N.R.C. 1 (1978), a licensing board's obligation in this regard has limits:

> We have previously held that a decision need not refer individually to every proposed finding; it "meets the requirements of the Administrative Procedure Act and the Commission's Rules of Practice if it sufficiently informs a party of the disposition of its contentions." [Citations omitted.]

Clearly, the Licensing Board's decision meets these standards. Even a casual reading of the opinion shows that, as to each part of the contention, the Licensing Board's consideration of the evidence was guided explicitly by a deliberate analysis of Joint Intervenors' arguments.

C. The Licensing Board Correctly Limited its Decision to the Alleged Deficiencies Specifically Raised in the Contentions, and to the Cumulative Import Thereof.

Joint Intervenors' Contention No. 1 alleges, in general, a failure in the Callaway Plant quality assurance/quality control programs applied during project design and construction. This general contention is followed by specific subcontentions of alleged defects in the construction of the plant which purportedly evidence failures of the quality assurance/quality control programs. While the Licensing Board and the parties recognized Joint Intervenors' argument that the findings on the specific contentions could lead to a cumulative conclusion which differs from the findings on any one allegation, the Licensing Board's decision properly is confined to the specific allegations actually pleaded in the contention.

While the Licensing Board did not change the language of the contention as proposed by Joint Intervenors, that Board explicitly held that the only allegedly deficient activities placed in litigation are those specified in the contentions proposed at the time of the special prehearing conference, unless additional contentions are proposed and admitted by the Licensing Board in the future.6/ Special Prehearing Conference

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6/ The wording of the contention contains the language "including but not limited to the following" as part of the introduction of alleged deficiencies. See PID, Appendix II. The Licensing Board's ruling rendered inoperative this attempt to preserve a perpetual option to amend the contention.

Order at 7 (April 21, 1981). No additional contentions were proposed. Joint Intervenors neither filed objections to the Licensing Board's Order (see 10 C.F.R. § 2.751a(d)) nor took exception to it as a part of this appeal.7/

Nevertheless, and in the absence of any exceptions on the point, Joint Intervenors assign considerable importance in their brief to "the question of the willingness of construction workers at the Callaway Plant to report deficiencies and nonconformances to their superiors and the NRC staff, especially after the firing of Bill Smart," which is argued to be relevant to this proceeding. Joint Intervenors' Brief at 7, 8. The same argument was advanced, albeit with considerably less force, in Joint Intervenors' Proposed Findings of Fact and Conclusions of Law, March 1, 1982, at ¶¶ 167, 175.

No evidence, suggestive or otherwise, is cited to support this speculative thesis by Joint Intervenors. Issues associated with Mr. Smart's dismissal -- which have been the subject

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7/ The Licensing Board's holding clearly was correct. The notice aspect of the contention requirement is a natural outgrowth of fundamental notions of fairness applied to the party with the burden of proof. As the Appeal Board has observed: "The applicant is entitled to a fair chance to defend. It is therefore entitled to be told at the outset, with clarity and precision, what arguments are being advanced and what relief is being asked . . . . So is the Board below. It should not be necessary to speculate about what a pleading is supposed to mean." Kansas Gas and Electric Company, et al. (Wolf Creek Generating Station, Unit No. 1), ALAB-279, 1 N.R.C. 559, 576 (1975).

of a separate NRC investigation outside of this operating license proceeding8/ -- were not pleaded in Joint Intervenors' Contention No. 1 nor admitted by the Licensing Board for litigation. Over the objections of Applicant and the NRC Staff, the Licensing Board received some evidence on the Smart case in order to ascertain whether Joint Intervenors could establish any nexus to their contentions. Having heard the evidence presented, the Licensing Board held, near the end of the hearing, ". . . that we have found no ties to Mr. Smart's firing and discharge with the issues of the Contentions that are before us . . .". Tr. 2002. In its decision, the Licensing Board recorded that it has not determined that a serious safety, environmental, or common defense and security matter exists as to any issues not contested by the parties. PID at 109; 10 C.F.R. § 2.760a.

The Licensing Board, therefore, correctly declined to give further consideration to the Bill Smart arguments in the Partial Initial Decision. Joint Intervenors cling to their unsubstantiated accusations on appeal in an effort to cloud the undeniable fact that in spite of years of active and exhaustive scrutiny on their part, they have been unable to refute in any way Applicant's showing that the Callway Plant has been

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8/ See Union Electric Company (Callaway Plant, Units 1 and 2), ALAB-527, 9 N.R.C. 126 (1979).

designed and constructed to operate safely. The Appeal Board likewise should dismiss these arguments by innuendo as the product of an active imagination. They were not properly raised below and when the Licensing Board exercised wide latitude by permitting limited exploration of the matter, that Board found that the Smart case has no nexus to the admitted contentions.

D. Joint Intervenors' Brief is Deficient.

While complaining that the Licensing Board's decision has made effective review impossible (Joint Intervenors' Brief at 4), Joint Intervenors have filed an 18-page brief in support of 70 exceptions.9/ As many as 32 exceptions are grouped and supported by an argument of little more than three pages. See Joint Intervenors' Brief at 9-12 (embedded plates). Extensive reliance is placed upon proposed findings of fact filed with the Licensing Board, sometimes in place of any argument whatsoever. See id. at 12 (Argument I.A.2 and I.B).

The Commission's Rules of Practice, at 10 C.F.R. § 2.762(a), require that the appellant's brief, ". . . with respect to each exception, shall specify, inter alia, the precise portion of the record relied upon in support of the

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9/ The exceptions themselves, which are not printed in Joint Intervenors' Brief, occupy six pages. See "Exceptions to Partial Initial Decision," January 31, 1983.

assertion of error." See also 10 C.F.R. § 2.762(b). Appeal Boards often have held that unbriefed exceptions should be disregarded as waived. See, e.g., Public Service Electric and Gas Company, et al. (Salem Nuclear Generating Station, Unit 1), ALAB-650, 14 N.R.C. 43, 49-50 (1981), aff'd sub nom., Township of Lower Alloways v. Public Service Electric and Gas Co., 687 F.2d 736 (3rd Cir. 1982); Public Service Company of Indiana, Inc. (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-461, 7 N.R.C. 313, 315 (1978); and cases cited therein.

It is virtually impossible to determine which of Joint Intervenors' exceptions are addressed in their brief, or which arguments are intended to support a particular exception. Similarly, by citing to proposed findings Joint Intervenors have not placed appellees and the Appeal Board on notice of "the precise portion of the record relied upon in support of the assertion of error." The Appeal Board has admonished appellants in the past not to rely upon proposed findings in place of meaningful argument and record references. See Salem, supra, ALAB-650, 14 N.R.C. at 50 (1981); Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-463, 7 N.R.C. 341, 370 (1978); Public Service Electric and Gas Company, et al. (Hope Creek Generating Station, Units 1 and 2), ALAB-394, 5 N.R.C. 769, 770 (1977). This is particularly troublesome in view of the fact, pointed out in Applicant's reply below, that many of Joint Intervenors' proposed findings

themselves rely on material outside the record, cite to exhibits beyond the purpose for which they were admitted, and draw expert conclusions from the evidence which were not endorsed by a witness.

It is the appellant's obligation to submit a brief containing sufficient information and argument to allow the appellate tribunal to make an intelligent disposition of the issues raised by the exceptions. See Catawba, supra, ALAB-355, 4 N.R.C. 397, 413 (1976). Joint Intervenors have failed to meet that obligation. As an appellee, Applicant's obligation, in turn, is to respond to the argument actually contained in Joint Intervenors' Brief, and not to the exceptions themselves or to unstated arguments made below before the Licensing Board. In an effort to assist the Appeal Board, however, Applicant has expanded its reply to focus attention on the key elements of the evidentiary record which support the Licensing Board's conclusions.

II. EMBEDDED PLATES

An embedded plate (or "embed") is a structural steel plate embedded in and anchored to a concrete member, such as a wall, beam or column. The embeds have either headed steel studs or steel anchor rods welded to one face of the plate. The studs are attached by an automatic welding process, producing machine

welded embeds. The anchor rods are attached by a manual welding process, producing manually welded embeds. Prior to concrete placement the plates are positioned in construction forms. After placement, when the concrete hardens around the studs or anchors, the plates become permanently embedded in the concrete member. To the face of the plate which is flush with the surface of the concrete member, either steel brackets or structural steel members can be attached by welding. The plates are used to support structural steel framing, HVAC duct supports, electrical cable tray supports and pipe support steel. PID at 4, 70 (¶¶ 1-3); Applicant Embed Testimony, ff. Tr. 501, at 10, 11, 28 and 34.

The essence of Joint Intervenors' contention on this issue is that certain of the embedded plates installed in concrete structures at the Callaway Plant prior to June 9, 1977, may contain faulty stud or anchor rod welds, and that if such welds fail the consequence could be the collapse of an entire floor, breakage of critical piping or core meltdown.

This embed contention was the principal focus of Joint Intervenors' case, with more than half of the twelve hearing days devoted to an extensive cross-examination of the Applicant, Staff and Board witnesses on this contention. In addition, Joint Intervenors introduced numerous and often voluminous documents pertaining to this contention.

In a comprehensive and generally well-reasoned opinion, the Licensing Board considered the evidence presented by the parties and concluded that while there were some concerns regarding the handling of certain aspects of the problem relating to the manually welded embeds, Applicant had adequately demonstrated the structural safety of both the manually and machine welded embeds. While Applicant disagrees with certain of the Licensing Board's criticisms of the handling of this embed problem (discussed below), Applicant submits that there is ample evidence in the record to support the ultimate findings of the Licensing Board on Joint Intervenors' contention.

A. Manually Welded Embeds

The safety and integrity of the embedded plates with manually welded anchor rods was established by an engineering analysis performed by Bechtel, Applicant's architect-engineer. After identification of a problem with the welds on the manually welded embeds, Cives Corporation, the manufacturer of the embeds, reinspected over 400 manually-welded embeds at the Callaway site to determine the nature and maximum extent of the welding deficiencies on the anchor rod welds and provided such information to Bechtel for use in its analysis. The critical welding deficiency considered in the Bechtel analysis was weld undersize. The required weld sizes varied from 3/8 inch to 5/8

inch. Most of the deficiencies were 1/16 inch undersize; the maximum undersize discovered was 1/8 inch. The undersize rarely extended around the entire circumference of the weld. PID at 74-75 (¶¶ 23, 29); Applicant Embed Testimony at 35; Tr. 1241 (Myers); Applicant Ex. 4 at 1-3; Board Ex. 1 (Enclosure 2 to ULNRC-2?8); Staff Ex. 6 at 7 and Attachment B, item 9; see also Tr. 695 (Parikh), 796, 871 (Meyers).

The Bechtel analysis determined the significance of such undersize welds on the safety of the embeds. The evaluation was made using certain conservative "worst case" assumptions; principally, that all anchor rods on a plate were considered to have 1/8 inch undersized welds and all welds were considered to be undersized for the full 360° perimeter of the anchor rod. Using these conservative assumptions, a reduced load carrying capacity was calculated for each of the 259 manually-welded embeds installed prior to June 9, 1977. These reduced capacities were then compared with the actual applied loads on each such plate. In no case did the actual load on a plate exceed its reduced plate capacity.10/ Rather, even with the recalculated load carrying capacity there still existed a smallest minimum safety factor of almost two.11/ PID at 75-76

10/ The Licensing Board states that for four plates, "the design load and the reduced design capacity were the same." PID at 76 (¶ 31). It should be emphasized, however, that it is accepted engineering practice to load a plate to its full design capacity, since even with such a load the embed retains its design margin of safety. See Applicant Ex. 20 at ¶¶ 7 and 8.

11/ In the introductory portion of their brief, Joint Intervenors make reference, in the most general terms, to

(Continued Next Page)

(¶ 29-32); Applicant Embed Testimony at 37, 38.

The gravamen of Joint Intervenors' opposition to the Licensing Board's decision on this issue is their assertion that Applicant has not established that welds with more than 1/8 inch average undersize do not exist on the manually welded embeds. If such greater undersize does exist, their argument continues, then the safety of these embeds, even with a safety factor of two, is in question.12/

(Continued)

Applicant and Bechtel having allegedly made "material misrepresentations of fact." Joint Intervenors' Brief at 2; see also id. at 3. While no support or discussion is presented for this serious allegation, it is an apparent reference to an issue raised in Joint Intervenor Proposed Finding 36 (March 1, 1982) concerning the fact that for four of the 259 manually-welded embeds installed prior to June 9, 1977, the recalculated load carrying capacity equals rather than exceeds the design load for the plates. (See supra n.10). As was amply demonstrated by Applicant in its proposed reply findings of fact, the statement in Applicant's initial proposed finding of fact 71(1) that "[i]n all cases the recalculated load carrying capacity still exceeded the maximum intended design load" was an unintentional overstatement, which in no way compromised the essence of the Bechtel analysis that all plates retained a significant margin of safety even with the assumed worst case welding deficiencies. See Applicant Proposed Reply Findings of Fact, Nos. 22-24, April 5, 1982; see also Applicant's Answer to Joint Intervenors' Motion for Admission of Additional Evidence (March 8, 1982); Applicant Ex. 20.

12/ Joint Intervenors have attempted to adopt by reference all their arguments in regard to the manually welded embed issue as set forth in their Proposed Findings of Fact and Conclusions of Law. See Joint Intervenors' Brief at 10. As discussed above, this incorporation by reference does not comply with the Commission's Rules of Practice. See supra pp. 10-12. To the extent the Appeal Board considers these matters, Applicant states that Joint Intervenors' proposed findings and conclusions have been responded to in Applicant's Reply thereto

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There is, however, no credible evidence in the record of the existence of weld undersize even approaching the extent assumed in the Bechtel analysis, let alone of a greater magnitude. Joint Intervenors had argued at the hearing and in their proposed findings of fact that such evidence did exist, relying on a 610-page document produced by Daniel International Corporation ("Daniel"), the constructor of the Callaway Plant, as the result of Daniel's own reinspection of the manually welded embeds. As was amply demonstrated at the hearing, the data in this document was determined, after extensive evaluation and investigation, to be inaccurate and suspect, and therefore not usable in performing an engineering analysis of the structural safety of the embeds. See PID at 20, 21, 77 (¶¶ 38, 39); Applicant Embed Testimony at 42, 43; see, generally, Applicant Ex. 7. Accordingly, the Licensing Board rejected Joint Intervenors' contention and found that there is no credible evidence of the existence of weld undersize in excess of that assumed in the Bechtel analysis. See PID at 21, 22.

Joint Intervenors do not challenge this conclusion in their brief, and apparently no longer contend that the record

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(Continued)

(Proposed Reply Findings of Fact Nos. 5-33 and 39-43, April 5, 1982).

affirmatively establishes the existence of anchor rods with excessive undersize. Now they simply argue that Applicant has not presented reliable evidence to establish the contrary -- that weld undersize greater than a full 1/8 inch does not exist. See Joint Intervenors' Brief at 11.

There is, however, substantial evidence in the record to support the Bechtel analysis and the factual assumptions upon which it is based.13/ The reinspection of available manually welded embeds by the Cives inspectors was undertaken for the purpose of determining the maximum average undersize on any weld. As the uncontradicted testimony of the Bechtel project manager indicates, the results of this reinspection were communicated orally to Bechtel by the Cives inspectors. To the extent that the Licensing Board finds fault in Bechtel's reliance on oral communications and concludes that the failure to obtain written documentation of the Cives reinspection is a violation of quality assurance requirements in Criterion XVII of Appendix B, Applicant disagrees and suggests that the Appeal

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13/ It is important to note that Joint Intervenors do not now, nor did they previously, attack the manner in which this analysis was performed. The only apparent criticism is Joint Intervenors' unsupported assertion in their brief that "no attention was paid to the fact that many plates contain multiple welding defects." Joint Intervenors' Brief at 11. To the contrary, the Bechtel analysis assumed, as a given, that every anchor rod weld on a plate was undersized the maximum amount. See Tr. 724, 792 (Meyers), 1242 (Thomas); see also PID at 76 (¶ 32).

Board may wish to modify this finding. PID at 27, 28. The Cives reinspection was not, in the strictest sense, a quality control inspection subject to the recordkeeping criteria of Appendix B; it was not designed to insure compliance of the welds with quality standards. Rather, its purpose was to determine the "worst case" weld in order to assist Bechtel in its engineering evaluation, a non-quality assurance function.14/

Moreover, there is documentation of the results of the Cives inspection. A Cives letter, written by one of the individuals who actually performed the inspection, confirms the extent of undersize found:

> The reinspection of the plate assemblies indicated the following:
>
> A. Most of the deficiencies were 1/16 [inch] undersize welds. A few welds were 1/8 [inch] undersize. Our inspection records do not indicate that any welds were more than 1/8 [inch] undersize.

Board Ex. 1, Enclosure 2. The Licensing Board's finding that this letter is not "'documentation' as that term is normally understood" is without foundation. PID at 17. The Board does not indicate what the nature of such documentation should be,

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14/ The quality assurance function at this stage was being performed by Daniel, which was inspecting the embeds on an "accept or reject for rework" basis. See Applicant Embed Testimony at 40, 41 and 43; Tr. 1357, 1358 (Starr), 1380-1384 (Holland); Applicant Ex. 6, p. 1.

nor does it indicate in what manner this verification of the results, based on first-hand knowledge and review of inspection records, falls short.

Apart from the issue of whether or not a lack of documentation violates Criterion XVII, there is certainly no evidence in the record that the results of the Cives reinspection were other than as testified to under oath by Applicant's witnesses and as set forth in the above Cives correspondence. Moreover, subsequent reinspections of Daniel-rejected but unrepaired manually welded embeds confirmed that not only were the weld deviations less than originally reported by the Daniel inspectors, but also that the deviations were substantially less severe than the "worst case" conditions assumed in the Bechtel analysis.15/ See PID at 78 (¶ 41); Applicant Embed Testimony at 44; Applicant Ex. 6, attached report at p. 5; Staff Ex. 6 at 8, 9; Tr. 1245, 1246 (Schnell).

15/ A review of the inspection records from this joint reinspection is particularly revealing. See Board Ex. 1, Encl. 9 to ULNRC-238, pp. 1-47. It confirms that the average weld undersize on any anchor rod never exceeded 1/8 inch. Furthermore, most undersizes detected extended only over a small percentage of the weld circumferance, and in the three cases where an undersize greater than 1/8 inch is observed its extent is 2% or less of the total weld circumference. See Board Ex. 1, Enclosure 9 to ULNRC-238 at p. 16 of 47, item 6 and at p. 20 of 47, items 6 and 8. The reinspection, therefore, disclosed not one weld deficiency even approaching the maximum weld undersize conservatively assumed in the Bechtel engineering analysis.

Apart from the Bechtel engineering analysis, Applicant presented, and the Licensing Board found, substantial additional evidence of the structural integrity of the manually welded embeds, even with the welding deficiencies identified. First, the existence of a design safety margin of at least two (assuming the "worst case" conditions of the welds) provides substantial safety assurance. PID at 18 and 76 (¶¶ 31, 32). Secondly, the tension tests performed on the worst available welds demonstrated a minimum ultimate weld strength in excess of three times the design load strength. PID at 24-25 and 80 (¶¶ 48, 49). Finally, Applicant's expert witness, Dr. John Fisher of Lehigh University, testified that even assuming that the worst weld deficiencies reported in the Daniel data extended around the circumference of the anchor rods, the embeds could safely carry their design loads.16/ PID at 22-23, 30 and 79 (¶ 44).

16/ Joint Intervenors gratuitously assert that Dr. Fisher's opinion was an "off-the-cuff comment" based upon no knowledge of the actual loads imposed on the embeds, without formal evaluation or testing, and contrary to the findings of the Bechtel analysis. See Joint Intervenors' Brief at 11. The citation is to Joint Intervenors' Proposed Findings of Fact ¶ 45, which in turn provides no reference to the record to support this contention. To the contrary, the record reflects that Dr. Fisher's opinion is based on formal industrywide, code-related investigations, and includes an analysis of all types of forces imposed on the anchor rod welds. Tr. 742-746 (Fisher). Rather than contradicting the Bechtel analysis, Dr. Fisher's opinion confirms the substantial conservatisms assumed in that analysis and reaffirms the significant additional margins of safety which exist for these embeds.

Accordingly, there is substantial credible evidence to support the Licensing Board's finding that Applicant has carried its burden of proof in establishing the safety and structural integrity of the manually welded embeds. While Applicant agrees with the Licensing Board's ultimate conclusion on the manually welded embed issue, we do disagree with several of the Licensing Board's collateral findings, which will be discussed below.

Applicant has previously discussed and will not repeat here, its disagreement with the Licensing Board's finding that a lack of written documentation of the Cives reinspection effort was a violation of quality assurance requirements. See supra pp. 18-20. A related matter is the Licensing Board's concern that the Bechtel Final Report on the embed issue predated the conclusion of the Cives reinspection. See PID at 15, 16 and 76 (¶ 33). It was apparent from the very beginning of the embed investigation, however, that certain weld deficiencies existed on the manually welded plates. It was not inappropriate for Bechtel to begin its calculations using the preliminary data from the initial rounds of Cives reinspections, subject to final confirmation at the conclusion of the Cives reinspection that none of the plates contained weld deficiencies greater than those conservatively assumed for purposes of the analysis. The fact that Bechtel reported the results of its calculations prior to the actual conclusion of

the Cives reinspection does not change the fact that the Cives data did not reveal any welds with greater deficiencies. See Board Ex. 1, Enclosure 2; see also Tr. 724, 796, 1241 (Meyers). Moreover, it does not alter the fact that no other credible evidence exists which indicates that any manually welded embed had anchor rod weld deficiencies greater than those assumed in the Bechtel analysis. See supra p. 20. Given this fact, the timing of the issuance of the Bechtel Final Report in relation to the conclusion of the Cives reinspections is of no significance to the ultimate finding as to the safety of the manually welded embeds.

The Licensing Board casts some doubt on the testimony of Applicant's witnesses that Bechtel and Applicant did not know of the conflicting Daniel inspection data until some time after Bechtel issued its Final Report:

> . . . [D]ue to the severity of the problem being investigated, in the Board's judgment, a lack of knowledge is not plausible.

PID at 20. Applicant submits, however, that there is no evidence in the record to support a finding that Bechtel or Applicant had knowledge of the nature of the deficiencies being found by Daniel, and that the lack of knowledge testified to under oath at the hearing is adequately explained in the record. Therefore, Applicant suggests that the Appeal Board may wish to modify this finding, as well as the essentially alternative Licensing Board finding, discussed below, that Criterion XVI of Appendix B was violated.

At the time of the embed investigation, there was no question that weld deficiencies existed on the manually welded embeds; the critical issue, however, was the nature and extent (i.e. "worst case") of these deficiencies. The "evidence", referred to by the Licensing Board (PID at 20 and 77 (¶ 37)), to the effect that Applicant knew of the large number of welding defects being discovered by Daniel, is presented in a document which merely indicated the number of deficient welds, not the nature or extent of the welding deficiencies. See Joint Intervenor Ex. 39. No information or indication is given in this document that the "worst case" assumptions being used in the Bechtel analysis were faulty. The mere fact that Daniel may have been inspecting these embeds and found deficiencies, would not in itself have alerted Bechtel or Applicant to the possibility that the assumptions based on the Cives reinspection were incorrect. See Applicant Embed Testimony at 41; Tr. 798 (Meyers), 799 (Schnell), 1383, 1384 (Holland), 1386, 1386A (Starr).

The Licensing Board presents no factual support for its finding of "knowledge" and does not dwell on this point.17/

17/ Where evidence contrary to the conclusions reached by the Licensing Board was reasonable on its face and sponsored by well-qualified witnesses, the Board was obliged to explain why the evidence was not accepted. See Seabrook, supra, ALAB-422, 6 N.R.C. 33, 41 (1977); Public Service Electric and Gas Company, et al. (Hope Creek Generating Station, Units 1 and 2), ALAB-429, 6 N.R.C. 229, 237 (1977). Agency expertise could not, in this instance, be a basis for disbelieving the testi-

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Rather it concedes that Bechtel and Applicant may have had no knowledge of these results of the Daniel inspection, and concludes that such lack of knowledge represents a violation of the quality assurance requirements of Appendix B, Criterion XVI. PID at 27-28 and 105 (¶ 141). Again, there is no discussion by the Licensing Board as to the factual basis for this conclusion. Criterion XVI requires that procedures be established to identify and correct conditions adverse to quality. In this case, the record does establish that, notwithstanding the lack of knowledge of the Daniel reinspection, Applicant together with Bechtel did properly identify the potential problem, determined the nature, extent and causes of the welding deviations, analyzed the possible consequences of the deviations, implemented appropriate corrective actions, and properly reported these activities to the appropriate levels of management. See PID at 28, 29. It is submitted that this constitutes compliance with the requirements of Criterion XVI. Moreover, in light of the determination of the unreliability of the Daniel data for use in resolving the embed problem, this lack of knowledge has no impact on the ultimate finding as to the safety and integrity of the manually welded embeds.

(Continued)

mony of witnesses Schnell (Union Electric), Meyers (Bechtel), Starr and Holland (Daniel).

The Licensing Board also found that the inconsistent reporting of weld deficiencies by Daniel inspectors demonstrates a supervisory weakness at Daniel. PID at 26 and 105 (¶ 141). It is true that the Daniel inspection data could not be used for an engineering analysis of the nature prepared by Bechtel because of the various inconsistencies and apparent errors in the data package. It must be emphasized, however, that the Daniel inspection reports were not prepared in order to provide a detailed record of the amount and extent of the weld deviations. Rather, such reports were intended only to provide a basis for accepting an embed, or for rejecting it and setting it aside for rework. See PID at 21 and 77 (¶ 40). In this framework, the Daniel reports served their intended purpose and do not indicate supervisory weakness.

While Applicant has expressed disagreement with several of the Licensing Board's findings and suggests that some might be modified, it should be emphasized that these findings by the Board are collateral and not essential to the ultimate conclusion that there is substantial evidence in the record of the structural integrity and safety of the manually welded embeds installed in the Callaway Plant. Accordingly, Applicant submits that this conclusion of the Licensing Board should be affirmed.

B. Machine Welded Embeds

Joint Intervenors have presented no argument in their brief to support their exceptions to the Licensing Board's decision in regard to the machine welded embeds. They simply incorporate by reference their proposed findings of fact previously filed. As indicated above, this incorporation by reference does not comply with the Commission's Rules of Practice. To the extent necessary to respond to the Joint Intervenors' Proposed Findings of Fact as incorporated, Applicant refers the Appeal Board to its Proposed Reply Findings of Fact, Nos. 5-10 and 34-38, April 5, 1982.

Joint Intervenors' failure to brief this aspect of the embed issue is not surprising. The safety and integrity of the machine welded embeds has been convincingly established. See PID at 8-12 and 71-74 (¶¶ 5-21). Contrary to the statement in Joint Intervenors' brief, the embed problem did not arise from a discovery that certain embeds "were defective." See Joint Intervenors' Brief at 9. Rather, stop work orders were issued after certain machine welded plates with "apparent defects" were discovered during a routine NRC inspection. PID at 5. A concern was raised that the stud welds on the embeds had not been inspected in accordance with AWS Code requirements. This initial concern was later determined to be without substance when it was concluded that the stud welds had been properly inspected. Applicant Embed Testimony at 15, 16; Tr. 835

(Meyers), 969, 978, 994 (Fisher); see generally, Tr. 957-961 (Slutter). Nonetheless a complete investigation of the machine welded studs was undertaken which conclusively established the structural integrity and safety of these embeds.

First, a complete reinspection of the welds of all available machine welded plates at the Callaway jobsite was undertaken. The results of this effort revealed an extremely low inspection failure rate of the stud welds and provided evidence of the quality and acceptability of the stud welds on the machine welded plates installed at Callaway prior to the stop work orders. See PID at 8, 9 and 71-72 (¶¶ 8-13); Applicant Embed Testimony at 4, 5; Tr. 1169-1171, 1239, 1240 (Schnell), 1308, 1410, 1411 (Gallagher); Applicant Ex. 4 at 1; Joint Intervenor Ex. 31; Staff Ex. 6, Attachment B at p. 4.

Second, Bechtel used the data from this reinspection and performed an engineering analysis to determine the probability of a failure in any of the machine welded plates installed prior to the stop work orders. Using substantial conservatisms, Bechtel calculated that the probability of a plate failure resulting from a machine welded stud separating from its plate is less than one in one billion (10^{-9}). PID at 9-11 and 72-73 (¶ 14); Applicant Embed Testimony at 21-27; Applicant Ex. 4 at 3-5; Tr. 505 (Thomas), 910-918 (Parikh).

Finally, additional confirmation of the safety of the machine welded embeds was demonstrated by the tension tests

performed by Dr. Fisher and Dr. Slutter of Lehigh University on six embeds which had been installed at the Callaway Plant prior to the stop work orders. The embeds were each subjected to a tension load in excess of its design capacity load and each exhibited no signs of plate failure. PID at 11, 12 and 73-74 (¶¶ 17-20); Applicant Embed Testimony at 27, 28; Gallagher Testimony at 4, 5; Applicant Ex. 5 at 4, 5.

Accordingly, there is substantial evidence in the record to support the Licensing Board's finding that Applicant has demonstrated the structural safety and integrity of the machine welded embeds.

III. HONEYCOMBING IN THE REACTOR BUILDING BASE MAT

In a well reasoned and documented decision on part I.C.1 of Joint Intervenors' Contention No. 1, the Licensing Board was unable to find serious defects in the overall quality assurance procedures followed by Applicant in connection with the construction of the reactor building base mat:

> The quality assurance procedures employed in this instance worked properly in that precautions were taken to prevent deficiencies; deficiencies that occurred in spite of the precautions were found promptly; appropriate reports and tests were made; and repairs were made which restored the defective areas to original design specifications.

PID at 42-43; see also id. at 86 (¶ 74). In addition, the Licensing Board concluded "that there is no reason to doubt the integrity of the reactor base mat or the performance of the tendon trumplates." Id. at 43.18/ This conclusion is based upon an understanding of the causes of honeycombing in concrete, the quality of the repairs performed, the soniscope investigation, and the successful post-tensioning operation performed at the plant. See id. at 33-37, 82-83 (¶¶ 57-61), 84 (¶ 65), 86-90 (¶¶ 76-84).

Joint Intervenors challenge the Licensing Board's decision on two fronts, contending that: (1) no reliable documentation of the concrete pour exists; and (2) no reliable testing was performed after the discovery of defects.19/ Joint Intervenors' Brief at 12.

18/ Joint Intervenors mischaracterize the Licensing Board's Opinion when they state that honeycombing was discovered at the bottom of the slab -- "the only area available for inspection." See Joint Intervenors' Brief at 12. The Board did not include that qualification, and in fact the base mat surfaces inspected included the exterior vertical surfaces of the base mat once the forms were removed, and the entire top surface. No honeycombing was identified on these additional surfaces. Tr. 381-382 (McFarland). Honeycombing is basically a surface phenomenon. Tr. 240-241 (Meyers).

19/ In further support of Exceptions 33 through 44, Joint Intervenors refer to and adopt their proposed findings of fact filed with the Licensing Board. Joint Intervenors' Brief at 13-14. If the Appeal Board entertains such arguments, Applicant respectfully refers to its Proposed Findings of Fact 90-113 (February 1, 1982) and Reply Findings 44-56 (April 5, 1982).

It is argued that there is a "total lack of documentation during the 62 hour concrete pour" which "renders it impossible to be confident that the pour was performed properly or to extrapolate about the quality of the mat in areas not accessible to visual inspection." Id. at 13. Joint Intervenors have both distorted and ignored the evidentiary record.

The record includes the testimony of Mr. McFarland of Union Electric, who observed roughly one quarter of the placement operation, and of Staff inspector Varela, who conducted inspections at the Callaway site during the base mat construction and repairs. Applicant Base Mat Testimony, ff. Tr. 227, at 11; Varela Testimony, ff. Tr. 396, at 1, 2. During the pour, Staff witness Varela observed the efforts of the quality control personnel to maintain the quality of the pour consistent with the design requirements. In particular, Mr. Varela observed the quality control personnel with regard to their responsiblity for assuring the timely coordination of relocating vibratory equipment craft personnel with placement equipment changes, and found their performance to be satisfactory. Varela Testimony at 7, 8. Three NRC Staff inspectors were present during the concrete placement operation, and one or more of these inspectors observed most of the operation. Id. at 6; Applicant Base Mat Testimony at 12.

The Staff did determine, on inspection, that only the civil QC inspector present at the termination of the pour

signed a Concrete Placing Report verifying work performance and activities, whereas the Staff determined that each of the QC inspectors who monitored earlier shifts should have signed such a report. Staff Ex. 3 at 3. This matter raised by the Staff involves interpretation and judgment as to what procedures should contain and require. The QC inspectors here followed the dictates of the QC procedures. Tr. 325, 330-331 (McFarland). The Staff inspector's judgment apparently differed from Applicant's on the amount of information required.

Without expressing a judgment on the merits of the disagreement between Applicant and the Staff, the Licensing Board was critical of Applicant's approach to remedying the deficiency -- which was to have each QC inspector subsequently sign a report. PID at 91 (¶ 88). There is no suggestion as to what other course was available to Applicant at a point in time well after completion of the pour. Nevertheless, the Staff interviewed some of the inspectors after receiving the concrete placement reports and verified that they had observed no deficiencies during concrete placement. Id. at 91 (¶ 89). This documentation, supplemented by the actual observations of the Staff, is more than adequate for its intended purpose. Moreover, as the Licensing Board's decision makes plain, there are many other substantial bases upon which that Board's conclusion on this contention rests.

In its treatment of Applicant's soniscope examination of the reactor building base mat, the Licensing Board explicitly responded to Joint Intervenors' argument that the velocity of sound in steel may account for the high sound velocity measured in tests of the base mat, and explained why that argument is "misguided." PID at 87 (¶ 77). Joint Intervenors continue to display their misunderstanding of the soniscope technique and now misread the Partial Initial Decision as well. The Licensing Board did not find "that sound waves cannot go through an interface between concrete and steel." See Joint Intervenors' Brief at 13. The Board found that the interfaces may influence the velocity of the sound since the signal may be halted by the interface or go around the obstruction. PID at 38-39 and 87 (¶ 77). In any case, angled shots were made, and there is no angled reinforcing steel; and even the vertical shots were perpendicular to the bulk of the reinforcing steel. See Applicant's Base Mat Testimony at Figures 3, 5 and 6. Thus, soniscope readings were taken in positions not parallel to reinforcing steel and high velocities still were measured.

IV. SA-358 PIPING

Part II.A of Joint Intervenors' Contention No. 1 goes to a single piece of SA-358 pipe in the Callaway Plant. The Licensing Board found that the weld irregularity was relatively

minor, that it was identified and properly reworked by Daniel, and that in its present condition it is free from defects. PID at 51-55, 96-99 (¶¶ 109-118).

In their brief on appeal, Joint Intervenors do not directly challenge the Licensing Board's conclusion that this piece of SA-358 pipe is safe. Rather, in a short but flamboyant argument devoid of a single direct citation to the record, Joint Intervenors renew their position that procedures for identifying and dispositioning nonconformances were not followed, and that "drop thru" or "melt thru" may have been the cause of the irregularity, which could then render other SA-358 pipe suspect.

Joint Intervenors argue that Applicant's QA/QC program failed somehow because it was a Daniel pipefitter, rather an inspector, who identified the surface irregularity. See Joint Intervenors' Brief at 14. In fact, this nonconformance was identified and documented pursuant to normal procedure. Joint Intervenors refuse to acknowledge that all project personnel are an integral part of quality assurance and quality control. Daniel administrative procedure AP-VII-02 requires project personnel, including craft personnel, to report nonconformances or nonconforming activities and bring them to the attention of Quality Control or Engineering personnel, who in turn must document the condition. Applicant SA-358 Piping Testimony, ff. Tr. 1537, at 6. Further, the Licensing Board found that the

procedure subsequently followed by Daniel in dispositioning the nonconformance was both proper and conservative. PID at 53.

Resorting to hyperbole unsupported by any citation to authority, Joint Intervenors assert that:

> The NRC Staff had to rely on communicatioms from a confidential source, and media and citizen involvement, in order to be apprised of and to be able to fully evaluate the defective part, the inoperative quality control system and the significance of both. Only because of that outside input did the NRC Staff's investigation result in the issuance of a notice of violation based upon Applicant's violation of an NRC quality assurance criterion.

Joint Intervenors' Brief at 14.

In fact, two separate NRC Staff investigations of this 27 square-inch area of a single piece of pipe were undertaken in response to anonymous allegations received from one individual. The second investigation involved 88 on-site inspection hours by three NRC personnel. It resulted in one item of noncompliance with respect to radiographic examination. This was not, however, one of the allegations raised. All of the alleger's allegations were found to be without merit, and the investigation concluded that the nonconformances in the pipe had been identified and corrected as required, and that examinations showed the pipe to be acceptable. Staff Ex. 7.

With respect to their drop or melt-thru theory, Joint Intervenors claim on appeal that the Licensing Board failed to

respond to their arguments. Joint Intervenors' Brief at 15. The appellants clearly mistake the Board's disagreement with the theory as a failure to address it. The Licensing Board thoroughly explained its rationale, based on the uncontradicted evidence, for rejecting Joint Intervenors' hypothesis. PID at 53-54, 98-99 (¶¶ 115-117). Such a condition would be readily detectable, and was not found in spite of several reviews of radiographs. Applicant SA-358 Piping Testimony at 12-15; Key Testimony, ff. Tr. 1681, at 2; Tr. 1564-65, 1642-43 (Stuchfield), 1751 (Key), 1751-52 (Beeman).

V. SA-312 PIPING

SA-312 is an ASME specification for both seamless and welded stainless steel pipe. Welded SA-312 piping is made from stainless steel plate formed and rolled into a tubular shape, the longitudinal seam of which is then autogenously welded (without filler metal). The weld is made from both the inside and outside surfaces for double-welded pipe. PID at 55; Applicant SA-312 Piping Testimony, ff. Tr. 1773, at 19 and Figure 1.

If the inside and outside welds do not penetrate deep enough, complete through-wall fusion does not occur and a plane then exists in the center of the pipe wall where the original plate edges are tightly abutted but not fused. This condition

is known as centerline lack-of-penetration (CLP). PID at 56, 100 (¶ 121; Applicant SA-312 Piping Testimony at 17 and Figure 1. SA-312 piping with CLP was discovered not at the Callaway Plant, but rather at the construction sites of two other nuclear facilities. The CLP problem was determined to be generic in nature. PID at 56, 57.

Accordingly, double welded SA-312 piping, which is installed at Callaway in Class 2 and 3 piping systems, may contain CLP. The Licensing Board determined, however, that there was substantial evidence in the record to conclude that such piping is structurally sound and can safely perform its design function. PID at 64.

Joint Intervenors have enumerated thirteen exceptions (nos. 51 - 63) to the Licensing Board's decision on this issue. Joint Intervenors in their brief, however, have not specifically addressed any of these exceptions. Rather, their argument raises three general contentions which will be discussed below.

First, Joint Intervenors contend that there is no evidence in the record to support the Licensing Board's finding that the SA-312 piping at the Callaway Plant has no greater CLP than that found to exist in the SA-312 piping examined in the Bechtel generic investigation - - 26%. Initially, it should be noted that Joint Intervenors presented at the hearing, and make reference in their written submissions, to no evidence that any

production SA-312 piping has ever been discovered to have greater than 26% CLP. Moreover, the record reflects that the Bechtel investigation examined piping which was produced by the same manufacturer, during the same time period and using the same materials, procedures, machines and operators as was the SA-312 piping installed at Callaway. PID at 60, 101 (¶ 127); Applicant SA-312 Piping Testimony at 24, 25; Tr. 1814 (Stuchfield); see also Rutherford Testimony, ff. Tr. 1898, at 4.

In addition, the Licensing Board's finding that the extent of CLP that may be in the SA-312 piping installed at Callaway will not exceed the 26% found during the Bechtel generic investigation is supported by the fact that in intentionally producing test samples with CLP in excess of 26%, Bechtel was required to use welding parameters outside the range of parameters used by the piping manufacturer. PID at 60; Applicant SA-312 Piping Testimony at 24, 25; Tr. 1811-1814 (Stuchfield, Egan); Applicant Ex. 11 at 2, 3. Joint Intervenors contend, however, that in reaching this conclusion, due consideration was not given to welding arc misalignment. The possibility of this welding deficiency either occurring or having the effect alleged by Joint Intervenors has been refuted by the evidence in the record. Applicant demonstrated at the hearing that the degree of arc misalignment is restricted by the configuration of the welding apparatus and could not reach

the extremes suggested by Joint Intervenors. Tr. 1882 (Stuchfield); see also Tr. 1814 (Stuchfield). Moreover, the record reflects that arc misalignment has a de minimus effect when coupled with the other factors which cause CLP. Tr. 1810-1816 (Egan, Stuchfield); see also Applicant Ex. 12, Figure 9.1 at 9.-2. Accordingly, there is ample credible evidence in the record to support the Licensing Board's finding as to the maximum extent of CLP.

The second contention raised in Joint Intervenor's Brief relates to one aspect of the Bechtel generic analysis of the effect of CLP on the various mechanical properties of SA-312 piping. Before discussing this argument, it is important to note that neither in their proposed findings of fact nor in their brief to the Appeal Board have Joint Intervenors addressed the most significant and revealing aspect of the Bechtel investigation -- the hydrostatic burst test.20/ Bechtel performed burst tests on SA-312 piping with intentionally produced CLP of up to 55%. Plugs were welded into the ends of the pipe and each specimen was hydrostatically pressurized until fracture occurred. The lowest burst pressure

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20/ In regard to the CLP problem, the only significant stress component is the "hoop stress," or the outward force exerted on the pipe due to the internal pressure of the fluid in the pipe. The burst test assesses the ability of the pipe to withstand hoop stresses. Rutherford Testimony at 3; Tr. 1830 (Hurd), 1880 (Stuchfield); see also Applicant Ex. 12 at p.4-1.

recorded was 3000 pounds per square inch (psi). This value is far in excess of the ASME Code-required hydrostatic test pressure of 882 psi for same type pipe,21/ and is correspondingly again higher than the design pressure and actual operating pressure for SA-312 piping applications at Callaway. PID at 60, 61, 101 (¶ 128); Applicant SA-312 Piping Testimony at 27, 28; Rutherford Testimony at 6; Applicant Ex. 11 at 2, 3, 14-19, see also Tr. 1906 (Rutherford). Joint Intervenors have presented no evidence challenging the results of this testing, which establishes the structual integrity and safety of SA-312 piping even with CLP far in excess of that contained in production piping.

Joint Intervenors, instead, attack the Licensing Board's finding that a hypothesized failure of SA-312 piping would not result in a catastrophic failure, but rather would fail in a "leak-before-break" mode. PID at 61, 62, 64, 102 (¶ 129). This finding by the Licensing Board was based on the results of a fracture analysis performed by Aptech Engineering Services, Inc. (Aptech) as part of Bechtel's generic investigation of the CLP problem. This analysis concluded that the calculated

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21/ It is important to emphasize that among other examinations, inspections and tests, all SA-312 piping at Callaway has been subjected to the ASME Code hydrostatic test, and therefore, has been pressurized and withstood hoop stresses in excess of that to which the piping will ever be subjected in operation. See Applicant SA-312 Piping Testimony at 16, 41; Applicant Ex. 17.

critical flaw size (i.e., the amount of CLP above which catastrophic failure will occur) is greater than the wall thickness of the pipe itself. See Applicant SA-312 Piping Testimony at 30-32; Applicant Ex. 12 at pp. 7-5 to 7-7, 10-1, 10-2. Joint Intervenors argue that this is an "absurd conclusion" because it means that "completely unwelded SA-312 piping would be acceptable". Joint Intervernors' Brief at 17. No factual basis for this assertion is presented by Joint Intervenors. To the contrary, the conclusion of the Aptech fracture analysis that critical flaw size exceeds wall thickness is not presented to establish the acceptability of unwelded pipe. Rather it demonstrates, on the basis of engineering calculations which have not been challenged by Joint Intervenors, that catastrophic failure of SA-312 piping with CLP cannot occur. See Applicant SA-312 Piping Testimony at 30-32. Rather, if any failure occurs, it will be in the leak-before-break mode.22/

Joint Intervenors' final contention is that the Licensing Board ignored Joint Intervenors' evidence of ASME Code violations and violations of NRC quality assurance regulations with respect to the SA-312 piping problem and subsequent investigation. Joint Intervenors' Brief at 17 (§IV.B.) Joint

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22/ It has been conservatively calculated, that under design conditions at Callaway, CLP on the order of 85% would have to exist before a pipe would leak. Tr. 1881 (Egan).

Intervenors, however, present no argument to support their assertions; rather they refer only to their proposed findings of fact (nos. 115-121, 124-129). Each of these arguments has been responded to in Applicant's Proposed Reply Findings of Fact Nos. 81-89 (April 5, 1982), and will not be repeated here. Suffice it to say that the record adequately supports the conclusions of the Licensing Board that: (1) the SA-312 piping at Callaway was examined and tested in accordance with the requirements of the ASME code, (see PID at 65; Applicant SA-312 Piping Testimony at 16, 17; Applicant Ex. 17); (2) the investigation, analysis and resolution of the CLP problem was conducted in accordance with the principles of the ASME code (see PID at 65, 66; Applicant SA-312 Piping Testimony at 25, 26; see, generally, Applicant Ex. 11); and, (3) that the use of SA-312 piping at Callaway cannot be considered a breakdown of Applicant's quality assurance/quality control programs (see PID at 65; Applicant SA-312 Piping Testimony at 41, 42).

Accordingly, there is substantial credible evidence in the record to support the Licensing Board's comprehensive findings and conclusions holding that the Applicant has demonstrated the structural integrity and safety of the double welded SA-312 piping installed at the Callaway Plant.

VI. PREASSEMBLED PIPING

Part II.B of Joint Intervenors' Contention No. 1 alleges that deficiencies in Applicant's quality assurance inspections and surveillances resulted in the acceptance and installation of defective preassembled piping formations at the Callaway Plant. This contention arises out of the discovery, at the Wolf Creek Plant, of potential deficiencies in preassembled piping formations manufactured by Gulf & Western ("G&W") for the SNUPPS plants and the subsequent efforts undertaken by Applicant to resolve any questions regarding the adequacy of the piping formations to perform their intended function. The Licensing Board, upon consideration of the record on this issue, concluded that Applicant's quality programs functioned properly to assure that the deficiencies associated with the G&W piping formations were corrected, thereby assuring the quality of the as-installed equipment at the Callaway Plant. See, generally, PID at 67-69, 104-107 (¶¶ 135-141, 144).

Disregarding this ultimate conclusion, Joint Intervenors claim that the method by which potential deficiencies in preassembled piping formations supplied by G&W were identified demonstrates that Applicant's QA program was inadequate. This assertion is based upon the following interrelated facts: (1) the initial discovery of potential deficiencies was made during a "nonmandatory" inspection of a piping formation by a

construction worker at the Wolf Creek site; (2) the deficiencies were not identified by Daniel upon receipt or installation of the formations at the Callaway Plant; and, (3) the Bechtel surveillance inspections at the G&W manufacturing facility failed to detect deficiencies in the formations. Joint Intervenors' Brief at 17, 18. Each of these issues will be addressed in turn.

Joint Intervenors do not take issue with either the adequacy of the inspections and audits undertaken by Applicant following discovery of the deficiencies, or with the Licensing Board's conclusions as to the sufficiency of the rework/repair effort on tne formations performed by Daniel; nor do Joint Intervenors challenge the capability of the reworked formations to perform their intended function. See PID at 67-69, 104, 105, 107 (¶¶ 135-140, 141). Applicant, therefore, will not discuss these issues here, but concurs in the findings made by the Licensing Board on these subjects.

Joint Intervenors have attempted, both before the Licensing Board and now on appeal, to make much of the fact that the preassembled piping deficiencies were first identified, not at the Callaway Plant, but by a construction worker at the Wolf Creek site as the result of a non-required inspection. Wolf Creek, like the Callaway Plant, is one of the SNUPPS units and, as such, plays an integral role in the SNUPPS site QA/QC program. See Applicant Preassembled Piping

Testimony, ff. Tr. 1920, at 11, 12. The SNUPPS concept, which emphasizes the sharing of information between member utilities, including the identification of potential generic deficiencies, provides an added degree of confidence that quality assurance standards will be maintained. Id. at 12; see also Schnell Testimony at 18-20. In the case of the G&W preassembled pipe formations, the SNUPPS QA/QC programs functioned as designed in that the Wolf Creek site organization identified the potential deficiencies and assured that fellow SNUPPS members were notified of this problem on a timely basis. Applicant Preassembled Piping Testimony at 12, 22; Tr. 1930, 1931 (Powers).

Included within Joint Intervenors' complaint that the deficiencies in the G&W formations were not discovered at the Callaway Plant is a separate assertion that the QA program failed because the deficiencies were discovered by a construction worker during the installation process (i.e., they were not discovered by a quality control inspector during a required quality inspection). Applicant, however, has repeatedly emphasized that the site QA/QC programs are not strictly limited to formal, required quality control inspections. Indeed, these programs stress that responsibility for assuring the quality of the materials used in and work performed on the Callaway Plant is incumbent upon all personnel. See Schnell Testimony at 14, 15; Tr. 1929-33 (Powers, Laux). Applicant

therefore fails to understand Joint Intervenors' complaints that the discovery of the G&W piping deficiencies constitutes a failure of the QA program -- rather, Applicant contends that its broad-based (and not narrowly formal) quality programs provide added confidence in their sufficiency.

Joint Intervenors' second major allegation with respect to this issue concerns the fact that, prior to the identification of the deficiencies at Wolf Creek, Daniel personnel at the Callaway Plant had not identified deficiencies in any of the G&W formations which had been received or installed at the Callaway Plant. As Joint Intervenors have recognized, at the time of the initial discovery of the potential deficiencies, the Daniel receipt inspection consisted primarily of a documentation review and a physical review of the equipment for such variables as shipping damage and component configuration.23/ Applicant Preassembled Piping Testimony at 11; see also Joint Intervenor Proposed Finding of Fact 141 (March 1, 1982). Subsequently, Applicant adopted an upgraded receipt inspection program, covering vendor non-conformances, which has been "retrofit" to cover material, such as preassembled piping, received on site prior to the initiation of the program. Applicant Preassembled Piping Testimony at 23; Tr.

23/ It would not be expected that this type of receipt inspection would detect the deficiencies later found with the G&W formations. Applicant Preassembled Piping Testimony at 11.

1936, 1937 (Powers). Accordingly, Applicant remains confident that, had the deficiencies gone undetected at Wolf Creek, either this upgraded inspection effort or one of a variety of systems tests would have identified the deficiencies in the G&W formations prior to full power operation. See, generally, Applicant Preassembled Piping Testimony at 20-22; Tr. 1931-1950 (Powers, Meyers, Stuchfield).

The sole remaining issue raised by Joint Intervenors concerns the adequacy of the surveillance inspections performed by Bechtel at the G&W manufacturing facility.24/ In accordance with Bechtel's procedures and specifications, in-process and final inspections of various manufacturing and testing milestones were to be conducted by the Bechtel Supplier Quality Representative at the G&W facility. See Applicant Preassembled Piping Testimony at 10, 11; Tr. 1954, 1955 (Porter). These Bechtel inspections at the G&W facility were of such a nature that the deficiencies later discovered at Wolf Creek should

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24/ Joint Intervenors state that the Bechtel inspection program at G&W was the "highest level" surveillance inspection program performed by Bechtel. Joint Intervenors' Brief at 6-7, 17. The inspection program, prior to discovery of the deficiencies, was the highest level of itinerant inspections, i.e., those in which the Bechtel inspector was not present at all times. This is not, however, the highest level of inspection provided by Bechtel, as demonstrated by the fact that following discovery of the deficiencies, the Bechtel inspection at G&W was upgraded to provide for a resident inspector performing a 100 percent inspection of manufacturing milestones. Tr. 1954-1955, 1957 (Porter).

have been initially identified by the Bechtel Representative at G&W. Tr. 1956 (Porter). Following the discovery of the deficiencies associated with the G&W piping formations, Bechtel conducted an evaluation of the inspections performed by its Representative at G&W and uncovered a number of weaknesses, particularly in the area of in-process inspections. Id.; Applicant Preassembled Piping Testimony at 18, 19. In light of the weaknesses discovered in the inspections performed at G&W, Bechtel undertook several actions to assure that these weaknesses were corrected at G&W and were not generic in nature: the level of inspection at the G&W facility was upgraded (see supra n.24) radiographic and weldment techniques at all pipe spool suppliers were reviewed; Bechtel Supplier Quality Representatives throughout the country were informed of the problems encountered at G&W; and, additional training was provided to ten of Bechtel's nondestructive examination field specialists who thereafter received upgraded certification. Applicant Preassembled Piping Testimony at 19; Tr. 1957-1959 (Porter). It is clear, then, that while the quality inspections performed by Bechtel at G&W exhibited certain weaknesses, Bechtel undertook prompt and comprehensive corrective actions to assure the maintenance of high quality standards.

In sum, the record in this proceeding shows that the QA/QC programs succeeded in identifying the deficiencies associated with the G&W preassembled piping formations and that the

weaknesses in the inspections performed at G&W were identified and resolved in a timely manner. Applicant therefore contends that the Appeal Board should uphold the Licensing Board's finding that no defects relevant to the adequacy of Applicant's quality assurance program are associated with the preassembled piping issue.

VII. CONCLUSION

The Licensing Board, as urged by Joint Intervenors, considered whether there were deficiencies in the Callaway Plant QA/QC program which indicate a programmatic breakdown in quality assurance. While the Board expressed concern over some of the deficiencies found, it concluded that they are of limited extent and have no broader implications regarding the overall effectiveness of the Applicant's QA/QC program.

> We base this conclusion on the fact that (1) an extensive QA/QC program exists, (2) the deficiencies found were disclosed and remedied within the program itself, (3) the reactor building is safely built and (4) the Applicant displayed a generally affirmative commitment to quality in the discovery and resolution of the problems we considered.

PID at 69; see also id. at 107-108 (¶¶ 142-146).

Joint Intervenors' contrary views on the overall quality assurance contention are based upon a serious misperception of the facts, a fundamental misunderstanding of the purpose and

operation of quality assurance and quality control programs, and a misconception of the standard to which Applicant should be held.

As used in the applicable NRC criteria,

> . . . "[Q]uality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements.

Introduction, Appendix B to 10 C.F.R. Part 50. See also Schnell Testimony, ff. Tr. 216, at 11-13. The quality assurance concept, then, applies to "all" relevant "planned and systematic actions," and not only, as Joint Intervenors apparently believe, to the activities of personnel in QA or QC departments. The quality assurance program for the Callaway Plant is designed to provide a means for identifying problem areas, whether it be by formal, planned inspection, or by casual observation. Schnell Testimony at 35. All Callaway project personnel are part of the QA/QC program. See Applicant SA-358 Piping Testimony, ff. Tr. 1537, at 6.

Applicant's quality assurance program for design and construction of the Callaway Plant was reviewed and approved at the construction permit stage. See Union Electric Company

(Callaway Plant, Units 1 and 2), LBP-76-15, 3 N.R.C. 445, 454-457 (1976), aff'd, ALAB-347, 4 N.R.C. 216 (1976). In order to obtain an operating license, Applicant is not required to prove, as Joint Intervenors implicitly argue, that its design and construction effort was error free. The Commission must find, in order to grant the application, that "construction of the facility has been substantially completed, in conformity with the construction permit and the application as amended, the provisions of the Act, and the rules and regulations of the Commission." 10 C.F.R. § 50.57(a)(1).

Absolute certainty, or complete, entire or perfect safety is not required by the Atomic Energy Act. What is required is a finding of reasonable assurance that the health and safety of the public will not be endangered by operation of the facility. See Nader v. Ray, 363 F. Supp. 946, 954 (D.D.C. 1973); see also Nader v. Nuclear Regulatory Commission, 513 F.2d 1045, 1052 (D.C. Cir. 1975). Commission proceedings are subject to the provisions of the Administrative Procedure Act. 42 U.S.C. § 2231; Commonwealth Edison Company (Zion Station, Units 1 and 2), ALAB-616, 12 N.R.C. 419, 421 (1980). In adjudicatory proceedings subject to the Administrative Procedure Act, the proponent of a rule or order has to satisfy a "preponderance of the evidence" standard in order to meet its burden of persuasion. Steadman v. Securities and Exchange Commission, 450 U.S. 91, 101 S. Ct. 999, 1009 (1981). Therefore, Applicant's

evidentiary burden here was met by providing the Licensing Board, by a preponderance of the evidence, with reasonable assurance that the public health and safety has been protected as to the issues raised in this case.25/ Zion, ALAB-616, supra, 12 N.R.C. at 421; Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-463, 7 N.R.C. 341, 360 (1978); and cases cited therein.

The Licensing Board commented, in its decision, that "[i]t appears that Intervenors' objections stem from an unrealistic assumption that the only acceptable performance of a constructor would be flawless work in the first instance." PID at 37. Joint Intervenors apply an equally unrealistic approach to quality assurance and quality control. The QA program is not designed to guarantee absolute perfection. Its very composition, with multiple levels of review and surveillance, acknowledges the possibility of errors; but the program itself provides a mechanism to identify problems and assure their resolution. The alleged deficiencies set forth in Joint Intervenors' contentions do not provide evidence of any failure of the QA program, nor can Joint Intervenors rationalize that these allegations are indicative of the quality of other construction activities. The quality assurance program was the mechanism by which these deficiencies and nonconformances were identified and resolved. Schnell Testimony at 22, 35.

25/ Cf. Joint Intervenors' Brief at 2, n.1.

In an apparently desperate attempt to taint Applicant with the types of quality assurance problems encountered at a few other facility sites,26/ Joint Intervenors have alluded, at several points in their brief, to certain unidentified material misrepresentations of fact which they allege have been made by Applicant to the NRC. See Joint Intervenors' Brief at 2, 3. The apparent substance of these allegations is discussed above and refuted in the section on embedded plates. See supra p. 15 and n.11. It is self-evident from the absence of any reference to the evidentiary record, or substantive argument in support of these allegations, that they are nothing more than exaggerated innuendoes designed to buttress a failing contention.

In conclusion, Applicant notes that this adjudicatory proceeding has constituted an exhaustive inquiry into the Joint Intervenors' allegations, which had previously been the subject of extensive review by the NRC Staff. Joint Intervenors had access to voluminous documentation dealing with the construction of the Callaway Plant, both through extensive discovery and from documents available to the public. Joint Intervenors have been able to pick and choose over a period of years, from

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26/ There is absolutely no basis for comparing the insignificant deficiencies here with the broad-based problems encountered at the South Texas Project. See Joint Intervenors' Brief at 3; Houston Lighting and Power Company (South Texas Project, Units 1 and 2), CLI-80-32, 12 N.R.C. 281 (1980) (I&E show cause order on suspension of safety-related construction; proposed civil penalties).

the documentation generated by Applicant's own quality assurance and construction programs and by the Staff's inspection and enforcement efforts, those issues which Joint Intervenors felt best supported their contention that such programs and efforts were deficient. It is revealing that this effort has produced only a few isolated alleged deficiencies. The alleged iceberg never emerged from underneath this tip, even though the Licensing Board gave Joint Intervenors wide latitude in the presentation of their case by cross-examination and the introduction of documents.

Upon identification of the construction deficiencies and nonconformances considered in this hearing, whether by formal, planned inspection, by casual observation, or by notification from the NRC of a generic, industry-wide concern, Applicant's quality assurance organization responded quickly and thoroughly to determine both the extent of the problem and its impact on the structural integrity and safe operation of the Plant.

For all of the foregoing reasons, the Licensing Board's Partial Initial Decision should be affirmed, and Joint Intervenors' request for further proceedings, see Joint

Intervenors' Brief at 18, should be denied as unnecessary.

Respectfully submitted

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