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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD '87 III -2 P4:43

In The Matter Of:	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-456
(Braidwood Station, Units 1 and 2)	)	50-457

OPENING BRIEF OF INTERVENORS-APPELLANTS  
BRIDGET LITTLE ROEM, ET AL.

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APPELLANTS BRIDGET LITTLE ROEM, ET AL.

QUESTIONS PRESENTED

1. Does the extensive record evidence of a pervasive atmosphere of harassment and production pressure in the L.K. Comstock Quality Control organization compel reversal of the Atomic Safety and Licensing Board majority's finding that Applicant Commonwealth Edison Company has carried its burden of demonstrating licensability of the Braidwood plants?

2. Does the record evidence of deficient grid area weld inspections prior to October 1983 compel reversal of the Licensing Board majority's finding, over the dissent of its Chairman, that those inspections provide "no cause to be concerned" over the safety of the plant?

3. Did the Atomic Safety and Licensing Board majority improperly place the burden of proof in the licensing proceedings on Intervenors?

## INTRODUCTION AND BRIEF PROCEDURAL HISTORY

This is an appeal from the Atomic Safety and Licensing Board's ("Board") May 19, 1987 Concluding Partial Initial Decision \*/ concerning Quality Assurance Contention 2.C. filed by Intervenors-Appellants Bridget Little Rorem, et al., in which the Board ruled by a 2-1 vote, over the dissent of its Chairman, that there is reasonable assurance that the Braidwood Units can be operated without endangering the health and safety of the public.

QA Contention 2.C., which was first filed on March 8, 1985, charged that Applicant Commonwealth Edison Company ("Edison") and its electrical contractor, L.K. Comstock Engineering Company ("Comstock"), had violated 10 C.F.R. Part 50, Appendix B, Criterion I and 10 C.F.R. 50.7 by subjecting Comstock Quality Control inspectors to systematic pressure, including harassment, intimidation, retaliation and other discrimination that discouraged the identification and correction of safety-related problems at Braidwood.

QA Contention 2.C. was initially filed as part of a much broader late-filed contention alleging deficiencies in the Braidwood QA program. On April 17, 1985, the Board rejected the contention (LBP-85-11, 21 NRC 609) but granted Intervenors leave to file an amended version, which they did on May 24, 1985. The

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\*/ Although the Licensing Board titled its May 19 decision its "concluding" Partial Initial Decision, it is still considering Intervenors' May 6, 1987 "Motion To Admit Late-Filed Contention On Financial Qualifications." In its June 15, 1987 Memorandum on Licensing Board jurisdiction, the Board expressly retained jurisdiction over that motion "until further action of the Licensing Board." In addition, on July 1, 1987, Intervenors filed a further Motion To Reopen The Record To Admit Late-Filed FQ Contention.

Board rejected two parts of the amended contention outright, reserved ruling on Part 2.C., and otherwise accepted the revised contention. (LBP-85-20, 21 NRC 1732 (1985)). On July 28, 1985, the Board admitted Part 2.C. pursuant to a stipulation by the parties.

On April 24, 1986, the Commission reversed the Board, dismissing all of Intervenors' QA contentions except for Part 2.C. and remanding Part 2.C. to the Board for a determination whether it met the late-filing requirements of 10 C.F.R. §2.714(a)(1). (CLI-86-6, 23 NRC 241 (1986)). On May 2, 1986, the Board found Contention 2.C. admissible.

Evidentiary hearings on QA Contention 2.C. occupied nearly 100 hearing days between May 6 and December 17, 1986. The record includes approximately 18,000 pages of testimony from 60 witnesses and 500 exhibits.

During the hearings, Intervenors presented extensive evidence in support of their allegations of improper production pressure directed to Comstock QC inspectors, including evidence to support their allegations of specific incidents of harassment and retaliation for raising safety concerns.

Edison did not deny the existence of an atmosphere of improper production pressure at Comstock; indeed, Edison conceded in its Proposed Partial Initial Decision ("Proposed P.I.D.") "a widespread perception of harassment and pressure to compromise quality" among Comstock QC inspectors. Proposed P.I.D. at 49. Rather, Edison argued that any such perception was the result of misunderstandings and was not attributable to any wrongdoing by

Edison. Edison also presented evidence that in its view demonstrated that the QC inspectors performed satisfactorily in spite of any pressure that may have been imposed on them.

On May 19, 1987 the Board issued its Concluding Partial Initial Decision disposing of QC Contention 2.C. The Board found that although some actions taken by Comstock management in dealing with QC inspectors "crossed the line of acceptable behavior," those actions were not "of sufficient severity to warrant the precipitous action of license denial." Majority Op. 74 \*/. Moreover, the Board majority found "considerable evidence" that Comstock QC inspectors had performed well and with integrity. Id. at 9.

In dissent, Chairman Grossman found considerable evidence of improper production pressure imposed by Edison on Comstock, and by Comstock on its QC inspectors; indeed, Chairman Grossman found incidents of harassment and retaliation so severe as to warrant a substantial civil penalty against Edison. Minority Op. 1-2. Chairman Grossman agreed with the majority that, notwithstanding the improper pressure, the QC inspectors had performed satisfactorily and that there was reasonable assurance of plant safety in spite of any harassment. Id. at 2. Nevertheless, because he found that Comstock's grid system of weld inspections

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\*/ Citations to the record and to the Licensing Board's opinions and findings will be in the following form:  
Licensing Board Majority Opinion -- "Majority Op. \_\_\_\_\_";  
Licensing Board Minority Opinion -- "Minority Op. \_\_\_\_\_";  
Licensing Board Minority Findings of Fact -- "Minority FF \_\_\_\_\_";  
Witness Testimony -- "(Name of Witness), Tr. \_\_\_\_\_";  
Exhibits -- "Edison Ex. \_\_\_\_\_" or "Intervenors' Ex. \_\_\_\_\_".

prior to October 1983 "totally lacks credibility," Chairman Grossman would have denied an operating license absent further evidence. Id.

In this appeal, Intervenors challenge both the evidentiary and the legal basis for the Board majority's conclusion that notwithstanding the atmosphere of improper production pressure at Comstock, Edison has met the "reasonable assurance" requirement of 10 C.F.R. §50.57(a). The Board majority's decision turns on its finding that Comstock QC inspectors performed satisfactorily in spite of any production pressure. See Majority Op. 9-10,74-75. Part I below argues that the record evidence compels reversal of that finding.

Part II below argues that the record evidence also compels reversal of the Board majority's finding that deficient grid area weld inspections pose "no cause to be concerned." Majority Op. 71.

Part III below argues that the Board majority's opinion not only runs counter to the manifest weight of the evidence, but is further flawed by an incorrect allocation of the burden of proof. Although the Board acknowledged that Edison bore the burden of proof of "reasonable assurance" in this proceeding (Majority Op. 77), the Board majority clearly -- and improperly -- placed the burden of proof on intervenors.

The regulations and the record compel reversal of the Licensing Board's ruling.

I. THE EXTENSIVE RECORD EVIDENCE OF THE PERCEPTION OF AND EXISTENCE OF IMPROPER PRODUCTION PRESSURE, COUPLED WITH THE LACK OF CREDIBLE EVIDENCE OF SATISFACTORY PERFORMANCE BY COMSTOCK QC INSPECTORS, COMPELS REVERSAL OF THE BOARD'S FINDING THAT EDISON HAS MADE THE "REASONABLE ASSURANCE" SHOWING REQUIRED BY 10 C.F.R. §50.57(a).

This Appeal Board may reject Licensing Board findings when it is "convinced that the record compels a different result." Northern States Power Company (Monticello Nuclear Generating Plant, Unit 1), ALAB-611, 12 NRC 301, 304 (1980) (quoting Niagara Mohawk Power Corporation (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 NRC 347, 357 (1975)). The record in this case compels the conclusion that Edison has not carried its burden of demonstrating with "reasonable assurance" that the Braidwood plants may be operated safely. 10 C.F.R. §50.57(a).

A. "Reasonable Assurance" Can Be Established Only Through A Quality Assurance Program That Complies With Criterion I of Appendix B, 10 C.F.R. Part 50

The Commission's regulatory scheme for assuring the protection of the public's health and safety in construction of nuclear power plants such as Braidwood requires effective implementation by licensees such as Edison of the Commission's Quality Assurance Criteria. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The "reasonable assurance" standard for licensing is met through effective adoption and implementation of a quality assurance program that complies with Commission regulations.

Criterion I of Appendix B in the licensing regulations requires the establishment of a Quality Assurance organization with "sufficient authority and organizational freedom," including "sufficient independence from cost and schedule when opposed to

safety considerations," to "identify quality problems; to initiate, recommend or provide solutions; and to verify implementation of solutions." 10 C.F.R. Part 50, Appendix B, Criterion I. The responsibility to establish and execute such a program is entirely on the Applicant's shoulders. Id.

B. There Is Extensive Evidence, Much Of It Uncontradicted, That The Comstock Quality Assurance Organization Failed To Meet Criterion I Requirements.

The most important fact in this case is also undisputed: that "a widespread perception of harassment and pressure to compromise quality" pervaded the Comstock QC department after August 1983. Edison's Proposed P.I.D. at 49. That fact was established by extensive record evidence, but it was brought home most clearly by accounts of the unprecedented March 29, 1984 visit by 24 Comstock QC inspectors to the NRC resident inspector's trailer at the Braidwood site to complain of harassment and production pressure at Comstock. (That visit is recounted in Minority FF 202-211.) \*/ During the meeting, the 24 inspectors expressed their unanimous opinion that Comstock Quality Control management was emphasizing quantity over quality. McGregor Tr. 17534-35; Minority FF 210.

The QC inspectors' perceptions resulted from their observations and from shoptalk concerning production pressures imposed by Edison on Comstock, the words and behavior of Comstock

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\*/ Frequent reference is made in this brief to the Minority Findings of Fact. Each of the Minority Findings of Fact to which reference is made is attached hereto as Appendix A. Intervenors incorporate those attaching findings, with their record citations, as part of this brief.

managers, and numerous incidents which the inspectors perceived as retaliation by Comstock against QC inspectors for raising safety concerns:

1. Production Pressure Imposed on Comstock by Edison.

As the Board majority acknowledges, Edison Construction Superintendent Dan Shamblin began heavily pressuring Comstock QC Manager Irv DeWald in mid-1984 to eliminate a large inspection backlog at Comstock: "There is no doubt that considerable pressure was put on DeWald by Shamblin, including the possibility of a work shutdown if progress on reducing the backlog was not made." Majority Op. 15. Shamblin informed DeWald by memorandum that "reduction of this backlog must be the first priority of LKC Production, Engineering and Quality Control personnel" and that "positive results must be seen very shortly" (emphasis in original). Intervenors' Ex. 8 at 1; Minority FF 25. Shamblin ordered DeWald to report to him every Monday on Comstock's progress. Intervenors Ex. 8 at 2. The record is devoid of any concerns expressed by Shamblin about the quality of Comstock's work. Edison's pressure on Comstock QC for faster production and its threat to cancel Comstock's contract were matters of considerable shoptalk among Comstock QC inspectors. E.g., Bossong Tr. 9857; Gorman Tr. 5840-41, 5871, 5884-85; Seeders, Tr. 7568; See Minority FF 39.

2. Pressure Imposed by Comstock QC Managers.

Comstock management, primarily through QC Manager Irv DeWald and QC Supervisor Rick Saklak, created and reinforced in a variety of ways the perception that Comstock was much more

concerned with quantity of work than quality. After Shamblin began pressuring DeWald, DeWald instituted weekly meetings with the QC inspectors at which he relayed Edison's threats and exhorted them to increase the speed of their work. Minority FF 38, 39. There is no mention in the record that DeWald ever made similar exhortations at those meeting with respect to the quality of work. DeWald's statements were understood by inspectors as a direction to emphasize quantity over quality. Id. That impression was strengthened by DeWald's introduction of a "status tracking system" which projected the number of inspections an inspector should perform in a day and compared them to actual results. Minority FF 40.

3. Perceived Incidents of Harassment and Retaliation.

A great deal of the evidence in the record concerns incidents in which inspectors believe they were harassed or subjected to retaliation by DeWald and Saklak for raising safety concerns. The Board majority, Chairman Grossman, and the parties all have different views about which of those incidents actually constitute actionable retaliation under 10 CFR § 50.7. But there is no dispute that there was considerable shoptalk about such incidents and that inspectors widely viewed the actions of DeWald and Saklak as retaliatory and as part of an effort to promote quantity over quality. See, e.g. Holley, Tr. 5210, 5266-67; Gorman, Tr. 5900-03; Hulin, Tr. 18128; Peterson, Tr. 5965-66; Rolan, Tr. 4914; Hunter, Tr. 8646, 8650; Martin, Tr. 9233; Bowman, Tr. 6955, 6950-52; Wicks Tr. 7133; Gorman Tr. 5886; Perryman Tr. 9636; Int. Ex. 195 at 15-17, 49; Int. Ex. 196.

Those perceptions are not without considerable foundation in the record. Even the Board majority concedes that the behavior of Saklak and DeWald toward individual inspectors left much to be desired, and that "some actions taken in dealing with QC inspectors crossed the line of acceptable behavior even for a large construction site." Majority Op. 74. For example, the Board found Saklak unsuited for his position (Id. at 41) and acknowledged his "scurrilousness" (Id. at 40), his "outbursts of temper" (Id. at 52) and his practice of threatening inspectors with discharge even though he was powerless to follow through. (Id.)

\* \* \*

The Board majority does not dispute the existence of a pervasive atmosphere of pressure at Comstock QC to emphasize quantity over quality. But neither does the Board even acknowledge that fact, much less attribute to it the decisive weight it demands. The Board's position seems to be that as long as inspectors continue to bring some safety concerns to management, the system must be working properly. Majority Op. 30.

But Criterion I demands much more: that QC inspectors feel completely free to bring all safety concerns to management's attention. That freedom does not exist in an organization such as Comstock's in which inspectors commonly believe (whether correctly or incorrectly) that management prefers speed over careful work and even retaliates against inspectors who raise safety concerns. The Commission cannot possibly condone a QC

organization in which inspectors believe they may face a choice between doing their jobs properly or being punished. That is the very reason for the existence of 10 CFR §50.7. When such perceptions are pervasive, as at Comstock, among a large group of inspectors over a period of years, "there has been a breakdown in quality assurance procedures of sufficient dimensions to raise legitimate doubt as to the overall integrity of the facility and its safety-related structures and components." Union Electric Company (Callaway Plant, Unit 1) ALAB-740, 18 NRC 343, 346 (1983).

- C. There Is No Credible Evidence In The Record To Support The Board Majority's Finding That Comstock QC Inspectors Performed Satisfactorily In Spite Of The Pervasive Atmosphere of Production Pressure.

The pivotal finding in the Board majority's opinion is that "the QC inspectors, in spite of management harassment and schedule pressure, performed their inspection duties in a professional manner and the fruit of their labors was not poisoned by management's actions." Majority Op. 74-75. It is perhaps because of that finding that the Board failed to explore in more depth the fact of and consequences of the pervasive atmosphere of production pressure at Comstock. Apparently, in the Board's view, the poisoned atmosphere at Comstock was inconsequential as long as the QC inspectors performed well. \*/

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\*/ That view is strongly at odds with the NRC licensing regulations. The heart of the NRC licensing requirements is that an effective and independent QA organization must identify, evaluate and initiate corrective action where called for on all conditions that fall short of acceptance criteria. The licensing scheme equates safety with an (footnote continues on following page)

In fact, there is no credible evidence in the record that the QC inspectors actually performed satisfactorily. Edison failed by a wide margin to produce evidence that could rebut the "legitimate doubt" about the integrity of Comstock quality control created by the evidence of harassment and production pressure at Comstock.

The Board majority cites three categories of evidence that in its view demonstrate effective QC performance: the expert testimony of Mr. Laney concerning the integrity of QC inspectors generally (Majority Op. 75), the testimony of "more than a dozen" Comstock QC inspectors that they had never personally succumbed to pressure to suppress safety concerns (or witnessed others do so) (Id. at 9, 75), and evidence from two reinspection programs (Id. at 10, 76). For the reasons explained below and at greater length in the Minority Findings of Fact, each of those categories of evidence is woefully deficient.

1. Reinspection Evidence.

Two separate sample reinspection programs (the BCAP and PTL programs) were conducted at Braidwood for purposes unrelated to measuring the effectiveness of Comstock QC inspector performance. Nevertheless, Edison attempted to use the results of those

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effective QA program: if "reasonable assurance" could be established through after-the-fact sampling, then the QA program requirements would be superfluous. The very existence of the requirements for an independently structured QA program, comprehensive documentation, and prompt and comprehensive identification of discrepancies indicate that minimal after-the-fact sampling is insufficient to meet licensing criteria.

programs as evidence of effective Comstock inspections. In fact, for reasons explained cogently in Minority Findings of Fact 330-373, the reinspection evidence has no probative value whatever on the issue of QC inspector performance. As Chairman Grossman found, "Neither of these programs was designed to measure Quality Control effectiveness and neither program, as presented by Applicant, was able to offer any assurance that Comstock's Quality Control program was effective or that the electrical system was properly installed by Comstock." Minority Op. 39.

Rather than repeat the arguments in the Minority Findings at length here, we merely list and summarize the principal defects in the BCAP and PTL data:

#### BCAP Defects

(a) Time Periods. The BCAP program examined only those items that were QC inspected and accepted before June 30, 1984; only 24% of the electrical construction items were therefore included. Much of the record evidence of harassment and production pressure concerns incidents and time periods after June 30, 1984. See Minority FF 343. The BCAP statistics can therefore address at most a small portion of the production pressure evidence.

(b) Types of Statistics Generated. The "agreement rate" and "design significance" statistics generated by the BCAP program can indicate at most the incidence and severity of defects remaining in the sample portions of the plant. \*/

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\*/ Although the design significance statistics are in principle a means of assessing the hardware quality at Braidwood, they (footnote continues on next page)

Absent information that Edison does not possess, such as the rate of errors committed by craft workers, those statistics provide no measure at all of inspector effectiveness. See Minority FF 356-360.

#### PTL Program

The PTL program suffers from the same basic infirmities as the BCAP program, but also suffers from the additional severe infirmity that its sample was not chosen in a statistically random manner that permits generalization beyond the sample itself. Minority FF 370.

#### 2. Laney Testimony.

The Board majority apparently gave considerable weight to the testimony of Mr. Laney that, in his experience, QC inspectors are generally people of high personal integrity who would resist pressure to compromise themselves. (Majority Op. 75). Such general testimony hardly establishes that individual Comstock inspectors were unaffected by harassment and production pressure; indeed, it is so general and speculative that one may question whether it has any relevance at all.

#### 3. Individual Inspector Denials.

The Board majority also gave heavy weight to the testimony of a dozen or so inspectors that they personally had not allowed

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are unreliable even for that purpose, because they reflect considerable subjective judgment by Sargent & Lundy, the Braidwood architect/engineer, which had a substantial stake in the results of those judgments. See Minority FF 362-369.

harassment or production pressure to compromise the integrity of their inspection work (Majority Op. 75). Even if the testimony of that small fraction of Comstock inspectors was credible, it certainly does not establish that Comstock's many other QC inspectors were not affected. Indeed, as Chairman Grossman points out, the testifying inspectors would be those most likely to resist production pressure, since they were the inspectors who had the courage and integrity to complain to the NRC in the first place. Minority Ultimate Finding of Fact and Conclusion of Law 14 (p. 281).

More importantly, little or no weight can be given to denials even of the testifying inspectors because of the severe consequences of an admission of wrongdoing. Even Mr. Laney testified that he would give little or no weight to uncorroborated denials of wrongdoing by an inspector, because such denials are self-serving. Laney Tr. 17300-301.

\* \* \*

In sum, the evidence cited by the Board majority falls far short of establishing acceptable work performance by Comstock QC inspectors. The lack of evidence of effective QC inspections, coupled with the extensive evidence of the poisoned atmosphere at Comstock, compels reversal of the Board majority's finding that Edison has met the "reasonable assurance" requirements of 10 C.F.R. §50.57(a). \*/

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\*/ In his minority findings, Chairman Grossman took pains to indicate he gave no weight to the evidence relied upon by the Board majority in their finding that Comstock QC inspectors had performed adequately. Minority Ultimate FF & CL 14 and (footnote continues on following page)

II. THE RECORD EVIDENCE CONCERNING DEFICIENCIES IN COMSTOCK'S PRE-1983 GRID AREA WELD INSPECTIONS COMPELS REVERSAL OF THE BOARD'S FINDING THAT THOSE INSPECTIONS PROVIDE "NO CAUSE TO BE CONCERNED."

A substantial amount of evidence was presented establishing that prior to October 1983, Comstock QC employed a system of grid area weld inspections under which the inspection of as many as 1000 or more welds was documented on a single inspection checklist. See Minority FF 315-329. Those checklists, which covered as many as three or four days of inspection activities, regularly indicated that no discrepant conditions had been discovered. See Minority FF 318, 320, 323. The grid area inspection procedure was not permitted by any approved Comstock quality procedure. (Martin Tr. 8358).

Chairman Grossman found that the grid area weld inspections are "totally lacking in credibility" in light of the record evidence

that the inspection standards of a significant portion of the weld inspectors were substandard, that the inspectors failed to observe significant numbers of discrepancies, and that the weld inspectors failed to document discrepant conditions as required by Appendix B . . .  
Minority Op. 37.

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(footnote continued from previous page)  
15 (pp. 280-81). Nevertheless, Chairman Grossman found, on the basis of unspecified "other evidence," that the Comstock inspectors had performed satisfactorily in spite of the harassment and production pressure at Comstock. There is no record citation or indication of any kind in either the Minority Opinion or Minority Findings of Fact to what "other evidence" Chairman Grossman refers. Intervenors know of no such evidence that would support that finding, which is strongly at odds with both the letter and spirit of the balance of the Chairman's Findings and Opinion.

The BCAP reinspectors found defects in 16% of the welds that had already been QC inspected and accepted. Minority FF 352. Considering that fact, and the fact that the defect rate is almost certainly higher among welds not already QC inspected and accepted, Chairman Grossman found it "inconceivable" that the grid area reports indicating no defects could accurately have reflected the original condition of the welds. Minority Op. 37.

The Board majority acknowledged the problems with grid area inspections, but found "no cause to be concerned" about them because some welds inspected by the grid area method were reinspected in the BCAP program, which uncovered no so-called "designed-significant" defects. Majority Op. 70-71. \*/ But, as explained above, the BCAP results provided no measure at all of the effectiveness of QC inspector performance. See Minority FF 356-357. Thus, BCAP provides no reassurance at all that grid area inspections were adequate.

In sum, the record evidence concerning grid area inspections all tends to raise serious concerns about their effectiveness; there is no substantial evidence to the contrary. Edison's failure to carry its burden of proof on that issue compels reversal of the Board majority's opinion.

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\*/ The Board also defended the pre-1983 practice of inspecting only 35% of welds. Majority Op. 70. But the issue raised by Chairman Grossman is not whether the sample was large enough, but rather whether the inspection of the sample was performed properly. If the inspections were unreliable, they would not be acceptable even if 100% of welds had been inspected.

III. THE BOARD MAJORITY IMPROPERLY PLACED THE BURDEN OF PROOF ON INTERVENORS.

The Board majority acknowledged at the end of its opinion that Edison, as required by 10 C.F.R. §2.732, bore the burden of proof in this case. Majority Op. 77. There is no question that intervenors met any burden of going forward with evidence of a quality assurance breakdown that may have been necessary to trigger Edison's burden of persuasion on quality assurance issues. See Louisiana Power and Light Company (Waterford Steam Electric Station, Unit, 3), ALAB -732, 17 NRC 1076, 1091 (1983).

Nevertheless, and despite the Board's suggestion to the contrary, its opinion makes clear that it placed the ultimate burden of proof in this case on intervenors. The very framing of the issues at the outset of the majority's opinion is the first indication that the burden was misplaced. Majority Op. 9-10.

The question before the Board, under 10 C.F.R. §§2.732 and 50.57(a), was whether Edison had proven, in the face of considerable evidence of a defective Comstock QC organization, that Comstock QC had performed effectively, in compliance with Commission regulations, and that there is "reasonable assurance" that the plant may be operated safely. Instead of thus focusing on Edison's burden, the Board posed -- and answered -- its questions in terms of the quantum of evidence that Intervenors had produced. The ultimate question in the Board's mind was not whether Edison had proven effective QC performance, but whether intervenors had proven a "sufficiently large breakdown in quality assurance procedures that there is no 'reasonable assurance' provided that the safety systems at Braidwood will

perform their functions and the public health and safety will be protected." Majority Op. 9.

The clearest indication of the Board's misallocation of the burden of proof is the statement at page 74 of its opinion that it does not consider Edison's and Comstock's "indiscretions of sufficient severity to warrant the precipitous action of license denial." (emphasis added). Implicit in that remarkable phraseology is a strong presumption in favor of granting a license, and a correspondingly heavy burden on Intervenors to produce compelling and persuasive evidence that a license should not be granted. The Board has thus turned the regulatory scheme upside down.

A further indication of the Board majority's distortion of the regulations occurs at the bottom of page 75, where the majority makes much of the fact that Intervenors failed to produce evidence of significant hardware defects that are as yet unidentified and uncorrected by Edison. Whether or not that assertion is true,\*/, the Board cannot thrust upon Intervenors the impossible burden of proving unidentified defective hardware; once Intervenors have gone forward with evidence of serious quality control deficiencies, it is the Applicant who must provide proof of acceptable QC performance and hardware quality.

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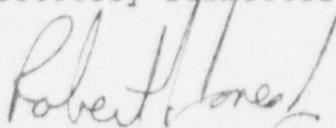
\*/ A strong inference can be drawn from the BCAP data (which show thousands of defects in the BCAP sample that were overlooked by QC inspectors) that the electrical construction items not included in the BCAP sample are also riddled with defects not found by the original QC inspectors.

The Board majority has turned the regulatory scheme upside down. It has created a presumption in favor of granting a license and imposed a heavy burden of proof on Intervenors. Its decision must be reversed.

CONCLUSION

The Licensing Board majority committed errors of fact and law that compel reversal of its May 19, 1987 Concluding Partial Initial Decision.

Respectfully submitted,



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One of the Attorneys for Bridget  
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DATED: July 1, 1987

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II. MINORITY FINDINGS OF FACTS

A. Organization

I accept Staff's Proposed Findings 1-15, in toto, as Findings 1-15.

1. [1.] Commonwealth Edison Company ("Applicant" or "CECo") is the owner of the Braidwood Nuclear Station, located in Braceville, Illinois. As the owner, Applicant ultimately is responsible for the design, construction, and operation of the facility. Applicant engaged Sargent & Lundy ("S&L") to design the Braidwood Station. Various contractors were retained by Applicant to construct the facility. Only one of which -- Comstock, the electrical contractor -- is pertinent to these findings. In particular, our focus is on certain activities and events involving that contractor during the period August 1984 through March 1985.

2. [2.] Comstock was awarded the electrical contract for Braidwood Units 1 and 2 by Applicant on February 5, 1979. Testimony of Bobby Treece, A.13 at 6, ff. Tr. 12881 [Treece Test.]. Prior to LKC's involvement, the electrical work had been performed by E. C. Ernst Company. Id.

Mr. DeWald's plan, 20 LKC Quality Control inspectors were dedicated to performing backlog inspections and 34 Quality Control inspectors were assigned to "current inspections." Int. Ex. 12 at 4-5.

25. [25.] Mr. Shamblin was not entirely satisfied with Mr. DeWald's target completion date of September 1984 for the junction box and small equipment backlog. See Shamblin Test., A.13 at 11. In a letter dated June 9, 1984, Mr. Shamblin informed Mr. Rolan and Mr. DeWald that according to CECO's records, the amount of all backlogged inspections exceeded 6,000 in number. Int. Ex. 8 at 1. Mr. Shamblin observed to Mr. DeWald and Mr. Rolan that CECO was "very concerned about the large existing backlog" and stated that "[r]eduction of this backlog must be the first priority of LKC Production, Engineering and Quality Control personnel." Id. [Emphasis in original.] Mr. Shamblin also took note of the fact that LKC's request for additional time to reduce the inspection backlog had been granted, indicating that "positive results (i.e. significant current inspection backlog reductions) must be seen very shortly." Id. [Emphasis in original.] If such results were not soon forthcoming, Mr. Shamblin was prepared to suspend LKC's operations. Shamblin Test., A.18 at 15. Finally, Mr. Shamblin directed Mr. Rolan and Mr. DeWald to report to him every Monday on the progress in eliminating the backlog that had been made the previous week. Int. Ex. 8 at 2.

In addition I add the following five findings (37-41) as follows:

37. In July, 1982, newly promoted Quality Control Supervisor Richard Saklak was charged with the mission by Comstock construction of trying to bring the quality control department under control and to organize a production system for responding to the installation reports from the production department. Tr. 8014-15. At 24 years of age, the young Mr. Saklak had previously been employed as a cost and scheduling engineer at Edison's LaSalle station and immediately prior to his Quality Control reassignment had been a planning and scheduling engineer for Comstock production. Tr. 7992. He had no prior Quality Control work experience. Very quickly after Mr. DeWald's appearance as Quality Control manager in August of 1983, he evaluated Mr. Saklak as a "very aggressive individual" who had taken on added responsibilities under him, duties that would have been performed by an Assistant Quality Manager, "with great enthusiasm and zest." Mr. DeWald concluded that "Rick is a real asset to the Braidwood QC department." Int. Ex. 52. When Mr. Saklak became a Quality Control supervisor in July of 1982, he shared his supervisory position with another individual. At about the time Mr. DeWald became Quality Control Manager, Mr. Saklak became the sole supervisor of Quality Control inspectors. Tr. 8000.

38. LKC replaced its prior Quality Control Manager Thomas Corcoran with Mr. DeWald in August, 1983, because Mr. Corcoran had

been too quality conscious and not sufficiently construction oriented. Tr. 1220-27. Mr. DeWald relied upon the Friday meetings, referred to above, as a primary means for communication with Quality Control inspectors. Tr. 1786. Management usually described those areas of inspection that were behind and those areas which needed more manpower allocated to them. Tr. 4241. Assistant Quality Control Manager Larry Seese would read the status reports which detailed the progress being made on projects to eliminate inspection backlogs and the projected dates of completion of those projects. Tr. 4243, 6871-73, 9663. John Seeders testified that at these meetings Mr. DeWald commented about being under schedule pressure from Edison. Tr. 7567. From these meetings, Seeders understood that the quantity of inspections was emphasized over inspection quality because the weld inspectors would comment that "DeWald wants numbers again" when Mr. DeWald pushed inspectors for greater productivity. Tr. 7566. Quality Control Inspector Terry Gorman also interpreted these weekly meetings as reflecting management's emphasis of quantity over quality in urging inspectors to perform more inspections. Tr. 5798. Mr. Gorman recalled Mr. DeWald's complaints that not enough work was being accomplished because too many people were sitting around the office when they should have been out in the field performing more inspections. Tr. 5776-77. Quality Control Inspector Robert Wicks testified that he believed quantity was emphasized over quality because Comstock management was trying to meet Edison-imposed deadlines. Tr. 7077-78. It was shoptalk among Quality Control

inspectors that Comstock stressed quantity over quality. Tr. 7087. Several inspectors remembered Mr. DeWald talking about a minimum required number of inspections to be performed as an attempt to eliminate inspection backlog. Tr. 6866-67, 9240-41.

39. Six inspectors testified that Comstock Quality Control management was pressuring inspectors for production under an Edison threat to cancel the Comstock contract if the inspection backlog was not eliminated by certain dates. Gorman, Tr. 5840-41; Holly, Tr. 5151-52; Bossong, Tr. 9857; Hunter, Tr. 8499-8500, 8744-47; Peterson, Tr. 5950-51; Seeders, Tr. 7567-69. Three inspectors acknowledged that the threatened loss of Comstock's contract was shoptalk among the Quality Control inspectors. Bossong, Tr. 9857; Gorman, Tr. 5840-41, 5871, 5884-85; Seeders, Tr. 7568. Mr. Seeders testified that such shoptalk was fairly common when Comstock was not meeting its deadlines. Tr. 7568. Inspector Danny Holley recalled a meeting in the summer of 1984 at which QA manager Robert Seltmann indicated that if the backlog of inspections was not eliminated, it could mean that the livelihood of Comstock at Braidwood would be lost. Tr. 5151-52. Inspector R. D. Hunter testified that more than once at the weekly meetings during 1984, Mr. DeWald had stated that Comstock was in danger of losing its contract if it failed to satisfy certain promised completion dates. Tr. 8499-8500, 8655, 8744, 8747. Inspector Dean Peterson recalled a special meeting where assistant Quality Control Manager Larry Seese indicated that things were looking very critical

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for Comstock and that everyone's help was needed to eliminate the backlog. Tr. 5950-51. Mr. DeWald acknowledged such a rumor that Comstock was in jeopardy of losing its electrical contract. However, he recalled the rumor circulating in January, 1985. Tr. 1345-47. Ultimately, Comstock did lose its contract for a portion of the electrical work on Unit 2. The Gus K. Neuberg Company has replaced Comstock for a portion of the Unit 2 electrical installation and inspection work. Tr. 1349.

40. In order to monitor inspector productivity and manage the inspection backlog elimination program as well as the performance of inspections on current installations, Comstock's Quality Control management developed a status tracking system. Under this system, the scheduled completion of various inspection tasks, including the inspection backlogs which existed in the spring of 1984, was projected on the basis of the number of average inspections an individual inspector was expected to perform in a day, e.g., an average expected level of performance, goal or quota. Int. Ex. 23; Seese Pref., ff. Tr. 2320 at 8-10; Seese, Tr. 2350-51; Saklak, Tr. 8116-18. For example, Mr. DeWald's early June 1984 backlog completion schedule was based on the average of five welding, equipment and configuration inspections per day; six termination inspections per day; and seven conduit inspections per day on average. Int. Ex. 12. The status report figures showing the number of inspections actually performed were compiled from individual inspectors' daily reports,

then passed through the inspectors' leads, who summarized and routed them to the status department. Comstock management posted the periodic status reports for Quality Control inspectors' information. Seese, Tr. 2498-99; DeWald, Tr. 1576-78; Comstock management acknowledged utilizing the status reports and tracking system to regulate inspector overtime assignments, and to transfer inspectors from one inspection area to another. Seese Pref., ff. Tr. 2320, at 9; Seese, Tr. 2350.

41. It is against this background that I consider alleged harassment, intimidation, and discrimination cited by Intervenor in its inspector harassment contention. First, I take up the matter of Worley O. Puckett, a Level III Weld Inspector, who, according to Intervenor, was fired by LKC because he "make numerous complaints about safety and quality deficiencies which he identified in the course of his duties at Braidwood." Second, I consider the case of John Seeders, an LKC inspector who allegedly was transferred out of LKC Quality Control Department to a clerk position in LKC's Engineering Department "in retaliation for his expression of quality concerns." Contention 2.C. Third, I discuss the complaints of harassment and intimidation made to the NRC by 24 LKC inspectors in March of 1985. Finally, I discuss additional instances of alleged harassment and intimidation not cited specifically in Intervenor's Contention.

discussed the incident with some of his colleagues who agreed to accompany him to the offices of Mr. McGregor and Mr. Schulz, the Senior Resident Inspectors at Braidwood. Tr. 4205-06. Based on his previous experience, Mr. Snyder considered Mr. McGregor to be a fair and concerned individual. Tr. 4593.

202. [197.] At approximately 8:15 a.m., the next morning, Friday, March 29, 1985, Mr. Snyder, accompanied by five other Quality Control inspectors "walked into the NRC Braidwood office with numerous allegations which 'effect' the quality of work being accomplished by the electrical contractor," LKC. Int. Ex. 42 at 1; Tr. 4210, 11567. Mr. McGregor advised the inspectors of their right to remain anonymous but informed them that the NRC would like to know their identify in order to obtain further information from them if necessary and to advise them of the results of the meeting. Int. Ex. 42 at 1; Tr. 11567.

203. [198.] During this meeting, Mr. Snyder informed the NRC Inspectors of the threat made against him the previous day by Mr. Saklak. Tr. 4211, 11569. Other inspectors complained to the NRC about Mr. Saklak's conduct as well. App. Ex. 11, Tr. 11569, 11736. In addition, the Quality Control inspectors raised a number of other complaints against LKC Quality Control management in this meeting. App. Ex. 109. Among these complaints were that CECO's "Quality First" Program was not effective; that unqualified persons were awarded lead

inspector positions; that certain of LKC's Quality Control management team harassed and intimidated Quality Control inspectors; and that management was more concerned with the quantity rather than the quality of the inspectors' inspections. Id.; Tr. 11569.

204. [199.] After the meeting adjourned, Mr. McGregor and Mr. Schulz contacted their superiors in the regional office to bring to their attention the events that transpired that morning. Weil Test., A.63 at 16; Tr. 11569-70. Participating in that conference call were Mr. Warnick, Mr. Weil, and Mr. Forney. Weil Test., A.16 at 16. The NRC inspectors informed the region that six LKC Quality Control inspectors had complained to them about harassment and intimidation from Mr. Saklak and an over-emphasis on quantity at the expense of quality of LKC's Quality Control management. Mr. McGregor and Mr. Schulz also reported to the region "that the LKC quality control inspectors were threatening a walkout the following Monday." Weil Test., ff. Tr. 11948, A.16 at 16.

205. [200.] Mr. McGregor and Mr. Schulz also recommended to the region that someone from the regional office be sent to Braidwood immediately to take sworn statements from the Quality Control inspectors. See Tr. 11582. Mr. McGregor and Mr. Schulz also recommended that the Region consider issuing an order stopping LKC from performing further work pending an inspection of the quality of work already performed. App. Ex. 109. The inspectors believed these

actions appropriate because they had previously notified CECO of discontent in LKC's Quality Control Department and CECO apparently had failed to take sufficient action to address the problem. Tr. 11740-56.

206. [201.] After speaking with Mr. McGregor and Mr. Schulz, Mr. Warnick, Mr. Weil, and Mr. Forney discussed the matter among themselves and decided that CECO should be notified of the substance of the Quality Control inspectors' allegations. Weil Test., ff. Tr. 11948, A.65 at 16. [~~This course of action was consistent with the policy of the NRC which "recognizes that an applicant has a strong interest in learning of and taking appropriate action to correct any problems which may affect the operation of its nuclear facility."~~ Id.; see App. Ex. 119 at 1.] The region determined that it would be appropriate to notify CECO of the substance of the allegations that had been made "because of the allegations involved CECO personnel and the information to be provided Applicant did not appear to be of such character as to enable Applicant to compromise a subsequent NRC inspection or investigation." Weil Test., id., A.66 at 17; see App. Ex. 119. Mr. Weil was therefore asked "to advise the six LKC quality control inspectors of the NRC's proposed course of action and ascertain whether any of them desired to remain anonymous." Id., A.65 at 17.

207. [202.] Mr. Weil then called Mr. McGregor to ask him to arrange a telephone conference with the six Quality Control inspectors. Tr. 11570. McGregor in turn contacted some of the inspectors and asked them to attend a meeting in his office during their lunch break. Tr. 4265. Mr. McGregor indicated that any other inspectors who wanted to attend should feel free to do so. Tr. 4265, 11571.

208. [203.] At approximately 12:00 p.m., the conference call began. Tr. 11571-74; Weil Test., A.67 at 18. Mr. Weil was informed at that time by Mr. McGregor that 18 Quality Control inspectors, in addition to the original 6, were present in the NRC office. Weil Test., ff. Tr. 11948, A.67 at 18; see Tr. 11573.

209. [204.] As stated above, the purpose of the telephone conference was to advise the six Quality Control inspectors of the action Region III proposed to take and determine whether any of them wished to remain anonymous. Id., A.65 at 17; Tr. 11971-72. Accordingly, Mr. Weil spoke with each of the original six Quality Control inspectors and asked whether there was any objection to the NRC notifying CECO of the substance of the allegations. Id., A.68 at 18; Tr. 11,972. None of these Quality Control inspectors expressed any disagreement or objection with this proposal to Mr. Weil. Id. Mr. Weil also asked each of these inspectors whether they wished to remain anonymous and was informed by each that confidentiality was not

desired. Id. Mr. Weil then afforded the other Quality Control inspectors in attendance an opportunity to speak; ten of those Quality Control inspectors took advantage of this opportunity and made statements. Id.

210. [new] Senior Resident Inspector McGregor testified that at some point during the meeting a request was made for a show of hands to determine how many Quality Control inspectors agreed that Comstock Quality Control management was emphasizing quantity over quality. Mr. McGregor recalled that the 24 inspectors' agreement with the statement was unanimous, without abstentions or denials, and that he or Mr. Schulz relayed that agreement to the Region during the conference call. Tr. 17534-35.

211. [205.] The telephone conference lasted between 30 and 40 minutes. Tr. 4269. Mr. Weil then notified OI Director Pawlik of the allegations received from the Quality Control inspectors and was informed by Mr. Pawlik that an "investigation by OI:RIII was not warranted" based on the information then available. Staff Ex. 23.

212. [206.] At approximately 1:15 p.m. that afternoon, another telephone conference was held, this time between officials of Region III and Commonwealth Edison Company (CECo). Tr. 11579. Present on behalf of the region were Mr. Forney, Mr. Williams, Mr. Weil, and Rogelio Mendez, an NRC inspector. Weil Test., ff. Tr.

D. Grid Area Weld Inspections

315. In 1981, Quality Control Manager Irving DeWald had worked at Braidwood as a Level II QC Inspector for L. K. Comstock. He and a few other weld inspectors including Richard Martin performed so-called "grid area basis" inspections, documenting large numbers of welds on single inspection reports. DeWald Pref. Test., ff. Tr. 1700, at A.19. There was a general and consistent belief among Quality Control inspectors that Mr. DeWald had signed a checklist that documented his inspection of a thousand or more welds in a single day. Eight of the Quality Control inspectors who testified had heard through general talk among the inspectors of a Mr. DeWald 1,000-plus checklist, but had not seen it themselves. Hunter, Tr. 8495-98; Martin, Tr. 8294; Mustered, Tr. 5061-62, 5086; Rolan, Tr. 4762-63, 4769-71; Stout Dep., Tr. 144-145; Klachko Dep., Tr. 192, 265-66; Hii, Pref. Test., ff. Tr. 16608, at 3; Gorman, Tr. 5817-18, 5828. Six of the inspectors that testified claimed to have actually seen one or more Mr. DeWald 1,000-plus weld checklist. Bossong, Tr. 9848-50; Bowman, Tr. 6890-91; Holley, Tr. 5154-56; Perryman, Tr. 9652-57; Peterson, Tr. 5933-35; Wicks, Tr. 7151-54.

316. Mr. DeWald testified that he is "pretty certain" that he had never documented a thousand or more welds on a single inspection checklist. Tr. 4092. He doubted that it was possible that he ever did so. At the direction of his Supervisor, Tony Simile,

Quality Control Inspector Bowman undertook a search for this checklist during the course of the proceeding, but was unable to locate the document. Tr. 6894; Bowman Pref. Test., ff. Tr. 16000 at A.13-A.15.

317. On deposition, Mr. DeWald had been asked the maximum number of welds he had documented on a single checklist and could not remember, until found in a casual search through his old weld inspection checklist, documenting as many as 551 welds on a single inspection checklist. Tr. 15000; Int. Ex. 19.

318. Although the inspectors originally believed that those inspection checklists represented inspections done over the period of one day, they were subsequently informed that the checklist could have been the result of several days' work. See, e.g., Tr. 6892. Mr. DeWald testified that, while the inspected welds may have been covered by a single checklist, "it may been a day, two days, three days it took me to complete all the particular inspections." Tr. 1482. With regard to the particular checklist covering 551 welds (Int. Ex. 19), Mr. DeWald believed that it took two, three or four days to complete his inspections. Tr. 1490. He had found all the welds acceptable. Tr. 1491.

319. Quality Control Inspector Richard Martin had observed a checklist covering 60 cable tray hangers and associated aux steel that could have covered up to 2,500 to 3,000 welds. Mr. Martin, who had

inspected on the grid basis alongside of Mr. DeWald, recalled actually inspecting on the order of 300 to 350 welds in one day. Tr. 8376. Earlier, on disposition, he even recalled inspecting 500 welds on one day. Tr. 8377-78. Mr. Martin had also seen a checklist filled out by Quality Control Inspector Thomas with over a thousand welds. Tr. 8294.

320. In December of 1984, inspectors John Walters, Mike Blake and Dan Asmussen reviewed a 1979 checklist by Quality Control Inspector Richard Yankeitis, documenting, on a single sheet, the inspection and acceptance of 1,166 welds. In a letter of concern to management, Mr. Asmussen stated, "I can not accept a 0% reject rate for that many welds inspected." One of the 77 hangers listed on the grid inspection cover sheet was later the subject of a 1984 reinspection which identified extensive welding defects not identified in the original grid inspection. Mr. Asmussen, speaking for himself and the other inspectors, indicated that they recognized their responsibility to bring their concerns to management's attention and felt that this situation deserved "immediate management investigation." Int. Ex. 18 at 5-6.

321. Mr. DeWald, as Quality Control management, agreed that the total number of welds (1,166) being inspected in a single day did appear to be a considerable number for one individual to accomplish. However, he dismissed that problem on the basis that the inspections

written on the checklist could possibly have represented a total of several days' work. He dismissed the other concern, regarding the acceptance of all the welds, as follows:

The other questionable item brought out by Mr. Asmussen is zero (0) rejects. To him, this is questionable, although it is felt the individual was a competent inspector.

Mr. DeWald concluded that if Mr. Asmussen had any question concerning the validity of the inspection, he could reinspect the items himself "to ensure a good valid inspection." Id. at 1.

322. As Mr. DeWald described the grid basis weld inspections, there was only a small number of inspectors, they would complete an area, document it on the PTL coversheet, and fill out the inspection report on various days. They did not complete their inspection reports on each and every day that they had done inspections. Tr. 1479. The reason that they didn't fill out inspection reports as they completed each component was because there were only three or four inspectors covering a hundred welders. Tr. 1483.

323. Mr. Martin, who had served as a weld inspector along with Mr. DeWald, described the weld inspection documentation practices in more detail. Tr. 8343-78, 9384-97. As a rule, no official documentation of rejectable conditions was ever made unless the craft

couldn't fix the defect promptly. Only then would an Inspection Correction Report be issued writing up the defect. Tr. 8349. Mr. Martin would simply note rejectable conditions in his personal notebook without indicating the identity of the welder or the particular weld found defective. Tr. 8351. Only acceptable items were documented on the official weld inspection checklist. Tr. 8352. This system, employed by Mr. Martin and the others for performing and documenting weld inspections, was not provided for by any Comstock quality procedure. Tr. 8358.

324. It was not until October, 1983, after a Commonwealth Edison Company audit, that the practice of documenting weld inspections on personal notebooks and completing checklists later in the office was uncovered and brought to an end. Tr. 9570-77.

325. In 1984, Mr. DeWald took newly hired Level III welding inspector Worley Puckett on a tour of the Braidwood facility. Mr. DeWald pointed out welds to Mr. Puckett that he (DeWald) had inspected when he previously worked as a Level II weld inspector. The welds were on a large hanger. Mr. Puckett testified that although he just glanced at the welds, he saw welds that he (Puckett) would not have accepted. The welds he had observed had undercut, excessive spatter, slag, overlap, and excessive craters. Mr. Puckett indicated that he would not have had inspectors working for him that would have accepted some of those welds. Tr. 6215-17.

326. Robert D. Hunter joined the L. K. Comstock Company at Braidwood in October of 1983. Within 30 days thereafter, he became a welding inspector. He had had plenty experience as a welder and welding inspector. Tr. 8471-81. When he first began inspecting at Braidwood, Mr. Hunter was asked by Quality Control Manager Irving DeWald to review some of Richard Martin's welds. Mr. Martin had been one of the few inspectors inspecting welds under the grid system, and had been trained by Mr. DeWald. Mr. Hunter reported to Mr. DeWald that Mr. Martin's work was lacking in certain areas. Mr. Martin would miss things such as undercut, cold-lap, and other things of that nature. Subsequently, in early 1984, Mr. Hunter accompanied Mr. Martin to the field, reviewed Mr. Martin's work, and discussed Mr. Martin's prior training with him. According to Mr. Hunter, Mr. Martin didn't know some simple things about welds. For example, he didn't know what rod-craters were, and what the face or toe of a weld should look like. Tr. 8484-92. Quality Control Inspector Thermond Bowman also testified with regard to reinspecting Mr. Martin's early welding inspections. Although he testified reluctantly on this matter, Mr. Bowman indicated that he had found one-third of the welds inspected by Mr. Martin to have been rejectable. Tr. 6888.

327. In 1984 and 1985, the "Braidwood Construction Assessment Program" was instituted which reinspected samples of prior Quality Control accepted construction work. Of over 13,000 welds reinspected, approximately 16% were found to be deficient in one or

more respects that might possibly have an affect on their safety function. Other, lesser types of deficiencies were ignored. The sampling was done on a statistically random basis and, presumably, should have represented the population at large. If the approximate 16% figure for discrepant welds represents discrepancies after at least one original Quality Control inspection, it is inconceivable that any large numbers of uninspected welds would be free of discrepancies. If the percentages arrived under the BCAP hold true, in an inspection of 500 welds, one might expect 80 welds to be discrepant ( $500 \times 16\%$ ), even after the welds were inspected at least once by Quality Control. Assuming at least a 50% Quality Control effectiveness on the welds examined under the BCAP Program 160 welds out of 500 would have been discrepant originally (i.e., before inspection). In the case of Mr. Yankeitis's 1,166 welds examined by Mr. Asmussen, one might similarly expect at least 340 welds to be discrepant. Not only is it inconceivable that the weld inspection reports indicating acceptances of multi-hundred welds could have reflected the original condition of the welds, but it is also inconceivable that such large numbers of discrepancies could have been reworked or repaired during the one, two, three or four days between the beginning of the inspection and the signing of the inspection report. Neither time nor space would be adequate for such operations even if craft were not otherwise occupied in its further construction activities.

328. Moreover, the failure to record discrepant conditions, which surely must have existed in the multi-hundred weld inspections under the grid system, if observed, would violate Criterion XVII of 10 C.F.R. Part 50, Appendix B, which requires, as a minimum, a record of any deficiencies noted.

329. On the basis of the evidence adduced, which indicates that the inspection standards of a significant portion of the weld inspectors was substandard, that the inspectors failed to observe significant numbers of discrepancies, and that the weld inspectors failed to document discrepant conditions as required by Appendix B, the weld inspections performed under the grid system, in effect until October of 1983, lack credibility.

E. Applicant's Sampling Reinspection Programs

330. In an attempt to prove the effectiveness of the Comstock Quality Assurance Program, Applicant presented the results of two large sample reinspection programs. The first program was the Construction Sample Reinspection (CSR) conducted as part of the Braidwood Construction Assessment Program (BCAP). This data spans the time period from the start of construction until June 30, 1984. The second set of data results from the routine overinspection of Comstock Quality Control accepted work by Pittsburgh Testing Laboratory (PTL) for Applicant's Quality Assurance Department for the period July 1, 1982 to June 30, 1986. These reinspection programs were conceived, designed and carried out independently of each other. DeGeorge, Reb. Prep. Test. at 6, 9, ff. Tr. 16740; Kaushal, Reb. Prep. Test. at 7-8, ff. Tr. 15568.

331. The Braidwood Construction Assessment Program (BCAP) was a program of reinspections and reviews carried out by Edison in 1984 and 1985 covering safety-related construction activities at Braidwood. The BCAP was comprised of three principal program elements. These were (1) the Construction Sample Reinspection (CSR), (2) the Reverification of Procedures to Specification Requirements (RPSR), and (3) Significant Corrective Action Program (RSCAP). Kaushal, Pref. ff. Tr. 13068 at 4. Only the CSR program element was presented at hearing.

332. The CSR consisted of a visual reinspection of a sample of on-site, safety-related construction work which, as of June 30, 1984, had been completed and Quality Control inspected. The sample was selected based in part on engineering judgment and in part on the use of statistical concepts. The reinspections were carried out from October, 1984 through July, 1985. Kaushal, Pref. ff. Tr. 13069 at 3, 13-16.

333. The CSR (and other elements of BCAP) were carried out by the BCAP Task Force. The BCAP Task Force Director was Edison employee Dr. Narindar Kaushal. Kaushal reported directly to the Braidwood project manager, Mike Wallace, who had principal production responsibilities at Braidwood. Kaushal Pref. ff. Tr. 13069 at 9-10. The BCAP QA group, a part of Edison's QA department, under the direction of an Edison employee, Neil Smith, oversaw the BCAP Task Force activities. Id. at 10.

334. Discrepancies found by BCAP CSR inspectors were evaluated for design significance by Sargent & Lundy (S&L), which was responsible for developing the design drawing specifications for Braidwood. The activities of Sargent & Lundy, the BCAP Task Force, and BCAP QA were reviewed by an Independent Expert Overview Group (IEOG) established through the Evaluation Research Corporation. Kaushal, Pref. ff. Tr. 13069 at 10-11.

335. The NRC Staff assigned inspector Ronald Gardner to monitor on-site the implementation of the BCAP program. Gardner was on-site from August 20, 1984 until June, 1985, during which time he engaged in daily oversight of BCAP activities. Gardner Pref. ff. Tr. 17606 at 3, 7.

336. BCAP Director Kaushal was assigned to BCAP in March, 1984, after BCAP was conceived but before it was implemented. Tr. 13098. NRC Inspector Gardner was assigned to BCAP in August, 1984. Gardner Pref. ff. Tr. 17606 at 3, Tr. 17569.

337. BCAP was not designed to look at suspected problems or to respond to the possible effects of harassment and production pressure on Quality Control inspector work performance. Nor was BCAP designed to look for isolated design significant defects. Rather, BCAP was designed as a quality "confirmation" program; the program design assumed that construction quality was good and relied on a sample size that would reveal only recurring, programmatic construction problems. Kaushal, Pref. ff. Tr. 13068 at 3-6, 16-17; Tr. 13326-28.

338. The record contains evidence that NRC officials had misgivings about the sufficiency of the BCAP design, but no evidence that the NRC actually approved that design. Edison forwarded the BCAP program document to NRC Inspector Keppler and his Staff for comments

in June, 1984. Keppler's response to Edison, Intervenor's Exhibit 140, made 27 specific recommendations for changes in the program design. With only one exception, Edison responded to each of Keppler's comments that "Edison believes that no change to the existing BCAP document is warranted." Kaushal, Tr. 13114-17.

339. The Board ruled that Mr. Gardner was not competent to vouch on behalf of the NRC for the adequacy of the BCAP program design or the S&L design significance evaluations because he had no role in either aspect and that if Edison or the Staff wished to establish that the NRC had approved the BCAP design or design significance evaluations, they would have to present other witnesses. Tr. 17566-606. No such witnesses were ever produced.

340. The CSR was a sample program. For purposes of taking samples, the entire population of on-site contractors' safety-related construction work was divided into 30 "construction categories," which were defined as groups of hardware constructed using similar processes or containing similar types of components. Six of those construction categories contained electrical work: cables; cable pans, cable pan hangers, conduit, conduit hangers, and electrical equipment installation. Kaushal, Rep. Prep. Test. at 11-13, ff. Tr. 13068. The total sample for each construction category consisted of three parts. The first or "random" portion was chosen in such a manner as to support formal statistical conclusions with at least 95% confidence

and at least 95% reliability concerning each sampled construction category. Kaushal, Reb. Prep. Test. at 13-16, ff. Tr. 13068; Frankel, Reb. Prep. Test. at 9-11, ff. Tr. 17082. For the second portion of the sample, engineering judgment was used to determine sample size and to select items. This portion emphasized types of items which are part of safe-shutdown or emergency core cooling systems. It was initially intended that the "engineering judgment" portion of the CSR sample would also emphasize the types of items which had previously exhibited deficiencies at Byron and Braidwood. However, for each of the electrical construction categories it was determined that none of the previously identified deficiencies could be limited to a subset of the construction category. Therefore, additional items were chosen using random methods. Kaushal, Reb. Prep. Test. at 14-15, ff. Tr. 13068. Although both the "random" and "engineering judgment" portions of the CSR sample already included more highly-stressed items, in the cable pan hanger category, 10 additional more highly-stressed items were added as the third part of the CSR sample. Kaushal, Reb. Prep. Test. at 15-16, ff. Tr. 13068; Kostal, Tr. 15074-75. Under the provisions of the CSR, if any design significant discrepancies had been found in the initial CSR sample, the sample size would have been increased. These sample expansion provisions could have led to a 100% reinspection. However, since no design significant discrepancies were identified the sample was not expanded. Kaushal, Reb. Prep. Test. at 6-7, ff. Tr. 13068; Tr. 13756-57, 14148-49.

341. The CSR inspection checklists and instructions were developed by the BCAP Task Force engineers based on relevant design information provided by S&L. The attributes selected for reinspection were those that (1) are required by applicable codes and standards, (2) potentially have an effect on the item's ability to perform its safety-related design function, and (3) are currently observable. Kaushal, Reb. Prep. Test. at 18-19, ff. Tr. 13068. In the electrical construction categories, the CSR checklists and instructions were not based on the original Comstock inspection checklists, and did not include attributes with no potential for design significance. Kaushal, Tr. 13180-86, 13375, 13385.

342. The CSR electrical sample was chosen from items that had been Quality Control inspected and accepted as of June 30, 1984. Edison estimated that only 24% of the total research construction items in the plant were "valid" and had been Quality Control inspected and accepted as of June 30, 1984; only those items were therefore eligible to be included in the CSR sample. App. Ex. 133, Int. Ex. 159. Thus only 17% of conduit hangers, 29% of electrical equipment installations, 39% of cable pans, 42% of conduits, and 59% of cable pan hangers were eligible to be included in the CSR samples. App. Ex. 133; Int. Ex. 159. The remaining 76% of the electrical construction items in the plant (some 72,216 items out of total of 94,947 electrical items in the plant) were ineligible for the CSR samples and were thus not covered by the CSR program at all.

343. The fact that the CSR program covered only 24% of the total electrical construction population at Braidwood limits the overall conclusions that can be drawn from the BCAP program with respect to Quality Control inspector performance. The CSR cutoff date of June 30, 1984 bears no relation to Intervenors' contention concerning harassment and production pressure. Many of the incidents exhibiting harassment of production pressure that have been developed in this record occurred after June 30, 1984:

- \* The Comstock campaign to eliminate the backlog was reaching its most intense period in June 1984. During that month, DeWald received a memorandum from Shamblin emphasizing the urgency of eliminating the backlog and announcing weekly meetings for progress reports.
- \* The termination of inspector Puckett, arguably the most egregious incident of harassment in this extensive record, occurred in August 1984.
- \* On March 29, 1985, 24 Comstock Quality Control inspectors went to the NRC to complain about problems at Comstock, including production pressures that, in their view, placed an emphasis on quantity over quality in the Comstock Quality Assurance organization.
- \* Allegations of harassment and production pressure continued well into 1986 as exemplified by the retaliatory incidents involving Richard Martin and Gregory Archambeault.

Early in the CSR program the NRC Construction Assessment Team identified deficiencies on three of six pipe supports/restraints which the BCAP Task Force inspectors had previously reinspected. The BCAP Task Force reinspectors had not identified these deficiencies. In

addition, IEOG overinspections identified deficiencies associated with a concrete placement which had not been identified during the BCAP CSR reinspections. Gardner, Reb. Prep. Test. at 8-9, ff. Tr. 17606. In response to these findings and following a meeting with Mr. Gardner on January 23, 1985, Mr. Kaushal temporarily suspended CSR reinspections. Gardner, Reb. Prep. Test. at 8-9, ff. Tr. 17605; Kaushal, Reb. Prep. Test. at 21-22, ff. Tr. 13068; Int. Ex. 148. Corrective actions were taken to address the identified CSR reinspection discrepancies and to ensure that future CSR reinspections were performed in an acceptable manner. These actions included the partial repeat reinspection of previously reinspected mechanical pipe supports, the review of electrical conduit support packages, and partial repeat reinspection of such supports, where necessary, the implementation of additional training for BCAP inspectors, the revision and clarification of BCAP checklists and instructions, and the initiation of the BCAP Quality Control overview of BCAP Task Force inspections. Gardner, Reb. Prep. Test. at 9-10, ff. Tr. 17606; Staff Ex. 25 at 5; App. Ex. 135; Wozniak, Reb. Prep. Test. at 5-7, ff. Tr. 13068; Smith, Reb. Prep. Test. at 7-14, ff. Tr. 13068.

344. Kaushal believed that the root cause of the CSR reinspection errors identified by the CAT and the IEOG prior to January 23, 1985 was a misunderstanding by the BCAP Task Force inspectors of certain attributes on their checklists. Tr. 13941-42. Mr. Gardner, on the other hand, concluded that the root cause of these

CSR reinspection deficiencies was the fast pace at which BCAP Task Force inspectors were working. Gardner, Rep. Prep. Test. at 10, ff. Tr. 13068. Although Mr. Gardner did not discuss this concern with Kaushal in their meeting on January 23, 1985, or document it in his inspection reports, he continued to monitor BCAP inspectors' attitudes and instructions. Tr. 18369. Subsequently the CSR reinspectors were instructed to disregard any pace concerns and take as much time as necessary to perform their inspections. Tr. 17623-24.

345. Three types of data were produced as a result of the BCAP CSR program. The first, the raw data from the CSR reinspections were tabulated in terms of the number of the discrepancies and the number of acceptable conditions identified by the CSR overinspectors. Second, those numbers were used to compute so-called "agreement rates." Third, the discrepancies were analyzed to determine whether they were design significant.

346. All CSR reinspection observations reported by the BCAP Task Force inspectors were reviewed by their lead discipline inspectors for clarity, completeness and accuracy. Kaushal, Rep. Prep. Test. at 22-23, ff. Tr. 13068. If suitable for further processing, the observations were evaluated for validity by BCAP engineers. Under BCAP procedures (Int. Ex. 143), CSR observations which had previously been identified by Applicant or its contractors on an existing nonconformance report or other controlled system were

considered to be invalid. Conditions that were in accordance with current design documents or design documents current at the time of the original Comstock inspection were also not valid. Kaushal, Reb. Prep. Test. at 23, ff. Tr. 13068; Int. Exs. 143, 154; Tr. 13588-603. Observations that related to items not within the CSR sample or attributes not on the CSR checklists were declared "out of scope." In addition, because the objective of the CSR was to look for previously unidentified and unaddressed construction problems, observations which pertained to known conditions addressed prior to the CSR through existing procedures or other documented plans for future construction completion activities (for example, all cable pan hanger configuration observations) were also declared "out of scope." Kaushal, Reb. Prep. Test. at 22-24, 26-27, ff. Tr. 13068; Tr. 13535-38, 13799-802; Int. Ex. 143. The remaining (valid, in-scope) observations were termed "discrepancies" and were transmitted to Sargent & Lundy for evaluation of design significance. Kaushal, Reb. Prep. Test. at 25-26, ff. Tr. 13068.

347. Early in the CSR program, Sargent & Lundy engineers reviewed each discrepancy sent to them by BCAP for validity as well as for design significance. However, in March 1985, NRC Inspector Gardner assessed an item of noncompliance against BCAP for invalidating 37 so-called "red-line" observations all relating to a Phillips-Getschow documentation practice, based on an inadequate rationale provided by S&L. Although the focus of the NRC Staff's

concern was the invalidation itself, rather than S&L's role, after this time BCAP-06 was modified to emphasize that S&L could only recommend invalidation and only the BCAP Task Force could invalidate BCAP observations. Thereafter, S&L played little or no role in the invalidation process. Gardner, Reb. Prep. Test. at 11-12, ff. Tr. 17606; Gardner, Tr. 17764-67, 18328-34; Kaushal, Reb. Prep. Test. at 25, ff. Tr. 13068, 13489-503, 13828-34, 14343-45, 14476-77.

348. Sargent & Lundy categorized all discrepancies sent to it for evaluation of design significance as either: "insignificant," "notable," or "design significant," depending on its severity. App. Ex. 179 at 15; Thorsell, Reb. Prep. Test. at 9-10, ff. Tr. 14270. Discrepancies which reduced an item's capacity by less than 10% but did not impair its ability to perform its safety-related design function were termed "insignificant." Discrepancies which reduced an item's capacity by 10% or more but did not impair its ability to perform its safety-related design function were termed "notable." Any discrepancy which would impair the item's ability to perform its Mr. Gardner safety-related design function within code allowable stresses was called "design significant." Thorsell, Reb. Prep. Test. at 9-10, ff. Tr. 14270; Kostal, Reb. Prep. Test. at 16-17, App. Ex. 179; Kostal, Reb. Prep. Test. at 28, ff. Tr. 13068. Sargent & Lundy's evaluation of discrepancies for each of the six electrical construction categories concluded that there were no design significant discrepancies.

349. The Board heard substantial testimony regarding S&L design significance evaluations for CSR discrepancies. CSR sample items cable pan hanger ("CPH") 104, and Cable ("CBL") 130 were vehicles for a comprehensive evidentiary review of S&L's approach and methodology; see, generally, Kostal, Tr. 14641-86, 14755-805, 15517, 16675-76; Thorsell, Tr. 14453-60, 14477-90, 14565-66; Int. Ex. 155, 155A, 155B, App. Exs. 159, 173, 180. Sargent & Lundy initially calculated the design margin for CPH 104, taking into account CSR identified weld discrepancies, to be 1.03. Tr. 14781-83; Int. Ex. 155B, pp. 14-15. Any value equal to or greater than 1.0 is not design significant and therefore acceptable. Tr. 14781; Int. Ex. 161. Subsequently, a revised calculation was performed using the actual cable tray weights that existed in the pan, rather than the conservatively estimated load use in the initial calculation. Tr. 14756, 14784-85, 15181-82; App. Ex. 159. That calculation resulted in a design margin of 1.89, but an improper shortcut was taken in the second calculation. Correcting for the shortcut, the design margin was calculated at 1.28. Tr. 14781-84. With respect to Cable 130, Sargent & Lundy erred in closing out a minimum bend radius violation observation on the basis of technical acceptance criteria contained in a letter from the cable manufacturer, Okonite Company, without first specifically pointing that cable out to the manufacturer's representative, or providing a written description of the bend radius violation to the manufacturer. Thorsell, Tr. 14482-83.

350. The criteria in the letter for approval of the bend radius did not apply to Cable 130 without a further determination by the manufacturer of the condition of the cable, and a different cable was examined by the manufacturer's representative, than assumed by Sargent & Lundy. Tr. 14456-62, 14482-89, 14565-67. The errors in both the CPH 104 and Cable 130 design significant evaluations were not discovered and corrected until the S&L experts were cross-examined by Intervenor's counsel at hearing.

351. The quality control inspection of an item such as a cable or a cable pan hanger requires the inspector to verify that the item conforms to design requirements for each attribute on his checklist. Verification of each such attribute may require one or more inspection judgments. Kaushal, Reb. Prep. Test. at 19-20, ff. Tr. 13068; Tr. 13761-62. Moreover, the items included in the CSR sample varied greatly in their complexity and thus in the number of inspector judgments required for the initial Quality Control inspection and for the CSR reinspection. Tr. 13758-59, 14166-73; App. Exs. 143, 144. To permit meaningful judgment of inspector performance and meaningful comparison of inspector performance with respect to items of differing complexity, the BCAP Task Force together with BCAP Quality Assurance and Sargent & Lundy developed the concept of "inspection points" and "discrepancy points." Tr. 13750-59, 13770, 13773, 14173-79. Each inspector check to determine the acceptability or rejectability of an item or an attribute was identified and termed

an "inspection point." Each inspection point which resulted in a CSR discrepancy was termed a "discrepancy point." Kaushal, Reb. Prep. Test. at 19-20; ff. Tr. 13068; Kostal, Reb. Prep. Test. at 13-14, ff. Tr. 14270; Tr. 13760-64. On this basis, over 98% of the inspection points were found to be correct (nondiscrepant) and more than two-thirds of the discrepancy points were insignificant. App. Ex. 179 at 16; Thorsell, Reb. Prep. Test. at 11, ff. Tr. 14270; Kostal, Reb. Prep. Test. at 22, ff. Tr. 14270.

352. Applicant also presented the CSR results for the electrical construction categories on a per weld basis. About 84% of the welds had no discrepancies. App. Ex. 181; Reb. Prep. Test. at 33, ff. Tr. 16740. The comparable figure for the PTL overinspection data for the period July 1, 1982 to June 30, 1986 is 93%. For the period in which the two data bases overlap (July 1, 1982 to June 30, 1984), the agreement rates are 89% and 90%, respectively. DelGeorge, Reb. Prep. Test. at 37-38, ff. Tr. 16740, 16801-02.

353. A third way of looking at the CSR results was supported by Intervenor in this proceeding. Any item with one or more discrepancies would be termed a "discrepant item." The NRC had originally required that any conclusions on expanding the CSR sample size be based on the percentage of acceptable items, irrespective of the number of attributable inspection points. Int. Ex. 140 at BCAF Comments II-4; Tr. 17710-11. Applicant committed itself to this

requirement. App. Ex. 128 at Attachment A, p. 3 of 7. Although Applicant's statistician did some early analyses based on an item, rather than inspection point, basis, Applicant inexplicably breached its commitment to the NRC and abandoned that basis. Tr. 17141-42, 17631, 17710-18. On an item basis, 60.0% of the cables, 64.4% of the cable pans, 59.0% of the conduit, 56.4% of the conduit hangers, 86.2% of the cable pan hangers and 72.5% of the electrical equipment installation would be deemed "discrepant items." App. Ex. 181. Applicant's witnesses did not view this as a reasonable or fair measure of Comstock Quality Control inspector performance -- both because it masks the actual number of inspector errors on each item and because it equates very dissimilar reinspection outcomes. For example, a huge cable pan hanger with hundreds of welds, one of which might be discrepant due to an arc strike, would count the same as a conduit wall strap support which was totally missing. Kaushal, Tr. 13758-59; Shevlin, Tr. 13770; Kaushal, Shevlin, Wozniak and Smith, Tr. 14173, 14179.

354. NRC inspector Gardner agreed that in grading inspector performance he would not equate such dissimilar "discrepant items." Mr. Gardner did not believe that Applicant Exhibit 181, standing along, presents a balanced portrayal of the CSR reinspection results. Nonetheless he recommended that the Licensing Board should consider all the data available to it, including the data presented on an item basis. Mr. Gardner stated that his own personal standards were high,

and he would expect a good inspection program would have resulted in lower rates of discrepant items than as shown in App. Ex. 181. However, he conceded that he had never developed acceptance criteria for differentiating good from average or poor inspection programs using data presented in Intervenor's suggested "item basis" format. Tr. 17633-45, 17807-11, 18347-49. In Mr. Gardner's view, the Comstock Quality Control inspectors were not effective in the "classical" 10 C.F.R. Appendix B sense of identifying all defects, but they were effective and adequate in the sense that they did not miss any design significant defects. Tr. 17807-09, 17813-15.

355. There is merit in both Applicant's and Intervenor's positions. Clearly, if we are dealing with a complex component containing a number of welds, each of which are evaluated on the basis of 17 design significant attributes, it would be unrealistic to judge the original Comstock inspection as a failure if one attribute on the component were discrepant, as Intervenor suggests. On the other hand, judging the quality of the original inspection on the percentage of attributes that were discrepant, as Applicant proposes, is similarly unrealistic. As an example, welds were divided into 17 inspection points (or attributes). It seems unlikely that any weld that had more than two or three discrepant inspection points (i.e., attributes) would have become the subject of an original inspection by an L. K. Comstock Quality Control inspector. If a craftsman were to weld a weldment with more than two or three faulty attributes, such as being

undersized or cracked, lacking fusion, etc., it is likely that he would redo that weld himself without waiting for quality control to reject it. On a practical level then, the original Quality Control inspector is inspecting welds that might have, at most, one, two, or three defective attributes (although any of those, such as a crack, might render the weldment totally nonfunctional). But, even if we were to assume that the Quality Control inspector inspected and passed only discrepant welds (those with one, two, or three defective attributes), his percentage of acceptable calls (i.e., his "agreement rate" under BCAP) would range between 82% and 94%. On its face, an 82% to 94% rate does not seem egregious, even though it should because, in our example, the Quality Control inspector missed every single discrepant weld that the craftsmen would not have redone of their own volition.

356. There are infirmities in the BCAP CSR reinspection program that go beyond the question of whether components, sub-components (such as welds), or inspection points should be tallied to determine the percentage of discrepancy. Even if we were to choose one of these, we would still lack the perspective to judge the quality of the original Quality Control inspection. The main element lacking in the evaluation would be the number of the discrepant items (components, sub-components, or attributes) that the original Quality Control inspector reported, as opposed to those that he missed, only the latter being disclosed under the BCAP program.

357. As an example, let us use welds as the unit of measurement and 15% of the welds as being found discrepant under the BCAP reinspection program. (Applicant's Exhibit 181 indicates that approximately 16% of the welds examined by the BCAP inspectors were found to be discrepant.) If we assume that the craftsmen had welded 45% of their welds discrepantly, the Comstock Quality Control inspector would have had to miss one-third of those discrepant welds ( $1/3 \times 45\%$ ) to have been found 15% discrepant under BCAP. If, on the other hand, the craftsmen had welded 20% of the welds discrepantly, the Comstock Quality Control inspector would have had to miss three-quarters of the discrepant welds ( $3/4 \times 20\% = 15\%$ ). Consequently, unless we know either explicitly or deductively (or inductively, as the case may be) how many discrepancies were reported by the original QC inspectors, we do not know whether the Comstock QC inspectors were 67% effective, 25% effective, or any other percentage. <sup>4/</sup>

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<sup>4/</sup> The calculation made in this example is somewhat simplified. Since I do not distinguish between weld discrepancies missed by an original Comstock QC inspector and any Comstock reinspector, but use only the final products of their cumulative inspections, it is unnecessary to adjust the calculation for welds that were reinspected, as in the examples presented at hearing where the examples began with a hypothetical 100 welds to be initially inspected.

I also do not take into account in this simplified calculation the possibility of the BCAP reinspectors' not being 100% accurate. I recognize that they could be expected to have missed

[FOOTNOTE CONTINUED]

358. There would seem to be no reason why the discrepancies uncovered by the BCAP reinspectors could not be compared to the discrepancies originally reported by the Comstock inspectors, as contained in the inspection packages for the sampled components. Under the requirements of Part 50, Appendix B, Criterion XVII, the original inspection records should be retrievable. Criterion XVII states, inter alia:

Criterion XVII. Quality Assurance Records:

... inspection and test records shall, as minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted. Records shall be identifiable and retrievable.

359. It would appear that even at this point a comparison can be made between the discrepancies found by the BCAP inspectors and those found by the original Quality Control inspectors. We need only

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[FOOTNOTE CONTINUED]

discrepant welds, as offered by Intervenors and Applicant. I do not also accept the proposition offered by Applicant that these BCAP reinspectors would have erroneously reported nonexisting discrepancies under a rate comparable to, or greater than, that of missed discrepancies. I do not believe that one could expect inspectors to find things that weren't there, except in unusual circumstances. That does not go to say that there might not have been differences in judgment between the BCAP reinspector and the original Comstock QC inspector, but I would expect that any errors in judgment on the part of the BCAP inspector would have been weeded out in the BCAP review that he was subject to which, in all probability, also weeded out any marginal calls he made, even if correct.

examine the original sampling packages, with no need for any further sampling, if we wish to measure the effectiveness of the original Quality Control inspectors. Whether any such comparison was ever made has not been disclosed and is not a part of the record. In the absence of such comparison the BCAP program cannot be accepted as any measure of the effectiveness of the original Quality Control inspector. It might also be noted at this juncture that if a comparison had been made, the entire controversy over which units (i.e. components, sub-components, inspection points) should be measured would have been obviated. Had Applicant compared only those attributes examined by the BCAP reinspector with the comparable attributes originally inspected to by the Comstock Quality Control inspector, Intervenors would have no basis for challenging the results. Of course, even if Applicant had measured apples against apples and oranges against oranges, it would only have arrived at a percentage of the effectiveness of the original Quality Control inspector. Unless those results were determinative on their face (i.e., either an extremely high rate of Quality Control inspector effectiveness or an extremely low rate), the results would still have to be evaluated by the experts and the Board.

360. Without any measure of effectiveness of the Quality Control inspector, and with only a measure of the absolute numbers of discrepancies missed, a meaningful comparison cannot be made between different periods of inspection activity. Moreover, any BCAP sampling

comparison between the pre-DeWald (as Quality Control Manager) era and the period in which the contention alleges that management harassed and intimidated inspectors, is particularly inappropriate. Mr. DeWald became Quality Control Manager in August of 1983, shortly before the grid area basis for weld inspectors was discontinued in October of 1983. The grid system was not a proper or effective method of inspection (see Min. FF 315-329, supra) and, consequently, neither the grid system period nor the DeWald-Saklak period represents a standard against which any other period can be judged.

361. In the absence of any measure of Quality Control effectiveness based upon a comparison between discrepancies missed and discrepancies reported, the BCAP evaluations of "design significance" were presented as a measure of Quality Control effectiveness. But the question of whether a discrepancy is "design significant," is totally irrelevant to the function of a Quality Assurance inspector. He is not charged with seeking out design significant discrepancies or even with determining whether any putative discrepancies are significant from a safety standpoint. His obligation is to report all discrepancies. Any attempt by him to ignore those discrepancies that he might consider insignificant would interfere with this obligation. The question of whether a discrepancy is design-significant is uniquely in the presence of an engineer to evaluate based in part on the inspector's findings but also based on a variety of other data and expertise that is not immediately known to a quality control

inspector. The measure of the qualification of a quality control inspector is whether he can inspect to established acceptance criteria. Tr. 16775-76.

362. The only value, therefore, that BCAP could have for us, considering the way it was programmed, is with regard to the constructed hardware, rather than with regard to the effectiveness of the Quality Control Inspection Program. However, even there little weight can be given to the results. The main problem here is with the the party selected to make the determination of design significance, Sargent & Lundy.

363. The BCAP program document recognized the need for independence of the Independent Expert Overview Group reviewing the program. The document provided that the IEOG members "will be free of any significant contacts with Commonwealth Edison Company" and "will not have participated in the design, construction, or quality assurance activities related to the Braidwood Station or with Braidwood side contractors within the last five years." App. Ex. 137 at V-2. The IEOG was not shown at hearing as being any more than a token oversight group. However, the BCAP Director, Mr. Kaushal, was an Edison employee. He and BCAP were answerable directly to Edison management in the person of Mike Wallace, the Braidwood project manager who was responsible for cost and scheduling considerations at Braidwood. Kaushal Tr. 13716. More importantly, Sargent & Lundy,

which performed the design-significant evaluations, the only evaluations of any importance <sup>5/</sup> in the BCAP program, did not meet the independence criteria. Sargent & Lundy failed the independence criteria on almost all grounds. As architect/engineer, it designed Braidwood and was intimately involved with its construction. As consulting engineer, it advised on construction and dispositioned NCRs and ICRs that documented discrepant construction activities. It was in day-to-day contact with Applicant, the Commonwealth Edison Company. Because of its intimate involvement in the construction activities, whether or not it was the case, Sargent & Lundy appeared to the Quality Control Manager of L. K. Comstock to be the prime electrical contractor and Comstock only the subcontractor. Mr. DeWald, Tr. 1805-06. Were the Braidwood facility to fail to meet its licensing requirement or were its construction to prove deficient in some degree, it is likely that Sargent & Lundy's liability exposure would surpass that of even Applicant, the Commonwealth Edison Company.

364. An example of S&L's direct liability for design significant defects is Cable 130, which violated the manufacturer's

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<sup>5/</sup> It would not have mattered one iota whether there had been half as many or twice as many discrepancies or notable discrepancies found by the BCAP inspectors. The entire conclusion as to whether the facility passed the BCAP test was founded on S&L's determining whether any of the discrepancies was design significant.

bend radii limitations and which S&L evaluated (incorrectly, at first) as having no design significance. The bend radii's violation was attributable to the cable being placed in a junction box that was too small to permit the cable to be bent properly. S&L had designed and ordered the equipment and installation, and had failed to require an adequate junction box. Tr. 14923-25.

365. Not only would Sargent & Lundy have failed the independence test in the BCAP program document, but other reasons exist for questioning the objectivity of its evaluations on the BCAP. Just prior to the critical period in issue in this proceeding (beginning with the summer of 1984), Sargent & Lundy had complained that the Comstock Quality Control inspectors were being "over-critical and were marking discontinuities which S&L felt were acceptable." App. Ex. 1 at 1. Sargent & Lundy had complained in particular about the Quality Control inspectors' interpretation with regard to overlap, undercut, arc strikes, lack of fusion, tack welds base metal reduction and spatter. Sargent & Lundy was concerned that these interpretations constituted "overinspection." Ibid.

366. Consistent with the evidence of Sargent & Lundy's concern about inspections being too critical, was the Quality Control inspectors' recurrent testimony during the course of the hearing that they were becoming somewhat demoralized because of Sargent & Lundy's practice, as evaluating engineer, of dispositioning QC-determined discrepancies on a "use as is" basis. Tr. 8162-64, 10485, 10576, 12320, 12632, 17363; Test. of Mendez and Neisler, ff. Tr. 10490 at 30. Many of the Quality Control inspectors believed these dispositions to be unjustified and had voiced complaints to the NRC. Ibid. Some had successfully challenged the S&L engineers' "use as is" dispositions. Tr. 8162-64.

367. Further disquieting about the role of Sargent & Lundy as an objective evaluator under BCAP were its participation in the improper termination of Mr. Puckett and its testimony in defense of that termination, its errors and evaluations of the two sample BCAP packages randomly selected by Intervenors for examination at hearing, its improper invalidation of 37 red-line drawings under BCAP, its complaints to Comstock's management concerning Quality Control inspectors who sought engineering advice from them for not having gone through channels (i.e., through their Quality Control supervisors with whom they disagreed), its unilateral departure from FSAR standards (e.g., with regard to response spectra (see Tr. 15176-79, 15197-201)) in evaluating BCAP design significance, and the seeming inability of

Sargent & Lundy witnesses to answer Intervenors' questions directly with regard to the BCAP program.

368. As a general matter, by virtue of its direct involvement in the design and construction of the Braidwood plant and its potential liability to Commonwealth Edison for any construction or licensing problems, Sargent & Lundy is too committed to the licensing of the plant to be considered an objective evaluator. While it is certainly entitled to evaluate the plant's construction under BCAP or any other program for its own purposes to determine for itself whether the plant is properly constructed, its commitment to the licensing of the plant is too strong for acceptance of its opinions as impartial. Furthermore, its past actions and testimony at trial confirm its partisanship in that regard. Its attitude in general appeared to be that it had designed the plant with so much safety margin that no deficiencies in construction and inspection in the electrical area could impair the ability of the electrical equipment to function safely. While that might be the case, that opinion should be expressed by someone other than the designer of the plant to be afforded much weight.

369. Further questions exist with regard to whether the design significant evaluations made by Sargent & Lundy are satisfactory samples for statistical application. In the statistical process, one can select sufficient items on a random basis to project

to the population at large. The population being sampled, however, must have a degree of homogeneity in order for that statistical projection to be valid. But in this case, the calculations and evaluations made for design significance appear to be unique calculations suitable only for the particular items selected. While Sargent & Lundy began its evaluations with standard design calculations, it departed from these standards through a series of so-called "refinement" when the design margins became minimal. Sargent & Lundy's design significance calculations were carried out by using successive levels of "refinement." When one set of calculations produced results that indicated a concern about design significance, Sargent & Lundy turned to a "more refined calculations" which, by eliminating purported conservatisms in the first set of calculations, enhanced the acceptability of an item. Sargent & Lundy employed multiple layers of refinement in order to arrive at its conclusions that no discrepancies were design significant. Tr. 15076, 14083-85. These refinements took many forms, including examinations of the "as-built" configuration of the sample item and its neighbors to determine if additional safety margins exist, departures from the FSAR specifications to those based upon its own engineering judgment to see if further safety margins exist, and departures from the equipment manufacturers' specifications and requirements on the basis of its own engineering judgment to determine if further safety margins exist. Many of these departures from the original design specifications adopted in the FSAR were based on ad hoc exercises in engineering

judgment and all were in the direction of finding additional safety margins in the as-built construction. Absent were any suggestions of refinements in the direction of reduced safety margins because of as-built conditions that might have included observations of less than satisfactory workmanship or materials in the sampled item, or in a neighboring item that might adversely affect the sampled item. Given the predisposition of Sargent & Lundy to validate the construction of Braidwood as satisfactory, which was the expressed purpose of the BCAP program, and considering Sargent & Lundy's resourcefulness and their predisposition for searching only for matters that would show an increased safety margin, it is difficult to see how they would ever find a discrepancy of design significance.

370. For the same principal reasons that the CSR agreement rates are not indicative of the efficacy of the original Comstock Quality Control inspector, because there is no comparison between the discrepancies he missed and those that he found, the PTL results are similarly unilluminating. Furthermore, in addition to the sampling's not being done on a statistically random basis, there is further doubt as to how representative the sampling was. The PTL inspectors were permitted to overinspect welds through paint. Although the PTL panel experts claimed that this amounted to only 7% of the inspected welds, this testimony was questionable.

371. They arrived at the 7% figure by reviewing PTL's overinspection records for July 1982 through June 1986 and determined how many of the welds were noted in the remarks section of the inspection reports as having been inspected through paint. This amounted to 7% of the total welds that were overinspected. The PTL witnesses testified that it was PTL's practice, although not a written procedural requirement, to indicate in the remarks section of PTL's inspection reports which welds were overinspected through paint. They believed that the PTL inspectors followed this practice whenever they inspected through paint. Tr. 15749-54.

372. That testimony is not acceptable. On its face, the 7% figure seems very low considering the practice of Comstock of coating welds with Galvanox after the initial installation and Quality Control inspection. Tr. 8533, 8541. Galvanox was a heavy, thick, gray-colored paint used as a protection coating to prevent welds from rusting. Tr. 8531, 8540. It would be less surprising if the figure given for welds covered by Galvanox by the time of the PTL overinspection were 70%, rather than 7%. Furthermore, not only did PTL's written procedures not require noting the welds overinspected through paint, but neither did the checklist given to the PTL overinspectors. Tr. 15780-81. Nor was there any other written direction to note those inspections through paint. Tr. 15782. But PTL, no less than the original Quality Control inspection group, is

required by Part 50, Appendix B, to document in writing its procedures and instructions. Criterion V, states, in pertinent part, as follows:

Criterion V. Instructions, Procedures and Drawings:

Activities affecting quality shall be prescribed by documented instructions ...

Criterion XVIII states, in pertinent part:

Criterion XVIII. Audits:

... The audits shall be performed in accordance with the written procedures or check lists by appropriately trained personnel ..."

373. If PTL, which had been overinspecting visual inspections of welds since 1977, had not memorialized any directions to its overinspectors to note welds inspected through paint (as it had documented its other requirements) by the period for which it offers its conclusions, 1982-1986, we cannot accept the testimony that these instructions existed and were uniformly applied. And, if in fact a large number of welds were inspected through paint, PTL's high agreement rate with Comstock Quality Control inspectors means very little because many discrepant attributes would have been obscured by the paint. The Galvanox coating could obscure cracks, undercut, cold lap, porosity, and other attributes. Tr. 8531-32. Moreover, one could not be sure that the sampling by PTL, which was not

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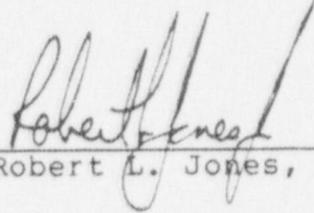
BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD 1987 JUL 2 8 44

In the Matter Of: )  
COMMONWEALTH EDISON COMPANY )  
(Braidwood Station, Units 1 and 2) )

OFFICE OF THE SECRETARY  
DOCKETING & SERVICE  
Docket Nos. 50-456  
50-457

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I hereby certify that I caused copies of the foregoing  
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this 1st day of July 1987, except that counsel for Applicant were  
served by personal delivery and counsel for Staff by Federal  
Express on this same date.

  
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