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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

COMMONWEALTH EDISON COMPANY

(Byron Nuclear Power Station,
Units 1 & 2)

Docket No. 50-454-OL
50-455-OL

Location: Rockford, Illinois **Pages:** 11,140-11,179

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY & LICENSING BOARD

In the Matter of:	
COMMONWEALTH EDISON COMPANY	Docket Nos. 50-454 OL
(Byron Nuclear Power Station Units 1 and 2)	50-455 OL

United States District Court
Second Floor
211 South Court Street
Rockford, Illinois

Friday, 24 August 1984

The hearing in the above-entitled matter was resumed, pursuant to recess, at 9:00 a.m.

BEFORE:

IVAN W. SMITH, Chairman
Atomic Safety & Licensing Board

A. DIXON CALLIHAN, Member
Atomic Safety & Licensing Board

RICHARD F. COLE, Member
Atomic Safety & Licensing Board

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On Behalf of the Joint Intervenors, DAARE?SAFE and Rockford League of Women Voters:

DOUGLASS CASSEL, Jr., Esq.
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Chicago, Illinois 60602

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I N D E X

P R O C E E D I N G S

JUDGE SMITH: On the record.

I wish you would address the matter of the telephone call, Mr. Wright. I didn't quite understand everything that you were talking about on the telephone call.

MR. WRIGHT: Well, as I explained to the other parties in the case, I attempted to contact Mr. Gallo or Mr. Miller this morning to talk about a possible stipulation before this hearing would begin at nine o'clock this morning.

JUDGE SMITH: Oh, I just had completely misunderstood what you were saying. I understand entirely, now. I thought you were talking about the possibility of us even coming in late today for this very purpose. And I thought you were referring to newly discovered evidence that you were going to offer, because you made a reference to coming back next week and it's a big dea.

All right. I understand.

MR. WRIGHT: Well, I'm not talking about newly discovered evidence at this point, Your Honor.

JUDGE SMITH: Never mind. Just forget it.

All right. Let's have a few preliminary matters. I want to dispose of the Office of Investigations report. You told me last night, Mr. Cassel, that you had no requirements with respect to it.

MR. CASSEL: That's correct, Judge.

JUDGE SMITH: How about you, Mr. Miller, so we can dispose of that? I have other papers. I have an SALP report. I'll throw it away. Let me see what else we have that we were given.

MR. CASSEL: There's one matter which we do anticipate a motion on, which we would be filing in writing, and which could be briefed. And that is a motion on the independent design review. As I indicated earlier, we have not had time to put that motion together because of the proceedings this week. But we do anticipate filing such a motion in written form contemplating that it can be handled on the papers. And if any proceedings, of course, come out of that that's another matter. But at least the motion and responses could be done on the papers.

JUDGE SMITH: All right. Here is a letter dated July 30, 1984 with respect to -- from Mr. Streeter to Mr. Reed, with respect to inspection concerning Systems Control and Hatfield Electric. The document was given to us as an apparent Board notification. Nothing was ever done with it. It was referred to in passing. But I'm going to throw it away.

MR. LEWIS: It was simply a Board Notification.

JUDGE SMITH: We have here the letter of April 16, 1984, which transmits Inspection Report 84-13 and it closes out 82-05-19, the special report.

MR. LEWIS: Not an exhibit in the proceedings. Simply background information for the Board and parties.

JUDGE SMITH: All right. I'm going to throw that away.

MR. LEWIS: You don't have to throw them away, Your Honor. They are not offered as exhibits in the proceeding.

JUDGE SMITH: Even though they may be very relevant to the hearing and interesting reading, I purposely do not want to have matters laying around that are not exhibits in evidentiary record.

Anything else you can think of?

Oh yes. We have made so many references to the Inspection Report and the Inspection Report Supplement. I don't know, I am torn. I can see the mystery involved in bringing it in as an exhibit, and yet it was referred to so often. Well, we'll come back to that. The parties ought to consider whether or not it should be an exhibit.

What is your feeling, Mr. Miller? You don't want it to be an exhibit, is that it?

MR. MILLER: Well, Judge Smith, we considered at a very early stage of our preparation whether or not the Reinspection Program Report should be introduced as an exhibit in toto here and concluded that it would be not productive. It contains information on many contractors. It

has information that is presented somewhat differently than the prepared testimony of the witnesses we did present. It is all perfectly consistent, I believe. And it was our judgment before the hearing started that we would not introduce it.

If the Board believes that it would be helpful, as a reference -- because certainly a lot of people have referred to it from time to time in the course of testifying -- I don't believe we would object to having it introduced as an exhibit, with the understanding that -- if we could -- that perhaps in preparing proposed findings, and perhaps as far as the Board is concerned in terms of what is and what is not actually in evidence, only those sections or portions of the Reinspection Program Report that were actually referred to by various witnesses in the course of their examination could be used as a basis for findings or by the Board in its decision.

JUDGE SMITH: That certainly would have to be the case. What is your feeling, Mr. Cassel?

MR. CASSEL: I would agree with the approach just outlined.

JUDGE SMITH: All right. Well, with that then, let's give it an exhibit number. It should be an Applicant's exhibit number, or if you think that has --

MR. MILLER: No, that's no problem. I'm just

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wondering about the necessary copies.

JUDGE SMITH: And the supplement.

MR. MILLER: Yes, sir. That would be Applicant's Exhibit R-4 and the supplement would be R-5. Now the question is, can we supply the necessary copies that haven't been marked up?

JUDGE SMITH: It doesn't have to be supplied today. But you will have to get it -- there is aproblem.

Let's go off the record.

(Discussion off the record.)

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JUDGE SMITH: Applicant's Exhibits R-4 and R-5 are received in evidence.

(The documents referred to were marked for identification as Applicant's Exhibits R-4 and R-5, respectively, and were received in evidence.)

JUDGE SMITH: And with that, you propose that we take an hour recess? Or how much time do you think we should take?

MR. CASSEL: Judge, I think it might be most productive to try to do it all in one piece, and rather than -- I mean, unless the Board would prefer to check back in later in the morning. It might just be simplest to reconvene after lunch, at which point we would --

MR. LEWIS: Why don't we take a half an hour and report back to the Board?

MR. CASSEL: Oh, we'll need more than a half an hour.

MR. LEWIS: But I really think that we ought to take that amount of time and see how we're doing and report back to the Board. Frankly, we've read the testimony and we think that a fair amount of the testimony can be discussed fairly quickly among the parties. There may be other items of testimony that may --

JUDGE SMITH: Let's go off the record.

(Discussion off the record.)

JUDGE SMITH: Back on the record.

MR. LEWIS: Mr. Chairman, I have recalled Mr. William Little to the stand, who has been previously sworn, in order to make a slight modification to the testimony of the NRC Staff with respect to the remanded issues in the proceeding.

Whereupon,

WILLIAM LITTLE

was called to the stand by counsel for NRC Staff and, having been previously duly sworn, was examined and testified further as follows:

DIRECT EXAMINATION

BY MR. LEWIS:

Q Mr. Little, let me direct your attention to the answer which appears as part of Answer 11 on page 14 of the Staff's Testimony on Remanded Issues. There is a sentence in that answer which reads presently as follows, "It should be noted that it was not possible for inspectors to reinspect their own work on a significant scale in that 61 percent of the Hunter inspectors, 57 percent of the Hatfield inspectors and 57 percent of the Pittsburgh Testing Laboratory inspectors no longer were on the site at the time of the reinspection."

Mr. Little, as a result of your review of the backup information on which these calculations or figures were derived, do you have any change to make to that sentence in your testimony?

A Yes.

Q Would you please tell us what it is?

A Okay. In the sentence that you just read, the number for the percent of the Hunter inspectors should be changed from 61 percent to 57 percent. And then later on in that sentence, I would like to insert the words, if you go down toward the end of the sentence which now says, "inspectors no longer on the site at the time of the reinspection," I would like to revise that statement to read as follows: "no longer were on the site as QC inspectors employed by Hunter, Hatfield and PTL at the time of the reinspection."

I would like to insert the words, after the word "site", the new words are, "as QC inspectors employed by Hunter, Hatfield and PTL."

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Q And is what you are indicating there that the numbers that you are reporting in this sentence indicate what percentage, for each of those contractors? What percentage of QC inspectors, who were reinspected in the Reinspection Program, were no longer working as QC inspectors for that same contractor?

A That's right.

Q And is that point made as part of the discussion of whether or not those inspectors could have been in a position to review their own work, as part of the Reinspection Program?

A That's correct.

Q Does this modification to your testimony cause you to change the conclusions in your testimony, in any way?

A No.

MR. LEWIS: That is the correction we wanted to make, Mr. Chairman. If there are any questions, Mr. Little is available.

CROSS EXAMINATION

BY MR. CASSEL:

Q Just a couple of minor points, Mr. Little. You made two changes in this sentence, one to changing 61 percent to 57 percent, and the other changing the language at the bottom. If you had not changed the language at the bottom,

in other words, if you had continued to refer only to the percentage of inspectors on the site at the time of the reinspection, that 61 percent would have dropped way lower than 57 percent, wouldn't it?

A I would not say way lower.

Q It is the case, isn't it Mr. Little, that of 23 Hunter inspectors who's work was reinspected, only ten -- or obviously less than 50 percent -- were offsite at the time of the Reinspection Program? Isn't that correct?

A I think ten, as I recall, comes about to be about 47 percent. I think that information shows that there were three inspectors who were still onsite, but they were in other jobs.

Q And they were still working for Hunter as inspection fitters, is that correct? If you would like to refer to the backup documents, on which you relied in changing your testimony, please do.

A Right. For Hunter, those three were in other jobs, working for Hunter.

Q Now do you know, Mr. Little, whether any of the inspectors, who's work was reinspected, were during the time of the Reinspection Program in supervisory positions within the Hunter QA Department senior to the inspectors who actually did the Reinspection?

A No, I do not. However, I do not believe this would

have had a significant effect on the results of the program, in that this is a common occurrence. I work for people who were once my peers. I don't think, by and large, the majority of workers work any differently whether they are looking at work of their supervisors or work of their peers or work of their subordinates.

MR. CASSEL: I have no further questions, Judge. Thank you.

MR. MILLER: I have no further questions.

JUDGE SMITH: All right, Mr. Little, you may step down.

JUDGE COLE: Just one question, Mr. Little.

BOARD EXAMINATION

BY JUDGE COLE:

Q You indicated you stated that no longer on the site, as QC inspectors, for Hunter, Hatfield and PTL. Did you mean or PTL?

A Yes.

JUDGE COLE: Okay.

BY JUDGE CALLIHAN:

Q Hunter had an inspector who is still onsite, but not working for Hunter. He may be working for Hatfield. Now this is the and/or business that was just discussed?

A I don't think that was true with Hunter.

Q Let's look at your change, the final two lines on

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page 14, including the alteration Inspectors no longer were on the site as QA inspectors employed by no one of the three?

A Yes, that's correct, my understanding.

Q No one of the three?

A Right.

Q You understand my question? One of the 57 percent of Hunter may now be working for Hatfield as an inspector.

A According to the data, the basic data that was given me, that is not true for Hunter.

Q Not on the site as an inspector for any one of the three?

A That is true.

JUDGE CALLIHAN: Thank you.

JUDGE SMITH: Thank you.

(Witness excused.)

JUDGE SMITH: We will take a recess until about 10:30 and return at that time.

(Recess.)

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JUDGE SMITH: All right, gentlemen. We're ready for your report.

MR. CASSEL: Judge, during the break we reviewed the prefiled testimony of Edison's rebuttal witnesses DeMoss, Erler, Mauer, Hooks, and Branch and advised Edison that we have no cross examination at this time for any of those witnesses and would be prepared to stipulate that that is, in fact their testimony.

Subsequent to that we were advised that Edison has some, I guess, supplemental testimony.

MR. GALLO: Supplemental rebuttal.

MR. CASSEL: Supplemental rebuttal in addition to this prefiled rebuttal for Mr. DeMoss. And we do have a couple of questions about that supplemental testimony, which has not been prefiled. I don't think that will take very long.

But with respect to the prefiled testimony of all five witnesses, we have no need for cross examination.

JUDGE SMITH: How about Somsag and Buchanan?

MR. CASSEL: Somsag and Buchanan we do anticipate cross examination and we need more time to prepare for that. Ms. Judson will be in here momentarily. The last time I talked with her I know she wanted at least until noon, but I didn't ask about specific questions. She should be in here in a moment. She just went to get the documents which relate

to the supplemental testimony of Mr. DeMoss.

MR. LEWIS: The Staff has no cross examination on the prefiled testimony of these five witnesses.

JUDGE SMITH: Are we prepared to proceed right now with Mr. DeMoss?

MR. CASSEL: I think so, Judge.

MR. GALLO: I believe, Your Honor, what we had done when we learned of the possibility of the stipulation was to draft a paragraph to add to the DeMoss prefiled testimony. And it's on that paragraph that Mr. Cassel wishes to ask some additional questions. Only one copy of the paragraph exists. If I could have a few minutes to get it xeroxed, I think it will be necessary to have a number of copies, in order to facilitate understanding.

JUDGE SMITH: In the meantime, while you're doing that, why don't we do what is required to reduce the four items of prepared testimony to record stipulation.

DeMoss's prepared testimony will also go in as stipulated. It will be the supplemental paragraph that will be the subject of cross examination.

MR. GALLO: I would propose, Your Honor, if it's agreeable, to simply stipulate into the record at this time the prefiled rebuttal testimony of Branch, Hooks, Mauer, and Erler.

JUDGE SMITH: Yes.

MR. CASSEL: Would you stipulate in the other part of DeMoss's --

MR. GALLO: I would, in addition, add to that the rebuttal testimony of DeMoss, at least the prefiled portion. So that would be five pieces of prefiled rebuttal testimony.

JUDGE SMITH: Gentlemen, is that stipulation satisfactory?

MR. CASSEL: I just want to be clear on the record, Judge, in my practice in other forums there is a very clear distinction, which I have been assuming applies here as well -- unless I am wrong in that assumption -- between the stipulation of testimony in the sense that we stipulate that if he were called to the stand that's what he would say. As opposed to a stipulation of fact, where we're agreeing with the testimony.

JUDGE SMITH: That's right.

MR. CASSEL: We're stipulating only if called that these witnesses would say what their prefiled testimony says.

JUDGE SMITH: That's correct.

MR. GALLO: That's certainly my understanding.

MR. LEWIS: Staff has no objection to this procedure.

JUDGE SMITH: That procedure is satisfactory with the Board, with one exception. We will accept the stipulation,

but Dr. Cole has one or two questions of Erler.

MR. GALLO: We will call him to the stand.

JUDGE SMITH: We'll swear him in and get that out of the way.

MR. GALLO: All right. There are a couple of minor corrections that we noted on the copies for the benefit of the reporter. I don't think we need to get into them.

JUDGE SMITH: All right, so the stipulated testimony is received and will be bound into the record.

(The prepared testimony of Dennis DeMoss, Ernest B. Branch, Robert W. Hooks, Bradley F. Maurer, and Bryan Erler follow:)

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454-OL
	)	50-455-OL
(Byron Nuclear Power Station, Units 1 & 2)	)	
	)	

Rebuttal Testimony of Bryan Erler

Q.1. Please state your full name and place of employment for the record.

A.1. Bryan A. Erler, Associate and Structural Design Director, Sargent & Lundy, 55 East Monroe Street, Chicago, Illinois 60603.

Q.2. Please describe your job responsibilities.

A.2. As Structural Design Director I am responsible for the overall coordination and management of four of Sargent & Lundy's Structural Divisions. These divisions are: the Structural Engineering Division; the Structural Engineering Specialist Division; the Structural Drafting Division; the Architectural Design Division. These Divisions have the responsibility for preparation, review and approval of all Structural design engineering calculations and civil/architectural/structural drawings.

Q.3. Please describe you educational background and work experience.

A.3. I graduated from Purdue University with a BSCE in 1969, and an MSCE in 1970. I have 14 years' experience in the field of civil/structural/architectural engineering and design of fossil and nuclear plants. I am a registered Structural Engineer in the State of Illinois. I started as a Structural Engineer at Sargent & Lundy in 1970. I worked on the containment design of several nuclear power plants including Zion Units 1 and 2, Fermi Unit 2, Zimmer Unit 1, and LaSalle Units 1 and 2. In January, 1973, I was promoted to the position of Supervisor of Special Structures Section, and in July, 1973, I was promoted to Assistant Chief, Structural Engineer Specialists, responsible for the containment design and seismic analysis of several nuclear power plants, including Byron Units 1 and 2, Braidwood Units 1 and 2, and Clinton Unit 1. In 1976, I was promoted to Chief Structural Specialist, responsible for all containment and seismic analysis at Sargent & Lundy. In 1977, I was promoted to the position of Head, Structural Design and Drafting Division, responsible for all structural design engineering calculations and civil/architectural/structural drawings at Sargent & Lundy. In 1979, I was appointed Associate in the firm and in 1982 was promoted to my current position of Structural Design Director.

I am presently a member of the American Concrete Institute, the American Society of Civil Engineers, and the Post-Tensioning Institute. I also serve on the following two technical committees: ACI/ASME Joint Technical Committee on Concrete Pressure Components for Nuclear Application (the National ASME Code committee responsible for developing criteria for design of reinforced and prestressed concrete containments and prestressed concrete reactor pressure vessels in ASME Section III Div. 2); and ACI-348, Structural Safety (responsible for establishing appropriate safety margins for reinforced and prestressed concrete structural designs and provides input for the ACI-318 design group).

Q.4. What is the purpose of your testimony?

A.4. I have undertaken to address various allegations by Mr. Stokes relating to evaluations of discrepancies performed by Sargent & Lundy. Specifically, I will confirm that the calculated actual stress of the discrepant items fell within the allowable stress limit of the American Institute of Steel Construction (AISC) Code. I will also report on the inspection of welds on neighboring connections for the cable tray that contained a cracked weld that confirms the validity of a particular Sargent & Lundy judgment. My testimony also discusses various allegations by Mr. Stokes with respect to flare-bevel groove welds, fatigue loading on pipe supports, and use of the AWS Code, AWS D1.1-83, for evaluation of welding discrepancies.

Q.5. Mr. Stokes in his testimony states that in his review of Sargent & Lundy evaluations, he found instances where Code stress allowables appeared to be exceeded. Did the evaluations of the Hatfield, Hunter and Systems Control Corporation visual weld discrepancies performed by Sargent & Lundy reveal any instances where the actual stresses exceeded the AISC Code allowable?

A.5. No. The evaluations revealed that none of the Hatfield, Hunter or Systems Control Corporation visual weld discrepancies resulted in actual stresses exceeding the allowable stress limit of the AISC Code.

Q.6. Mr. Stokes in his testimony states that a "10% overstress factor" was used by Sargent & Lundy during intermediate steps of the calculations conducted to disposition various weld discrepancies under the Reinspection Program. Could you explain Sargent & Lundy's use of this factor?

A.6. The 10% overstress factor refers to a 10% limit where Sargent & Lundy engineers are allowed to use their knowledge of the structural analysis to decide, when the calculated stress is less than or equal to 10% greater than allowable, that the calculated stresses have sufficient conservatisms in them to meet the AISC Code stress allowable.

In the case of the Reinspection Program, some of the initial calculations of the Hunter and Hatfield weld discrepancies showed an overstress less than 10%. This

was not relied upon, however, when the calculations were refined. In no instance was the 10% overstress factor applied in the final determination that the capacity of the various connections met allowable stress limits.

Q.7. Mr. Stokes alleges in his testimony that it appears that Sargent & Lundy's judgments and evaluations fell short of the degree of objectivity and impartiality required of an independent review. Have any judgments or evaluations been performed by Sargent & Lundy to verify that a particular judgment was appropriate?

A.7. Yes. I have reviewed a number of judgments and evaluations performed by Sargent & Lundy to verify that its judgments were appropriate. For example, a judgment was made by Sargent & Lundy with respect to the evaluation of a crack in a cable tray holddown weld. This discrepancy was one of the 187 discrepant Hatfield welds included as part of the sample when, in response to NRC questions, additional inspections were made of welds not initially covered by the Reinspection Program. This discrepancy was evaluated by assuming the cracked weld had a 100% reduction in capacity. The calculation involved transferring the load to the other weld on the cable tray support and to four welds on neighboring connections. It was determined that the other welds could easily sustain the additional load transferred from the cracked weld because their calculated stress was very low compared to the AISC allowable. This determination was based on a judgment

that the neighboring welds were in a nondiscrepant condition. This judgment was verified by a recent inspection.

Q.8. What was the result of the inspection?

A.8. No discrepant conditions were present in any of the welds.

Q.9. Mr. Stokes testified to concerns about flare-bevel welding at Byron. Were flare-bevel groove welds included in the Byron reinspection program and, if so, how many contained discrepancies that required calculations for evaluation?

A.9. Flare bevel groove welds were captured by the reinspection program. The discrepancy evaluations performed by Sargent & Lundy included 30 flare-bevel AWS welds produced by Hatfield Electric Company.

Q.10. Were the tubes to which these welds were made inspected for a determination of the actual radius?

A.10. Yes. An inspection was performed of each of the tubes. The measurement yielded radii at least two times the tube wall thickness (2T) for all tubes except one which had a radius equal to 1.75T. The stress of each weld was conservatively evaluated using the AWS formula for effective throat of 5/16R with the smallest R measurement of 1.75T. This demonstrated that the AWS allowable stresses were met.

Q.11. Were these welds produced under a qualified procedure?

A.11. Yes, these welds were produced by Hatfield welders under qualified procedures.

Q.12. Mr. Stokes testified that flare bevel groove welding was included in a Hatfield prequalified welding procedure designated as 13AA. How do you reconcile this testimony with your previous answer?

A.12. The Hatfield AWS flare bevel welds captured in the Byron Reinspection Program were produced during the period May, 1978 through September, 1982. During that period of time, flare bevel groove welds were produced under qualified procedures 13Q and 13AB. Procedure 13AA, a prequalified welding procedure, was approved on December 30, 1983, and flare bevel groove welding was erroneously included in its procedure. This is being rectified and the procedure for flare bevel groove welding is being issued as a qualified procedure.

Q.13. Mr. Stokes opines in his testimony that fatigue loading should have been considered with respect to pipe supports. Was fatigue loading considered in the analysis of pipe support loading?

A.13. Yes. Fatigue loading was considered in the analysis of these welds. However, in accordance with the AISC, it is

not necessary to reduce the allowable stress in a weld for fatigue loading until the number of stress cycles exceeds 20,000. The number of stress cycles experienced by pipe supports at Byron is substantially less than 20,000.

Q.14. Is there an inconsistency between fatigue requirements for piping and those for pipe supports?

A.14. No. Both piping and supports require consideration of fatigue. Due to the nature of loading on a piping system, the requirements may vary depending on the class of the system. For example, a Class 1 system requires explicit calculation for the piping while Class 2 and 3 piping are affected by cyclic loading only if the number of cycles exceeds 7,000 (ASME Section III NC 3611.2). For pipe supports with respect to Class 1, 2 and 3 piping, both ASME and AISC are consistent in not requiring any reduction in allowable stress for less than 20,000 cycles.

At Byron, for Class 1 piping systems, the analysis has accounted for the number of cycles as required by the code. For Class 2 and 3 piping systems, the number of cycles experienced is less than 7,000. Accordingly, no reduction in allowable stress for fatigue is required. The supports are subjected to less than 20,000 cycles and, consequently, no allowable stress reduction due to fatigue is required in the design of the supports.

Mr. McLaughlin, as a structural engineer, was guided by the 20,000 cycle requirement of the AISC Code, and

he properly concluded in his testimony that convexity weld discrepancies could be neglected because structural elements, such as pipe supports, erected in Byron did not experience 20,000 on and off loadings. Similarly, as a mechanical engineer, Mr. Branch properly conducted a fatigue analysis for Class I piping in accordance with the ASME Code. These are consistent with standard design practices. Mr. Stokes' contrary viewpoint is erroneous.

Q.15. Is a waterhammer loading on a piping system a loading which could cause a fatigue problem?

A.15. No. Waterhammer is a dynamic pulse loading with low frequency of occurrence. Therefore, the number of stress cycles is extremely low and fatigue is not a problem. Indeed, Attachment 10 to Mr. Stokes' testimony clearly states that very fact.

Q.16. Mr. Stokes expresses a concern about the fact that Sargent & Lundy's evaluations of weld discrepancies were performed pursuant to the AWS D1.1-83 Structural Welding Code while the welding was performed pursuant to earlier editions of the code. Do you believe the use of two editions of the AWS code present the concern articulated by Mr. Stokes?

A.16. No. AWS Code D1.1-83 was used for design assessment of the discrepancies in the reinspection program. It should initially be pointed out that with the exclusion of the

year 1978, a revised version of the AWS Code has been published every year from 1975 to the present. The design requirements have not changed significantly since the issuance of AWS D1.1-75, which was the Code in effect at the time of initial construction. The allowable stresses are the same. The few changes that have been made with respect to calculation of stresses have all been more restrictive with regard to weld capacity. These stricter weld design requirements in no way require less demanding calculations for evaluating a discrepancy. If anything, it is conservative to use the latest edition of AWS D1.1 for evaluation of discrepancies.

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	)	50-455-OL
(Byron Nuclear Power Station, Units 1 & 2)	)	
	)	

Summary of Rebuttal Testimony
of Bradley F. Maurer

I. Mr. Bradley F. Maurer of Westinghouse Electric Corporation testified previously at the hearings before the Atomic Safety and Licensing Board on the structural adequacy of main control panels that were designed and fabricated by Systems Control Corporation ("SCC") for Byron.

II. Mr. Maurer addresses allegations made by Charles Stokes with respect to use of an epoxy resin surface filler on two main control board panels supplied by SCC and Westinghouse. Mr. Maurer also discusses comments made by Mr. Stokes regarding the failure of SCC main control board panels to meet AWS D1.1 Code criteria for welds.

III. Mr. Maurer testifies that the two main control board panels in question where the epoxy filler had been used were repaired with full penetration welds. He also states that a complete inspection of all main control panels found no other instances of tack-welded plates with epoxy filler.

IV. With respect to the failure of SCC main control board panels to meet AWS D1.1 Code criteria, a complete investigation and analysis of all accessible welds was performed by Westinghouse. The results of the investigation and analysis demonstrated that the actual as-constructed welds were acceptable.

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	)	

Rebuttal Testimony of Bradley F. Maurer

Q.1. Please state your full name and place of employment for the record.

A.1. Bradley F. Maurer. I am employed by Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania, 15230.

Q.2. Please describe your job responsibilities.

A.2. My responsibilities include qualification of various electrical equipment and devices by analysis and by shake table testing, and main control board qualification by analysis. I have performed seismic qualification of Class 1E medium power transformers using a combination of shake table testing and analysis. I have conducted seismic testing programs on electrical components of the Process and Protection System. I have assisted in the analysis of main control boards for several nuclear plants. In conjunction with

other senior engineers in the Equipment Qualification Analysis group, I performed the structural analysis of the Byron main control board and other main control panels.

Q.3. Are you the same Bradley F. Maurer who testified at the hearings before the Atomic Safety and Licensing Board on August 2, 1984 on the analyses and inspections performed by Westinghouse to address the structural adequacy of main control panels that were designed and fabricated by Systems Control Corporation ("SCC") for the Byron station?

A.3. I am.

Q.4. What is the purpose of your rebuttal testimony?

A.4. The purpose of my rebuttal testimony is to address allegations made by Charles Stokes with respect to use of an epoxy resin surface filler, commonly known as Bondo, on two main control-board panels, 1PM02J supplied by SCC, and 1PM05J, supplied by Westinghouse. I will also discuss comments made by Mr. Stokes regarding the failure of SCC main control-board panels to meet AWS D1.1 code criteria for welds.

Q.5. With respect to the use of an epoxy resin surface filler on the SCC and Westinghouse main control-board panels, would you describe the purpose for its use?

A.5. Epoxy resin surface filler material was utilized by both SCC and Westinghouse prior to painting the main control boards. The surface filler material was used to fill or glaze any marks or scratches in the steel plate material. After filling these marks or scratches, the filled surfaces were then sanded, primed and painted.

Q.6. Are you aware of any instances when Bondo was used as other than a filler material to repair surface blemishes?

A.6. Yes. During the course of human factors engineering modifications to the control boards under the direction of Westinghouse, it was discovered that a steel plate on the front of main control panel 1PM02J supplied by SCC was not welded with full penetration welds. The steel plate was tack welded and epoxy resin surface filler had been used. In addition, cracks at tack-welded steel plates were observed at two other locations in two panels, 1PM02J and 1PM05J. This matter was documented in a Commonwealth Edison Non-Conformance Report ("NCR") F-695, which was written on February 23, 1982.

Q.7. Were the panels repaired?

A.7. Yes. The steel plates which were tack welded and filled with epoxy resin and the cracks mentioned in Answer 6 were removed. The plates were replaced using full penetration welds. In addition, a complete inspection of all the main control panels supplied by SCC and Westinghouse was performed. No other instances

of tack-welded plates with epoxy filler were found. The work was performed under the direction of Westinghouse Electric Corporation.

Q.8. Were precautions taken during the repair of main control panels to prevent warping of the material being welded?

A.8. Yes. The welding of the metal plates was performed by adding only small amounts of weld at a time. Also, additional heat sinks were applied at the locations being welded. Both of these techniques serve to limit the heat buildup from the welding process and thus minimize the potential for warping of the panels. After the welding was completed, the rewelded areas of the panels were checked for warpage. None was found.

Q.9. Is it possible for particles of epoxy resin surface filler to become lodged in a safety-related control switch?

A.9. No. All safety-related control switches are enclosed to protect the contacts from dirt and debris.

Q.10. With respect to the failure of SCC main control-board panels to meet AWS D1.1 Code criteria, was an investigation performed regarding these SCC main control panels?

A.10. Yes. NCR F-544 was written August 8, 1980, prior to the Reinspection Program, concerning the welding of

structural members of the main control panels not meeting the acceptance criteria requirements of AWS D1.1. An investigation of these panels was performed by Westinghouse. Westinghouse's investigation included a visual inspection and evaluation of all accessible welds to determine the overall quality of these welds. Under the direction of Westinghouse, several welds were added to the Unit 2 main control board to make the unit consistent with Unit 1. An analysis was also performed to determine the structural adequacy of the control panel welds. The results of the Westinghouse investigation and subsequent analysis demonstrated that the actual as-constructed welds were acceptable. This Westinghouse inspection and analysis was specifically addressed in my prepared testimony under questions and answers 13-15 as well as in my cross examination.

Q.11. Mr. Stokes asserts that in order to correct the situation under NCR F-544, SCC was allowed to write its own acceptance criteria. Is this assertion correct?

A.11. No. SCC did not supply the acceptance criteria used to close out NCR F-544. The acceptance criteria were established by Westinghouse utilizing AWS D1.1.

Q.12. Does this conclude your testimony?

A.12. Yes, it does.

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REBUTTAL TESTIMONY OF ROBERT W. HOOKS

Q.1. Please state your full name and place of employment for the record.

A.1. Robert W. Hooks, Assistant Division Head, Structural Engineering Division, Sargent & Lundy, 55 East Monroe Street, Chicago, Illinois, 60603.

Q.2. Please describe your job responsibilities.

A.2. As an Assistant Division Head, I manage and coordinate the work performed by the Structural Engineering Division for the projects assigned to me. Currently, these include Byron and Braidwood Personnel from the Structural Engineering Division are responsible for preparation, review and approval of nearly all structural design engineering calculations.

Q.3. Please describe your educational background and work experience.

A.3. I graduated from the Ohio State University with a B.S. in civil engineering in 1971. I have thirteen years of experience in structural engineering and design of fossil and nuclear power plants. I am a Registered Structural Engineer in Illinois. I am a member of the American Concrete Institute. I began my career as a Structural Engineer at Sargent & Lundy in 1971. I worked on several fossil projects and on the Clinton Nuclear Station. In 1973, I was promoted to Senior Structural Engineer and continued to work on Clinton, where I was responsible for design of several of the structures. In 1977, I was promoted to Supervising Design Engineer. In that position I was responsible for the structural design activities for Carroll County and then for Marble Hill. In 1982, I was promoted to my current position and became responsible for Byron, Braidwood, and Marble Hill.

Q.4. Are you familiar with the Byron Reinspection Program?

A.4. Yes. I directed the preparation of some of the engineering calculations for the evaluation of discrepancies.

Q.5. Were you involved in the preparation of the report?

A.5. Yes, I provided input to the final report.

Q.6. What is the purpose of your rebuttal testimony?

A.6. My rebuttal testimony addresses the validity of the information contained in Attachment 7 of Mr. Stokes' testimony.

Q.7. Mr. Stokes, based upon Attachment 7 to his testimony, suggests that Sargent & Lundy may have used a design assumption of R=2T which may not be valid. Would you describe Attachment 7 and the applicability of that document to the Byron plant?

A.7. Attachment 7 is a series of pages extracted from a voided section of calculation book No. 12.2.94BR, "Braidwood Non-Conformance Reports". The information contained in Attachment 7 is neither applicable to Byron nor Braidwood.

Q.8. Can you explain why not?

A.8. Prior to the start of weld discrepancy evaluations for the work covered by this calculation book, one of the engineers involved began preparation of the design control summary for this work. In the course of his preparation, he prepared several pages of instructions and methods for weld discrepancy evaluation and made copies of several pages of a presentation concerning welding which were presented at an internal Sargent & Lundy technical meeting. These pages included Gayley-stamped pages 39 to 41 concerning flare-bevel groove welding. Some of the instructions and methods

for weld discrepancy evaluations that were prepared by the engineer were approved and included in the operative sections of the Calculation Book No. 12.2.94BR. The remaining pages, including all those in Attachment 7, were not approved for use. These were voided and placed in the "Void" section of the calculation book.

Q.8.9 What is the genesis of the page in Attachment 7 entitled "Flare Bevel Groove Welds"?

A.8.9 That page is one of several visual aids prepared by me in preparation for a technical information meeting for the structural engineering supervisors. At that meeting, I discussed the subject of flare-bevel groove welds and tube steel radii. The statements on that page reflect preliminary information concerning tube steel radius measurements that I had received from the Marble Hill site. As I indicated in A.8., this information was gathered by one of the engineers for possible use in connection with the evaluation contemplated in connection with the work on Braidwood. However, it was discarded because effective throat size was specified on the drawings.

Q.8.10 Was the voided flare-bevel groove weld information in Attachment 7 included in any calculation book provided to Intervenors during discovery other than No. 12.2.94BR?

A.8.10 No. It was only included in the voided section of Calculation Book No. 12.2.94BR. I am certain of this

statement because it ordinarily would have been discarded rather than maintained in the void section of the calculation book. Moreover, I checked this matter with my engineers and they assured me that this information was not included in any calculation book involving Byron.

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Summary Of Rebuttal Testimony
Of Ernest B. Branch

I. Mr. Branch, an Associate and Mechanical Design Director of Sargent & Lundy, testified previously at the hearings before the Atomic Safety and Licensing Board on Sargent & Lundy's evaluation of Hunter Corporation's ASME visual weld discrepancies and discrepancies of Hunter objective attributes.

II. Mr. Branch addresses the allegation by Charles Stokes that two ASME discrepant welds were measured by gauges that were insufficiently precise.

III. Mr. Branch, based on his expertise as a member of the ASME Code Committee for the provision of the Code that establishes the acceptance criterion for welds with undercut discrepancies, testifies that because the acceptance criterion for undercut is stated as a common fraction of 1/32 inch, a measurement within 1/64 inch of that figure, or 3/64 inch, will be in compliance with the Code. Because the measurements for the two welds are each less than that figure, the Code requirement is met.

IV. Mr. Branch also testifies that an engineering evaluation of the effect of undercut on these two welds was conducted. This evaluation demonstrated that the Code minimum wall requirement and the Code allowable stress criteria are satisfied.

V. Mr. Branch concludes that because the code criterion of 1/32 inch for undercut was met, and based upon the engineering evaluation of the welds, the reported weld undercuts have no design significance.

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Rebuttal Testimony Of Ernest B. Branch

Q.1. Please state your full name and place of employment for the record.

A.1. Ernest B. Branch. I am an Associate and Mechanical Design Director of Sargent & Lundy which is a Consulting Engineering Firm, located at 55 East Monroe, Chicago, Illinois, 60603.

Q.2. Please describe your job responsibilities.

A.2. As Mechanical Design Director, I am responsible for the overall coordination and management of two of Sargent & Lundy's key mechanical divisions that have the responsibility for piping design and analysis. These divisions are the Mechanical Design & Drafting Division and the Engineering Mechanics Division. I am responsible for providing leadership, overall management, direction, supervision, progress monitoring, and quality of design work for all of the projects under design at Sargent & Lundy.

I am a member of the ASME Committee for Section III of the Code, which includes the Code provision establishing the acceptance criterion for welds with undercut discrepancies.

Q.3. Are you the same Ernest B. Branch who testified at the hearings before the Atomic Safety and Licensing Board on August 2nd and 3rd, 1984 on Sargent & Lundy's evaluation of Hunter Corporation's ASME visual weld discrepancies and discrepancies of Hunter objective attributes?

A.3. I am.

Q.4. What is the purpose of your rebuttal testimony?

A.4. The purpose of my rebuttal testimony is to respond to Mr. Stokes' allegation that ASME weld nos. 62 (S-CC-100-11A) and 63 (S-CC-100-33) were impermissibly accepted because of the imprecision in the gauges used in measuring the weld undercut.

Q.5. What accuracy is required by the ASME Code for measuring weld undercut of this type?

A.5. The ASME Code does not expressly state a tolerance for the measurement of undercut. Mr. Stokes is incorrect when he states that "ASME requires machine shop type accuracy to the thousandths" to determine Code compliance. The

acceptance criterion for undercut is stated in ASME Section III, paragraph ND-4424 as a common fraction, 1/32 inch, which means that the Code intended the value to be treated as an approximate, fractional dimension. Whenever the Code intends exact precision, an acceptance value is stated as a decimal value.

An acceptance criterion stated in terms of 1/32 inch has an acceptance level within 1/64 inch, that is, the Code is met if the measurement for undercut is 3/64 inch or less. The undercut measurements of the two welds referred to by Mr. Stokes were .041 and .037 inch. Inasmuch as these values fall below 3/64 inch, the Code requirement is met.

The whole area of required accuracy for measurement of weld profile features is being reviewed by the Code Committee, of which I am a member, to establish clearly measurement criteria for weld profiles. For example, a Code case is currently being considered that will clearly state that piping fillet weld size dimensions specified on drawings are to be considered as nominal or approximate and that measured values within 1/16 inch of that nominal are acceptable.

Q.6. Was an engineering evaluation of the effect of undercut on these two welds conducted?

A.6. Yes. Although it was unnecessary, a calculation was done to establish the effect of the reported undercut on code minimum wall thickness requirements and code stress criteria.

Q.7. Can you explain the evaluation?

A.7. Yes. The calculation was performed to answer two questions. First, is the depth of undercut sufficient to encroach on code-required minimum pipe wall thickness? Second, is the stress intensification introduced by the undercut sufficient to cause code allowable stresses for moment loading to be exceeded?

The calculation was conservatively biased in that it assumed that the undercut extended completely around the total weld circumference when it actually extended around only a portion of the weld circumference. In addition, the stress intensification factor for the undercut was multiplied by the intensification used in the original analysis for the weld joint instead of treating the effects separately.

Q.8. What was the result of the analysis?

A.8. The pipe wall thickness calculation showed that the wall thickness remaining after deducting the maximum undercut and the manufacturing tolerance was about 27 times the code required minimum wall. This is not surprising because the service pressure for the system is 150 psi and schedule 80 pipe was selected to provide adequate mechanical strength for a power plant environment.

Q.9. What was the result of the stress intensification effect on moment loading?

A.9. This calculation showed that even when considering the maximum undercut to conservatively extend all the way around the circumference of the weld, and multiplying the fillet weld intensification by the undercut intensification, code allowable stresses for the applicable loading conditions, including seismic load, were not exceeded.

Q.10. In summary, what is your opinion concerning welds 62 (S-CC-100-11A) and 63 (S-CC-100-33)?

A.10. The reported undercut measurements satisfy the code criterion of 1/32 inch. In addition, based on the calculations performed, the code minimum wall requirement and the code allowable stress criteria are satisfied. For these reasons, the reported weld undercuts have no design significance.

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Summary Of Rebuttal Testimony
Of Dennis DeMoss

I. Mr. DeMoss is a Mechanical Project Engineer for Sargent & Lundy responsible for mechanical engineering and design activities associated with the Byron project.

II. Mr. DeMoss addresses Charles Stokes' allegation that the discrepant ASME and AWS welds identified in Attachment 8 to his testimony were not evaluated by Sargent & Lundy under the Reinspection Program.

III. Mr. DeMoss demonstrates that, with the exception of three welds that were not part of the Reinspection Program, all welds in Attachment 8 were, in fact, evaluated by Sargent & Lundy.

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REBUTTAL TESTIMONY OF DENNIS DEMOSS

Q.1. Please state your full name and place of employment for the record.

A.1. Dennis Demoss. I am employed by Sargent & Lundy, 55 East Monroe Street, Chicago, Illinois 60603.

Q.2. Please describe your job responsibilities.

A.2. I am a Mechanical Project Engineer in the Project Management Division. I am responsible for mechanical engineering and design activities associated with the Byron Project. Currently, I am coordinating on-site mechanical engineering and design activities associated with the construction of Byron. These activities include the design of mechanical piping systems and associated mechanical equipment and the resolution of field installation and system operation problems. I prepare and supervise the preparation of mechanical calculations required by these design activities.

Q.3. Please describe your educational background and work experience.

A.3. I am a 1977 graduate of the University of Cincinnati with a Bachelor of Science Degree in Nuclear Engineering. I received a Master of Science in Materials Engineering from the University of Illinois, Chicago in 1981. I began my career with Sargent & Lundy in 1974 as an Engineering Coop student. My coop work experiences included sessions in Mechanical Design and Drafting, Mechanical Analysis, Nuclear Licensing and Project Management. Upon graduation I began full time employment as a Mechanical Engineer working on the design of a BWR nuclear power plant. Subsequent assignments included numerous plant betterment projects for three coal-fired generating stations.

In 1981, I was assigned to the Byron nuclear plant as a mechanical engineer. My responsibilities included preparation of piping and instrumentation diagrams, equipment and pipe sizing calculations, preparation and evaluation of equipment procurement specifications, and the preparation and review of mechanical calculations.

I am a member of the American Society of Mechanical Engineers and am a registered Professional Engineer in the States of Illinois and Ohio.

Q.4. Are you familiar with the Byron Reinspection Program?

A.4. Yes. I prepared and supervised the preparation of engineering calculations for the evaluation of mechanical-type discrepancies reported by the reinspection program. These mechanical-type discrepancies included all ASME Code related discrepancies.

Q.5. Were you involved in the preparation of the report?

A.5. Yes. I provided input into the formal report for mechanical-type discrepancies.

Q.6. What is the purpose of your rebuttal testimony?

A.6. The purpose of my rebuttal testimony is to respond to the allegation in Mr. Stokes' testimony that the discrepant ASME and AWS welds identified in Attachment 8 to his testimony were not evaluated by Sargent & Lundy.

Q.7. Please describe Attachment 8.

A.7. Attachment 8 is an interim status report of the Hunter discrepancies identified under the Reinspection Program. I should emphasize that this document only lists 108 discrepant welds. The other 10 discrepancies are objective category documentation discrepancies.

Q.8. Were the 108 welds in fact evaluated under the Reinspection Program?

A.8. With the exception of three welds that were not part of the Reinspection Program, all the welds in Attachment 8 to Mr. Stokes' testimony were evaluated by Sargent & Lundy. This can be demonstrated by a comparison of the drawing numbers in Attachment 8 with the component numbers in Sargent & Lundy document BRP-1, which is a summary I prepared of Hunter discrepant welds that were evaluated in the reinspection program. A comparison of the two sets of numbers reveals that these are the same welds.

Q.9. How many of the 108 welds shown in Attachment 8 were ASME discrepant welds evaluated by Sargent & Lundy?

A.9. Of the ~~110~~ 108 welds, 46 were ASME discrepant welds evaluated by Sargent & Lundy. Later in the program, three more ASME welds with discrepancies were submitted to Sargent & Lundy for evaluation. This produces the total number of 49 evaluations of discrepant ASME welds testified to by Mr. Branch.

JUDGE SMITH: Mr. Erler?

Whereupon,

BRYAN ERLER

was called to the stand and, having been duly sworn, was examined and testified as follows:

EXAMINATION BY THE BOARD

BY JUDGE COLE:

Q Mr. Erler, on page 4 of your testimony, the bottom of the page, the last full sentence on that page. It states "Some of the initial calculations of the Hunter and Hatfield weld discrepancies showed an overstress less than 10 percent."

A Yes.

Q Were there any that were more than 10 percent?

A No. I think, as we have discussed before, the calculation, the initial calculations, are done using often conservative loadings and assumptions. And if it exceeds the 10 percent, the engineer continues on with a calculation, getting improved loadings and complete the calculation, making sure it's less than 10 percent or less than the allowable stress.

Q I was just looking at the way the sentence read. It wasn't clear to me that there were none that were over 10 percent. You just state that some were less than 10 percent.

A That's correct. The calculation for every

connection ended with it less than 10 percent overstress.

Q So there were none that were more than 10 percent overstressed?

A That's correct.

Q Okay, on page 6 a minor point. The last sentence on that page. You say this demonstrated that AWS allowable stresses were met. By that you mean were not exceeded?

A That's correct.

JUDGE COLE: Thank you. That's all I have.

MR. GALLO: Are there any other questions of this witness?

MR. CASSEL: Yes, I have follow up. I just can't resist the temptation, Judge. I can't go the whole morning without a single cross examination question.

JUDGE COLE: I can see myself trying to write up something about that.

(Laughter.)

CROSS EXAMINATION

BY MR. CASSEL:

Q Mr. Erler, when you stated just now that these calculations used conservative assumptions, were you referring in whole or in part to their design assumptions? That is, the assumptions from the design criteria?

A I was referring primarily to the assumptions used that the engineer makes in developing an analysis or selecting

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the loads, and how he would then prepare his calculations.

Q Were you referring in part to the design criteria?

A Well, design criteria are part of the calculation. It is a basis input.

Q And when you said -- when you referred to conservative assumptions, were you referring in part to the design criteria?

A I would say that's part of the calculation.

Q I'm sorry. I didn't hear your answer.

A Yes.

MR. CASSEL: Thank you. No further questions.

JUDGE SMITH: Thank you, Mr. Erler -- excuse me. Did you have something?

MR. LEWIS: No.

(Witness excused.)

JUDGE SMITH: Now Ms. Judson is going to report. What are we doing now?

MR. GALLO: We could call Mr. DeMoss and deal with the additional supplemental rebuttal.

JUDGE SMITH: Oh, yes. I forgot about that.

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Whereupon,

DENNIS DE MOSS

was called as a witness on behalf of the Applicant, and having been first duly sworn was examined and testified as follows:

MR. GALLO: Your Honor, the paragraph I referred to earlier is handwritten, and perhaps it would be appropriate for Mr. DeMoss to simply read it into the record. And then we would have it in that form and it would be unnecessary to bind in the page itself.

Is that acceptable?

JUDGE SMITH: Yes.

DIRECT EXAMINATION

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BY MR. GALLO:

Q Mr. DeMoss, would you just read your additional testimony at this point?

A In his testimony, Mr. DeMoss refers to three discrepant welds that were excluded from the Reinspection Program and they were not evaluated by Sargent & Lundy.

These three welds were initially included in the program because it was believed that they were attributable to Inspector A, an inspector captured in the program. It was subsequently learned that these three welds had been rewokred and inspected by a QC inspector other than Inspector A. Thus, the reinspection of these three welds could not be attributed to Inspector A, and, accordingly, they were

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excluded from the program and the statistics shown for Inspector A in Table B-3 in Applicant's Exhibit R-4.

Q Does that conclude your statement, Mr. DeMoss?

A Yes, it does.

MR. GALLO: The witness is available for cross examination.

JUDGE SMITH: Mr. Cassel?

MR. CASSEL: Ms. Judson.

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CROSS-EXAMINATION

BY MS. JUDSON:

Q Mr. DeMoss, when did you determine that these welds were not attributable to Inspector A?

A This was, I would say, back in January sometime.

Q Mr. DeMoss, I will have co-counsel show you what has previously been marked and accepted in the record as Ericksen Attachments D and E.

(Documents handed to witness)

These are Edison's answers to Interrogatory 12, Sup., which counsel have stipulated were true and accurate for the purpose of this proceeding.

Is the Inspector A listed, is it the same Inspector A to whom you are referring?

A Yes.

Q Now, looking at the column -- if I may have your indulgence.

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(Pause)

MS. JUDSON: Your Honor, may I look on with the witness, because he has my only copy of this exhibit.

(Counsel for Intervenors and Applicant approaching the witness.)

BY MS. JUDSON:

Q Referring to the second column which lists sample, can you tell me what the number refers to?

A That would be the number of components that were reinspected, I believe.

Q And adding 24 and 27 would give you what total?

A 51.

Q So Interrogatory 12 Sup., which has been stipulated as true and accurate, are listed a total of 51 reinspections by Inspector A, is that correct?

A That is correct.

Q Do you know why over seven months after you have determined this error, this information was incorrectly provided in response to interrogatory?

A No, I do not.

MS. JUDSON: No further questions.

JUDGE SMITH: Anything further?

MR.LEWIS: No questions.

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EXAMINATION BY THE BOARD

BY JUDGE CALLIHAN:

Q Inspector A didn't do these three inspections?

A Initially he did.

Q Well, I look at your sentence, "These three welds" -- I guess the sentence in your handwritten supplement -- "These three welds were initially included in the Program because it was believed that they were attributable to Inspector A."

A That's correct.

Q Did he really do the inspection?

A Initially he inspected them. I think in the timeframe of 1977.

However, they were reworked subsequently, and that is where the confusion happened. They were reworked, they were again inspected by a QC inspector and found to be acceptable.

Q The reworking took place before the inspection?

A That's correct.

Q Thank you, that helps.

Now, to my primary question. Was the inspector designed here in your paragraph by merely, "a QC inspector other than Inspector A," was that QC inspector captured in the Reinspection Program?

A Yes, he was.

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Q He was part of it.

A However, I should add that at the time the items were reworked, this was beyond the first 90 days, the first 90 days of his employment.

Q Is the substance of this then that these three welds and their inspection, did come into the Reinspection Program, but not under Inspector A, but under his successor?

A No, they did not.

BY JUDGE COLE:

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Q The reason why they didn't was because it was after the additional 90-day period?

A I believe so.

JUDGE CALLIHAN: Thank you.

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REDIRECT EXAMINATION

BY MR. GALLO:

Q Mr. DeMoss, one question on redirect, with respect to the three welds that have been the subject of your testimony, do you know whether or not the discrepancies were repaired?

A Yes, they were.

MR. GALLO: I have no further questions.

JUDGE SMITH: You may step down.

Thank you.

(Witness excused.)

MR. CASSEL: Judge, I was just consulting with

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Ms. Judson about scheduling. She anticipates that her cross of Messrs. Buchanan and Somsag will last on the order of 45 minutes, and would like to pick up with that following the lunch break at 1:00 p.m., if that is convenient for all parties concerned.

If there is a problem with that, we would propose then to reconvene at 12:30.

JUDGE SMITH: The cross of Somsag and Buchanan--

MR. CASSEL: Yes, sir.

JUDGE SMITH: -- will in totality take 45 minutes?

MS. JUDSON: Maybe less.

I will say, your Honor, the more time I have to prepare, the shorter it will take to do it.

JUDGE SMITH: Let's go off the record now.

(Discussion off the record)

JUDGE SMITH: All right, we will recess and resume at 12:30 p.m.

(Recess.)

JUDGE SMITH: On the record.

Mr. Miller, would you announce the schedule for the proposed findings?

MR. MILLER: Yes, sir. The parties have conferred off the record, among themselves, with the Licensing Board and have agreed to the following schedule for proposed findings.

Commonwealth Edison will file it's initial proposed findings on September 10. The Intervenors will file their proposed findings on September 17. The Staff will file its proposed findings on September 24th.

Commonwealth Edison's reply findings will also be filed on September 24th.

We also discussed the format of the findings and the parties have agreed to cooperate in providing parallel paragraphs of findings for the convenience of the Board.

JUDGE SMITH: All right. Thank you.

That's an acceptable schedule.

The Board wishes to remind the parties of its previous admonition that any matter not argued in the proposed findings, perhaps will not be decided by the Board. And that is, if you fail to make a point in your proposed findings, the Board may -- at its option -- deem that to be a waiver of that point or a default on that point.

All right. We will return at 12:30.

Oh, Mr. Miller?

MR. MILLER: Thank you.

Judge Smith, when Mr. Muffett was on the stand last, to discuss the Systems Control Corporation inspections that were going on currently, he reported that the actual physical inspections were almost done and that it would take approximately a week after the Staff received the data reporting those inspections for the Staff to analyze it and reach a conclusion.

That process will take place sometime within the next week or ten days, I would guess. I think that Commonwealth Edison Company is pointing towards having the results of the inspection of the accessible Systems Control welded connections in the Staff's hands Monday or Tuesday of next week.

I've raised it with the Board to ask whether the Board wishes to hold the record open to receive the results of that reinspection or whether the Board believes that since it is, in fact, essentially a 100 percent reinspection of accessible connections this is a matter that can properly be delegated to the Staff for its close-out? And we just need some guidance, and I wanted to raise it with the Board before we adjourned and formally closed the record, as to the way in which this ought to be handled.

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JUDGE SMITH: Of course, we will hear from Mr. Cassel on that, bearing in mind that there is -- I think you're familiar with the Board Notification requirements that are in effect. And that is if we were to regard it as a delegable item to the Staff, anything that develops of safety significance would have to be reported to the Board and parties in any event.

So would you have an objection to that procedure? That was consistent with our Initial Decision that we regarded a 100 percent non-judgmental type of inspection activity as being a matter that could be delegated by the Staff.

MR. CASSEL: I am not sure what the procedure would be. Would the Staff basically -- if what you're suggesting is that whatever the results of this inspection and the Staff's evaluation are, that that would be -- in its entirety -- supplied to the Board Notification and copies provided to the parties at the same time.

That would certainly be adequate because then we could look at it. And if we had any concern we wanted to raise, we could attempt to do so. If we had none, it would merely be a Board Notification. It wouldn't have to be in the record.

JUDGE SMITH: It could go either way. And I would guess, and perhaps the Staff would not object to that,

sy5lb4

normally what they might be expected to do is only make it a Board Notification, if a matter rises of safety significance.

But would you object if they just made it a Board Notification, the results?

MR. LEWIS: I think that under the standards I'm applying anyway, it would be a Board Notification. What it would be is it would be an Inspection Report.

JUDGE SMITH: That's right. Exactly. All Inspection Reports have been -- all right. I don't see any problem them. That will be satisfactory.

We will not keep the record open for that.

MR. MILLER: Thank you.

(Whereupon, at 11:16 p.m., the hearing was recessed, to reconvene at 12:30 p.m. this same day.)

nd5

sy61b1

AFTERNOON SESSION (1:40 p.m.)

JUDGE SMITH: Back on the record.

Judge Cole, you asked him a question in question two, "Did you previously provide testimony in this proceeding, in the spring of '83?" "Yes."

MR. MILLER: I'm sorry. He is the same Mr. Somsag who was here on July 30th.

JUDGE COLE: He was here on July 30th and testified? Okay.

MR. MILLER: As I understand it, you are prepared to stipulate that Mr. Somsag's testimony can be bound into the record as if read.

JUDGE SMITH: Yes, do you have any objections? Do you have any cross examination?

MR. LEWIS: No cross examination and no questions?

JUDGE SMITH: All right. Mr. Somsag's testimony -- oh, is he here? It doesn't even have to be stipulated.

Do you adopt the testimony being put into evidence?

The testimony on the cloning of the inspectors, I guess, that you have today?

(Laughter.)

MR. SOMSAG: Yes.

JUDGE SMITH: All right. So it is bound in.

(The testimony of Malcolm Leo Somsag follows:)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454-OL
	)	50-455-OL
(Byron Nuclear Power Station, Units 1 & 2)	)	
	)	

REBUTTAL TESTIMONY OF
MALCOLM LEO SOMSAG

Q.1. Please state your name.

A.1. Malcolm Leo Somsag.

Q.2. Did you previously provide testimony in this proceeding in the spring of 1983?

A.2. Yes.

Q.3. At that time, you stated that you were the Hunter Corporation Quality Assurance Supervisor for the Byron project. Do you still hold that position?

A.3. Yes. The descriptions of Hunter Corporation, my background and my responsibilities as Quality Assurance Supervisor set forth in may prefiled testimony submitted in the spring of 1983 are still accurate.

Q.4. What is the purpose of your testimony?

A.4. The purpose of my testimony is to describe how quality control inspector candidates were granted official status as inspectors, to demonstrate that the performance of any inspection enlists the same skills that are necessary to perform any other inspection, and to explain the purpose of 'document inspections' and why there was a large population of inaccessable 'document inspections' during the N.R.C. Reinspection Program.

Q.5. Please describe the process of selecting and screening quality control inspectors followed by Hunter Corporation at the Byron Nuclear Power Plant project.

A.5. Hunter Corporation applied a consistent approach to supplying quality control inspectors at the Byron Nuclear Power Plant project. The manner in which quality control inspector were recruited and selected for development is as follows.

It is necessary to be able to readily qualify inspectors so that production activity increases do not spread existing Quality Control Inspectors too thin. Inspector candidates with a minimum of high school education or G.E.D. equivalence were recruited from the on site production labor pool since these individuals are knowledgeable of work place terminology, logistics, and techniques of construction. In

some cases, recruiting of Quality Control inspector candidates occured through recommendations from a building or area superintendent. In such cases the individual was contacted and interviewed by Quality Control Supervision. In other cases the candidate was discovered by Quality Control inspection personnel without such a recommendation. All candidates from the on site labor force who become inspectors were trained to recognize that they are not to inspect any work they performed as production workers. In addition, Hunter Corporation considered off site applicants as well. Generally, off site applicants would have to have had either previous experience as an inspector in an environment equal to the nuclear industry, or previous experience as a production worker in the nuclear industry where that work was subjected to programmatic Quality Control Inspection.

All candidates were screened and tested in relation to their knowledge of basic construction terminology and techniques. Screening includes evaluation of the candidates' ability to embrace Quality Control and Quality Assurance principles. Selection of candidates for further development was based upon their observable attitudes and ability to expand their inventory of technical knowledge. Hunter Corporation Quality Control inspectors were expected to discharge their responsibilities in a positive and unbiased manner. Candidates referred by building or area superintendents, as well as off site candidates with previous inspection experience, have failed during Hunter Corporation's application of this step.

Q.6. How were these candidates trained and tested by Hunter Corporation?

A.6. Training of Quality Control Inspector candidates has been performed in a manner that will progressively refine the individual's recognition and decision making abilities. These two basic abilities are necessary to produce reliable inspection results regardless of the scope of any inspection that individual inspectors could be called upon to perform. Inspector candidates received both formal lecture/classroom and on-the-job training. Training was administered by certified inspectors and Quality Assurance auditors. Lecture/classroom training indoctrinates the individual in the Quality Assurance program administrative and technical criteria. On-the-job training imparts proficiency in application of administrative and technical criteria through actual hands-on performance of inspections in the plant. The candidate performed inspections accompanied by a certified inspector, who commented on the correctness of his performance. The certified inspector then performed the inspection of record.

In order for a candidate to become a certified inspector he had to pass a vision examination as well as written examinations that evaluated his mastery of the classroom training. The latter examinations must be reviewed and approved by an A.N.S.I. N45.2.6 Level III inspector prior to the time they are administered. Additionally,

certified Quality Control Inspectors conducted on-the-job evaluations of the candidate's proficiency in relation to application of administrative and technical criteria. These evaluations were conducted prior to allowing the individual to perform inspections unsupervised.

During 1982 we revised our inspector qualification procedure to formalize and refine the practices employed to select, train, examine, and certify inspectors. Examples of this would be formal verification of education, formally establishing minimum hours of training required, formally demonstrating level III inspector review and approval of examinations to be administered and refinement of examination content.

Q.7. Are there components or elements common to all quality control inspections?

A.7. Yes. The scope of any inspection that could be performed is defined by four parameters: type, size, location, and condition. All Quality Control Inspector candidates have been exposed to the training and examination necessary to assure proficiency in this conceptual approach. 'Type' involves a recognition of the general characteristics of an item of hardware, as indicated by its form, identification, composition, or function. 'Size' involves a recognition of dimensional characteristics. 'Location' involves a recognition of the item's placement in relation to other components or predetermined points of reference. 'Condition' involves a

recognition of the item's appearance in relation to predetermined indication, flaw, and defect criteria. An indication attracts the inspector's attention, a flaw causes the inspector t. 'size' and 'type' its physical characteristics. This then results in a decision of acceptability or nonacceptability by the inspector.

Q.8. Please illustrate the application of this conceptual approach to some specific hardware inspections.

A.8. Attached to this testimony are five (5) diagrams (Attachment A). These diagrams refer to the corresponding inspection elements in Attachment B to the prepared testimony of Dr. Eugene P. Ericksen at pp. 5-6.

Diagram 1	Inspection Element 32
Diagram 2	Inspection Element 36
Diagram 3	Inspection Element 32
Diagram 4	Inspection Element 42
Diagram 5	Inspection Element 38

Each diagram depicts an application of the terms: type, size, location, and condition. In order to establish recognition of terminology on these diagrams, type is represented by 'T', size is represented by 'S', location is represented by 'L', and condition is represnted by 'C'. Corresponding documents which establish, in part, the formal record of the inspections are attached to each diagram. The hardware and inspections represented are typical of any hardware or inspection. I will discuss some of the inspections on diagrams 1 and 2 which demonstrate application of each of the four terms, type, size, location and condition.

Referring to Diagram 1, pipe component and fit-up

inspections apply the concept of 'size' during performance of such inspections as fit-up gap, bevel angle, and preheat inspections. In each case 'size' is a recognition involving physical measurement. The fit-up gap is the space between the closest surfaces of the parts to be welded together, and would be measured with a feeler type guage. The bevel angle is the sloping cut made on each part so that the weld can be deposited, and would be measured with a protractor. Preheat is the process of applying heat to a predetermined level so that welding can be performed, and is measured with a standard commercial temperature indication device.

Referring to Diagram 2, hanger inspections apply the concept of 'size' during performance of extension piece and pin to pin dimensions. In each case the 'size' again involves performing a physical measurement. The extension piece is a structural extension of the assembly, and is measured with standard commercial rulers. The pin to pin dimension is the distance between the centers of the pivot pins, and again would be measured with standard commercial rulers.

Referring again to Diagram 1, pipe component and fit-up inspections apply the concept of 'type' during performance of identification inspections. The identification inspection verifies that the correct materials are going to be used or have been used and that the items display the governing drawing number, correct part number and weld number. Referring again to Diagram 2, hanger inspections apply the concept of 'type' during the performance of pivot

pin inspections. The pivot pin inspections verify that the pin is either machined with grooves for installation of spring clip locking devices to keep it in place, or has threads for installation of load nuts and lock nuts to keep it in place.

Referring again to Diagram 1, pipe component and fit-up inspections apply the concept of 'location' during performance of configuration inspections. Configuration inspections verify that the items to be welded together exhibit the proper spatial plane relationships and that the connecting weld will be where it is necessary.

Referring again to Diagram 2, hanger inspections apply the concept of 'location' during performance of such inspection as chain dimension and angle orientation inspections. Chain dimension is the relationship between the point of attachment on the pipe and a readily identifiable reference point on the pipe, and inspection verifies that the point of attachment on the pipe is correct. Angle orientation is the geometrical relationship between moving parts when a pipe line is in a cold and stable state, and inspection verifies that the assembly displays the proper geometrical values. Most 'location' inspections involve using standard commercial measuring devices, or reading scales built into the assembly.

Referring again to Diagram 1, pipe component and fit-up inspections apply the concept of 'condition' during performance of damage and cleanliness inspections. Damage is characterized by structural degradation, and inspection

verifies that it does not exist to a degree that compromises the integrity of the item. Cleanliness is characterized by the absence of gross foreign material inside or adhering to the item, and inspection verifies that the level of cleanliness is appropriate for the circumstance.

Referring again to Diagram 2, hanger inspections apply the concept of 'condition' during performance of such inspections as a threaded connection locked inspection. Threaded connection locked is a characteristic wherein the load nut will not loosen, and inspection verifies that lock nuts are tight or the threads to the outside of the load nut have been interrupted.

As the foregoing examples indicate, the application of the basic concepts is consistent. However, the examples also indicate that the scope of application varies among classifications of hardware.

Q.9. Please explain the role of 'document' inspection in Hunter Corporation's QA program.

A.9. Hunter Corporation chose to identify the topic of 'document inspection' during the N.R.C. Reinspection Program as a separate inspection attribute because documentation developed during the construction process is reviewed for accuracy and completeness during the performance of any in-process inspection. This same documentation has always been subjected to an overall inspection once production claims that the work is completed on the corresponding hardware to

the extent necessary to perform the inspection and gain acceptance.

The 'document inspections' occur in two steps so that two goals are attained. The goals are to collect in process construction data; and to assure all required data has been collected and all required inspections have been performed and resulted in acceptance of the hardware. An example of attaining the first goal can be given by referring to the component support process sheet attached to Diagram 2. All inspections called for on the back side of this process sheet would be in-process inspections (i.e., those inspections conducted that lead to initial completion of the assembly). Performance of inspection number 2 would include inspector review of the other documents generated during the construction process for the hanger. This review would verify that such things as welder identification, welding materials used, and use of construction tolerances employed are properly recorded on the documents in the construction package.

An example of attaining the second goal can be given by referring to the component support/whip restraint/ jet deflector final inspection report attached to Diagram 4. This particular checklist applies to all three classifications of hardware identified in the form title. I direct your attention to the area of the form titled 'Review of inspection type 2 documentation and and type 3 inspection'. These reviews would result in re-review of the documents in the construction package for the hanger plus expand the review

into documentation systems that would not be reviewable at the time of the in-process inspections.

Regardless of the format of any document that could be inspected by any inspector, the inspection would be similar in that it would simply verify the collection of data so that status could be determined.

Q.10. Why were there a large number of inaccessible document inspections in the reinspection program?

A.10. The various individual 'document inspections' of in-process hardware are usually conducted by different inspectors. The completed document package is also usually inspected by different inspectors. The reason for a large number of inaccessable 'document inspections' is that the documents had been subjected to the ongoing 'document inspections' by other inspectors and therefore could have been corrected and would not yield meaningful results from a N.R.C. Reinspection Program standpoint.

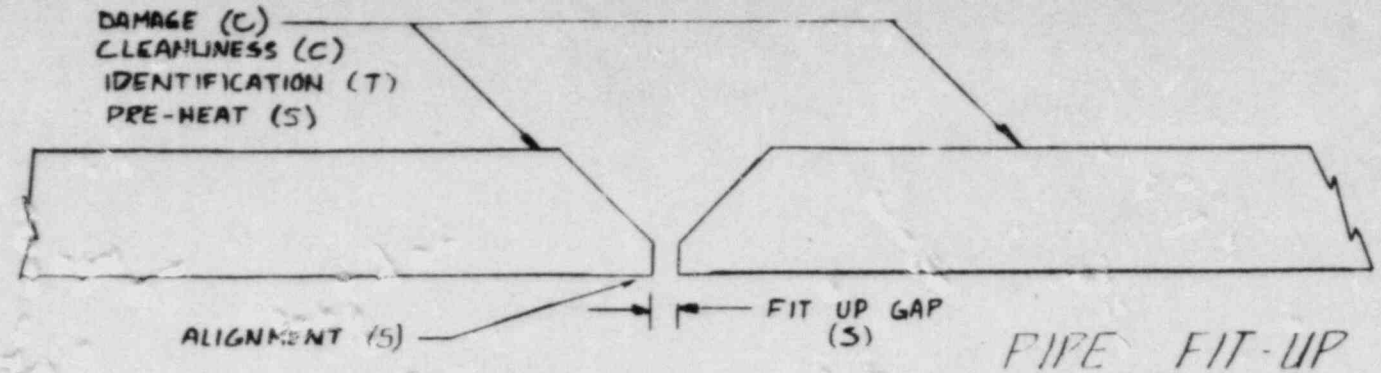
Q.11. Have you reviewed the results of the reinspection program on Hunter Corporation inspectors?

A.11. Yes I have. Attached to this testimony as Appendix B (previously identified as Applicant's Exhibit R-3) is a tabulation of those results and includes information in relation to date of transfer out of Quality Control or termination of employment with Hunter Corporation. The tabulation was prepared at my direction and the results are

accurate to the best of my knowledge and belief. The transfer and termination dates have been obtained from the Hunter Corporation payroll accounting department.

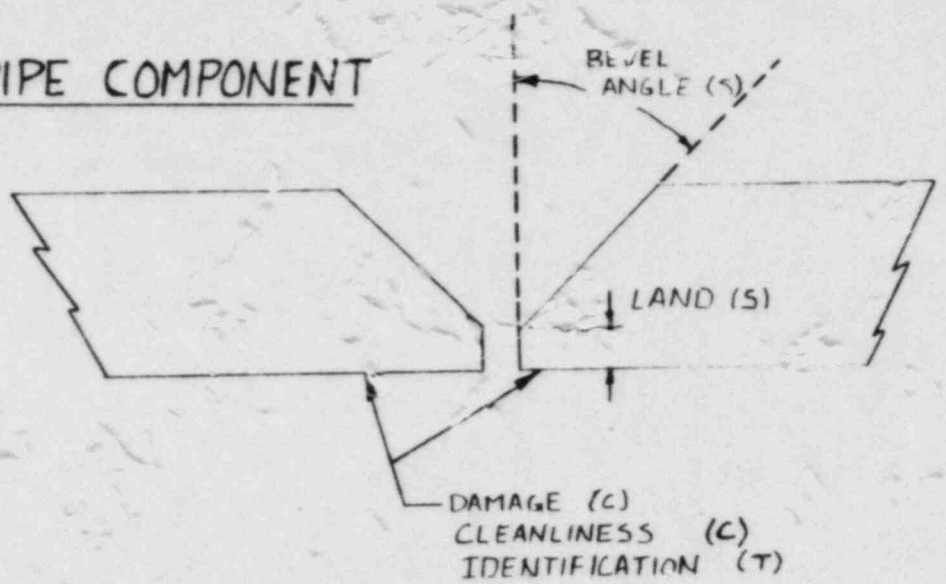
ATTACHMENT A

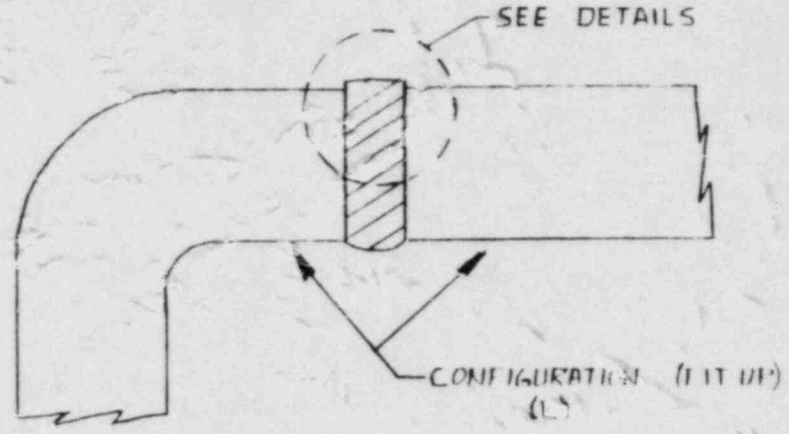
DIAGRAM #1



PIPE FIT-UP

PIPE COMPONENT





A-7

J.T.P. NO. _____

PROCESS SHEET
(P-1-P-8 BUTT WELDS)

CONSTRUCTION COPY

HUNTER CORPORATION

CUSTOMER COMMONWEALTH EDISON CO	**PROJECT** ☐ 4391 ☐ 4392	**LOCATION** 324	**JOB NO.** C-751006	**DESCRIPTION OF JOB SEGMENT**	**WELD NO.**
QUALITY CLASS	RECORD MATERIAL MK. NO'S ☐ N/A ☐ REQUIRED	JOINT TYPE ☐ OPEN BUTT ☐ CONS. INSERT ☐ BACKING STRIP ☐ FILLET			
PURGE ☐ NOT REQUIRED GAS ☐ REQUIRED	PREHEAT TEMP. °F TO °F	WELDING PROCESS & FILLER METALS	ROOT ☐ GTAW ☐ PASS ☐ SMAW AWS #		
MAXIMUM INTER PASS TEMP. °F	2ND ☐ GTAW ☐ PASS ☐ SMAW AWS #	REMAINING ☐ GTAW ☐ PASSES ☐ SMAW AWS #			
FLAT TOP ☐ NOT REQUIRED FINAL WELD ☐ REQUIRED	PRIMARY FINAL N.D.E. MT ☐ PT ☐ RT ☐ UT ☐	SECONDARY FINAL N.D.E. MT ☐ PT ☐			
POST WELD HEAT TREATMENT ☐ NOT REQUIRED ☐ REQUIRED	REMARKS		0		RELEASED FOR CONST.
PART OF LINE NO.	**DWG. NO.**	**PROCESS SHEET ISSUED UNDER REV.**	**Q.A.** **DATE** **ANI** **DATE** **REV.** **ENG.** **DATE**		**DESCRIPTION OF REVISION**

SEQ. NO.	CRAFT	OPERATION DESCRIPTION INCLUDE INSPECTION AND NDE	HOLD Q.C.	POINT A.N.I.	PROCESS SPEC NO.	REV	PERFORMED/INSPECTED BY & DATE	A.N.I & DATE	MATERIAL TO BE USED
1	Q.C.	COMPONENTS INSPECTION ☐ IDENTIFICATION			SEE SEQ. 2				BACKING STRIP (When Req.)
		☐ DAMAGE ☐ INTERNAL CLEANLINESS ☐ PROPER END PREPS							
2	P.F.	FIT-UP AND TACK PER WELD PROCEDURE					ENTER WELDING DATA ON REVERSE SIDE		COMPONENT # 1
	Q.C.	☐ PROPER FIT-UP							P NUMBER
	P.F.F.	RECORD MATR'L MK. NO'S (IF REQUIRED)					P.F.F.		SPEC. & GRADE
3	P.F.	ROOT PASS PER WELD PROCEDURE					ENTER WELDING DATA ON REVERSE SIDE		SIZE
	Q.C.	☐							NOMINAL THICKNESS
4	P.F.	SECOND PASS PER WELD PROCEDURE					ENTER WELDING DATA ON REVERSE SIDE		MINIMUM THICKNESS
	Q.C.	☐							CUST. I.D. NO.
5	P.F.	REMAINING PASSES PER WELD PROCEDURE					ENTER WELDING DATA ON REVERSE SIDE		MK. NO.
	Q.C.	☐							OTHER
6	Q.C.	FINISHED WELD INSPECTION ☐ IDENTIFICATION ☐ CONTOUR							
		☐ REINFORCEMENT ☐ SURFACE DISCONTINUITIES ☐ REQUEST N.D.E.							COMPONENT # 2
7	N.D.E. CONTRACTOR	PERFORM PRIMARY N.D.E.			SEE N.D.E. REPORT		SEE N.D.E. REPORT		P NUMBER
	Q.C.	ENTER ACCEPTABLE N.D.E. REPORT #							SPEC. & GRADE
8	N.D.E. CONTRACTOR	PERFORM SECONDARY N.D.E.			SEE N.D.E. REPORT		SEE N.D.E. REPORT		SIZE
	Q.C.	ENTER ACCEPTABLE N.D.E. REPORT #					RECORD P.W.H.T. DATA ON REVERSE SIDE & PROD. APP. INST.		NOMINAL THICKNESS
9	P.F.	PERFORM P.W.H.T. (IF REQUIRED)					ENTER WELDING DATA ON REVERSE SIDE		MINIMUM THICKNESS
	Q.C.	☐ CHECK SET UP PER PROD. APP. INST.							CUST. I.D. NO.
10	A.N.I.	FINAL VISUAL INSPECTION							MK. NO.
									OTHER

HN-14A (1-80)

WELD CONFIGURATION

0° IS ALWAYS THE TOP ON VERTICAL WELD JOINTS LOOKING AT COMPONENT NUMBER 1.

0° IS ALWAYS NORTH ON HORIZONTAL WELD JOINTS LOOKING IN THE PLAN VIEW.

90° 180°

WELD RECORD FORM USAGE IN THE FIELD

... PRODUCTION SUPERVISOR IS RESPONSIBLE FOR MAKING ALL DATA ENTRIES ON THE WELD RECORD SIDE OF THIS FORM AS FOLLOWS

SEQ NO ... TACK WOULD BE SEQUENCE 2, THE FIRST PASS (ROOT) WOULD BE SEQUENCE 3, THE SECOND PASS WOULD BE SEQUENCE 4, AND THE REMAINING PASSES WOULD BE SEQUENCE 5. ENTER THE SEQUENCE NUMBER OF THE WELD ...

... ENTER THE PORTION OF THE WELD MADE BY THE WELDER ... EXAMPLE 0° TO 180°

... AND DATE — ENTER THE STAMP NUMBER OF THE WELDER AND DATE ... TOOK PLACE

WELD MATERIAL — ENTER THE TYPE (A.W.S. #), SIZE, HEAT NUMBER OR LOT NUMBER ... NUMBER FOR THE FILLER METAL USED. WHEN A LOT NUMBER IS ... ON THE WMSH ENTER IT INSTEAD OF THE HEAT NUMBER

... REV. NO. — ENTER THE REVISION NUMBER OF THE WELDING PROCE... SPECIFIED ON THE PROCESS SHEET SIDE AS THE WELD IS MADE

... AND DATE — AFTER THE SUPERVISOR HAS ENTERED ALL DATA FOR EACH ... INITIALS AND THE DATE OF DATA ENTRY

... (PACKAGE) ENTER THE J.T.P. NUMBER AS LISTED ON THE PROCESS SHEET SIDE

... ENTER THE WELD NUMBER AS LISTED ON THE PROCESS SHEET SIDE

... ENTRIES NEED ONLY BE MADE IF POST WELD HEAT TREATMENT (PWHT) IS REQUIRED

... ENTER THE RECORDER CHART NUMBER

P.W.H.T. EQUIPMENT NO(S) — ENTER THE IDENTIFICATION NUMBERS OF THE CONSOLE, RECORDER AND THERMOCOUPLES

... PERFORMED BY AND DATE — ENTER THE NAME OF THE EQUIPMENT OPERATOR AND THE DATE(S) OF P.W.H.T.

... ENTRIES BY AND DATE — THE PRODUCTION SUPERVISOR ENTERS HIS NAME AND THE DATE OF DATA ENTRY

... CONTROL WELDING INSPECTOR IS RESPONSIBLE FOR REVIEW AND ... THE COMPLETED PROCESS SHEET AND WELD RECORD

PROCESS SHEET FORM USAGE ...

... PRODUCTION SUPERVISOR IS RESPONSIBLE FOR ... MATERIAL TRACEABILITY DATA (HEAT NUMBERS, MANUFACTURERS ... ETC). WHEN ... RECORD MATERIAL MK. NOS. SECTION IS CHECKED ... THE PROCESS SHEET ... DATA IS TO BE ENTERED ... MATERIAL TO BE USED ... PROCESS SHEET IN THE "MK ..." SUBHEADING AFTER THE SUPERVISOR ENTERS THE DATA, HE ENTERS HIS ... S AND THE DATE ... PER ... SELECTED BY FIELD FOR SEQUE... NEXT TO P.F.F. ... OTHER SIGNATURES AND ... BY QUALITY CONTROL OR THE AUTHORIZED NUCLEAR ...

... SHEET WILL PROVIDE THE PRODUCTION SUPERVISOR WITH THE BASIC ... MATERIAL, WELDING, NON-DESTRUCTIVE EXAMINATION AND Q.C. INSPECTION REQUIREMENT ... FOR MORE DETAILED DATA RELATIVE TO WELDING AND ... SPECIFIED WELDING PROCEDURE SPECIFICATION OR ... IMPLEMENTATION PROCEDURE

WELD RECORD

SEQ NO.	WELD DESCRIPTION	WELDED BY / DATE	WELD MATERIAL TYPE	WELD MATERIAL SIZE	WELD MATERIAL HEAT OR LOT NO.	WELD REQ. NO.	WELD PROCDR REV. NO.	ENTRYS BY / DATE

J.T.P. NO ________ WELD NUMBER ________ P.W.H.T. CHART NO ________

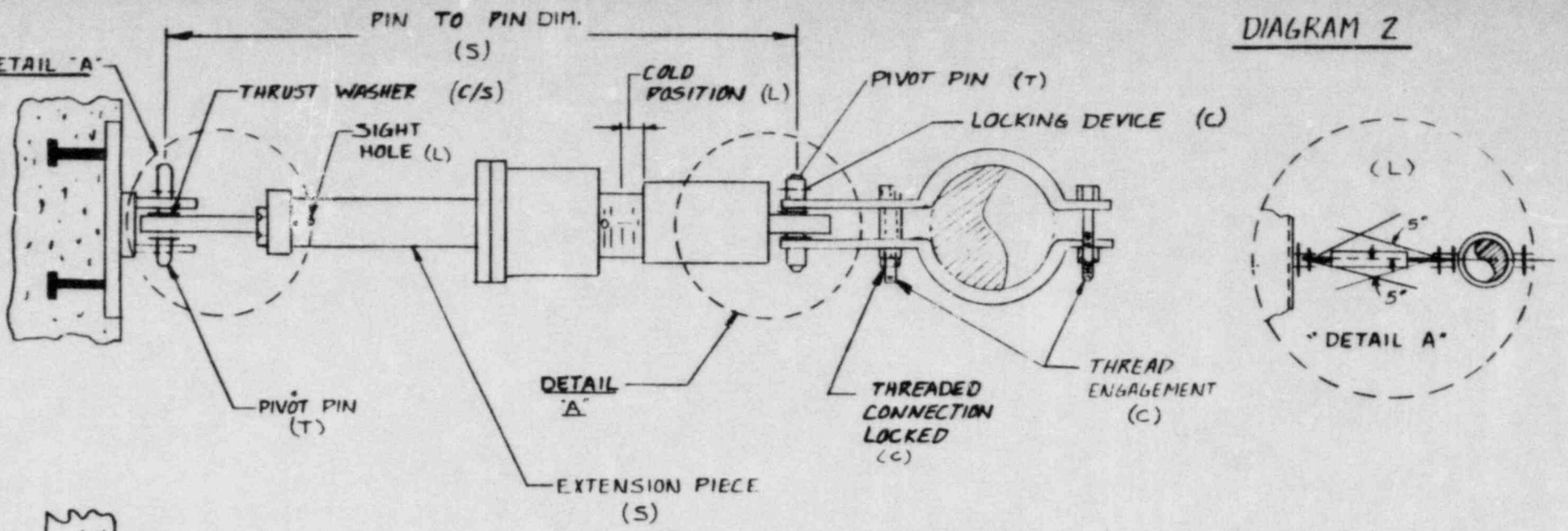
P.W.H.T. EQUIPMENT NO(S) ________ RECORDER ________ CONSOLE ________ THERMOCOUPLES

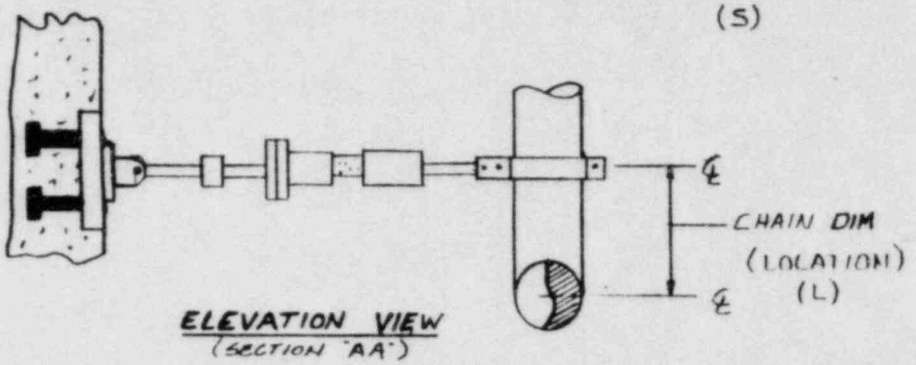
P.W.H.T. PERFORMED BY ________ DATE ________ P.W.H.T. ENTRIES BY ________ PROD. SUPV. DATE ________

COMPLETED PROCESS SHEET AND WELD RECORD APPROVED BY ________ Q.C. INSPECTOR DATE ________

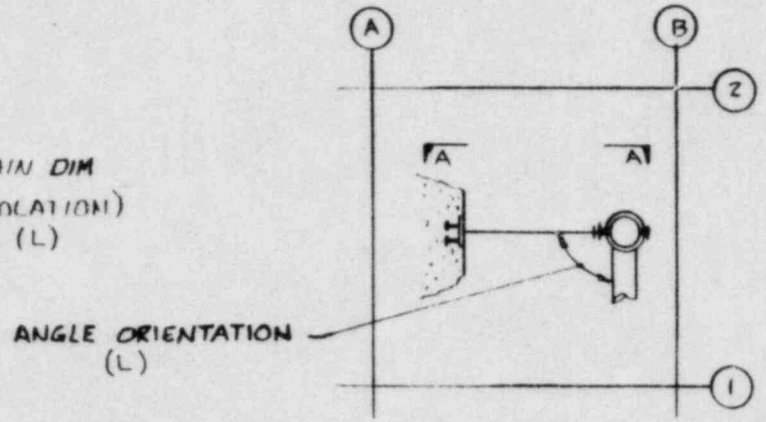
HN15A (7-78)

DIAGRAM 2





ELEVATION VIEW
(SECTION "AA")



KEY PLAN
(TYP)

HANGER INSPECTION FOR MECHANICAL SNUBBER

CONSTRUCTION COPY

COMPONENT SUPPORT PROCESS SHEET

J.T.P. NO. _____

HUNTER CORPORATION

CUSTOMER CECO PROJECT ☐ 4391 ☐ 4392 LOCATION 324 JOB NO C-751006 DRAWING NO _____ PROCESS SHEET ISSUED UNDER DRAWING REV _____

TORQUE REQUIREMENT CONNECTION CODE KEY
A EXTENSION PIECE JAM NUT
B LOAD STEM JAM NUT
C BOLT JAM NUT
D EXTENSION PIECE PIVOT MOUNT ASSEMBLY SCREWS

DESCRIPTION OF JOB SEGMENT — **N.D.E. REQUIREMENTS**

WELD NUMBERS	WPS NUMBER	WELDING PROCESS SMAW	GTAW		FILLER METAL AWS NUMBER	PREHEAT TEMP RANGE IN °F	MAX INTERPASS TEMP IN °F	PWHT N/A	PWHT REQ	PWHT PROCEDURE	PRIMARY FINAL VIS	MT	PT	RT	UT	SECONDARY FINAL VIS	MT	PT
(IN NF FILLETS)																		

TORQUE REQUIREMENTS CONNECTION CODE

A	B	C	D	
☐ IN LBS ☐ FT LBS	☐ IN LBS ☐ FT LBS	☐ IN LBS ☐ FT LBS	☐ IN LBS ☐ FT LBS	☐ IN LBS ☐ FT LBS

ANI & DATE	QA & DATE	ENG. & DATE	REV	DESC. OF REVISION
			O	RELEASED FOR CONST

ANI & DATE	QA & DATE	ENG. & DATE	REV	DESC. OF REVISION

ANI & DATE	QA & DATE	ENG. & DATE	REV	DESC. OF REVISION

SEQ NO	DEPT	OPERATION DESCRIPTION	HOLD POINT Q.C	HOLD POINT ANI	PERFORMED/INSPECTED BY AND DATE	ANI AND DATE
1	PROD	WELD NO			ENTER WELDING DATA ON REVERSE SIDE	
	QC	FIT UP INSPECTION ☐ END PREPS ☐ JOINT CONFIGURATION ☐				
	QC	FINISHED WELD INSPECTION ☐ IDENTIFICATION ☐ CONTOUR ☐ WELD SIZE ☐ SURFACE DISCONTINUITIES ☐ REQUEST NDE (If Required)				
	QC	ENTER ACCEPTABLE NDE REPORT NUMBERS PRIMARY FINAL SECONDARY FINAL				
1	PROD	WELD NO			ENTER WELDING DATA ON REVERSE SIDE	
	QC	FIT UP INSPECTION ☐ END PREPS ☐ JOINT CONFIGURATION ☐				
	QC	FINISHED WELD INSPECTION ☐ IDENTIFICATION ☐ CONTOUR ☐ WELD SIZE ☐ SURFACE DISCONTINUITIES ☐ REQUEST NDE (If Required)				
	QC	ENTER ACCEPTABLE NDE REPORT NUMBERS PRIMARY FINAL SECONDARY FINAL				

SEQ NO	DEPT	OPERATION DESCRIPTION	HOLD POINT Q.C	HOLD POINT ANI	PERFORMED/INSPECTED BY AND DATE	ANI AND DATE
3	QC	VERIFY ACCEPTABLE INTERFACE BETWEEN COMPONENT SUPPORT AND ITEM BEING SUPPORTED ☐ LOCATION ACCEPTED ☐ CONNECTION ACCEPTED LOCATION VERIFIED BY ☐ PIPING ISO REV ☐ HC 98 ☐ KEY PLAN REV ☐ OTHER (SPECIFY)				

SEQ NO	DEPT	OPERATION DESCRIPTION (APPLICABLE FOR SNUBBERS ONLY)	HOLD POINT Q.C	HOLD POINT ANI	PERFORMED/INSPECTED BY AND DATE	ANI AND DATE
3	PROD	PREPARE SNUBBER FOR INSTALLATION				
	QC	WITNESS STROKING OF SNUBBER ☐ SNUBBER MOVES FREELY THRU RANGE				
4	PROD	INSTALL SNUBBER. TORQUE TO VALUE SPECIFIED IN DESCRIPTION OF JOB SEGMENT. ENTER PROCESS SPEC. AND REV. NUMBER USED DURING TORQUE OPERATION INDICATE TWP				
	QC	INSTALLATION INSPECTION WITNESS TORQUE OPERATION ☐ CONNECTION A ACCEPT ☐ CONNECTION B ACCEPT ☐ CONNECTION C ACCEPT ☐ CONNECTION D ACCEPT ☐ VERIFY HN-29 COMPLETE				

SEQ NO	DEPT	OPERATION DESCRIPTION	HOLD POINT Q.C	HOLD POINT ANI	PERFORMED/INSPECTED BY AND DATE	ANI AND DATE
1	PROD	WELD NO			ENTER WELDING DATA ON REVERSE SIDE	
	QC	FIT UP INSPECTION ☐ END PREPS ☐ JOINT CONFIGURATION ☐				
	QC	FINISHED WELD INSPECTION ☐ IDENTIFICATION ☐ CONTOUR ☐ WELD SIZE ☐ SURFACE DISCONTINUITIES ☐ REQUEST NDE (If Required)				
	QC	ENTER ACCEPTABLE NDE REPORT NUMBERS PRIMARY FINAL SECONDARY FINAL				
1	PROD	WELD NO			ENTER WELDING DATA ON REVERSE SIDE	
	QC	FIT UP INSPECTION ☐ END PREPS ☐ JOINT CONFIGURATION ☐				
	QC	FINISHED WELD INSPECTION ☐ IDENTIFICATION ☐ CONTOUR ☐ WELD SIZE ☐ SURFACE DISCONTINUITIES ☐ REQUEST NDE (If Required)				
	QC	ENTER ACCEPTABLE NDE REPORT NUMBERS PRIMARY FINAL SECONDARY FINAL				

SEQ NO	DEPT	OPERATION DESCRIPTION	HOLD POINT Q.C	HOLD POINT ANI	PERFORMED/INSPECTED BY AND DATE	ANI AND DATE
1	PROD	WELD NO			ENTER WELDING DATA ON REVERSE SIDE	
	QC	FIT UP INSPECTION ☐ END PREPS ☐ JOINT CONFIGURATION ☐				
	QC	FINISHED WELD INSPECTION ☐ IDENTIFICATION ☐ CONTOUR ☐ WELD SIZE ☐ SURFACE DISCONTINUITIES ☐ REQUEST NDE (If Required)				
	QC	ENTER ACCEPTABLE NDE REPORT NUMBERS PRIMARY FINAL SECONDARY FINAL				

REMARKS _____

BY AND DATE _____

ECN/FCR NO. _____
(IF AN ECN/FCR IS REQUIRED TO ACCOMPLISH INSTALLATION - TO BE ADDED BY PRODUCTION)

FORM HN-14F (5/83)

JTP NO _____ REPLACEMENT / MODIFICATION MATERIALS USED

DWG ITEM NO	DESC OF MATERIAL	MK NO & FIELD ORDER NO	ENTRIES BY & DATE	DWG ITEM NO	DESC OF MATERIAL	MK NO & FIELD ORDER NO	ENTRIES BY & DATE

NOTE THE PRODUCTION SUPERVISOR IS RESPONSIBLE FOR COMPLETION OF ALL NON-INSPECTION FIELD ENTRIES ON THIS FORM IN THE SAME MANNER AS PRESCRIBED IN FORM HN-14A. THE REPLACEMENT MODIFICATION MATERIALS USED CHART SHALL BE COMPLETED WHEN MATERIALS ARE REPLACED OR ADDED AS NF SUPPORT CLASS 1 (A) PRIMARY PLATE, SHELL OR LINEAR ELEMENTS. FOR CLASSIFICATION, REFER TO DRAWING BILL OF MATERIALS.

WELD RECORD

WELD NO(S)	TYPE	SIZE	WELD MATERIAL HEAT/LOT NO	WMSR NO	PERFORMED BY & DATE	WPS & REV NO	ENTRIES BY & DATE

COMPONENT SUPPORT INSPECTION CHECKLIST

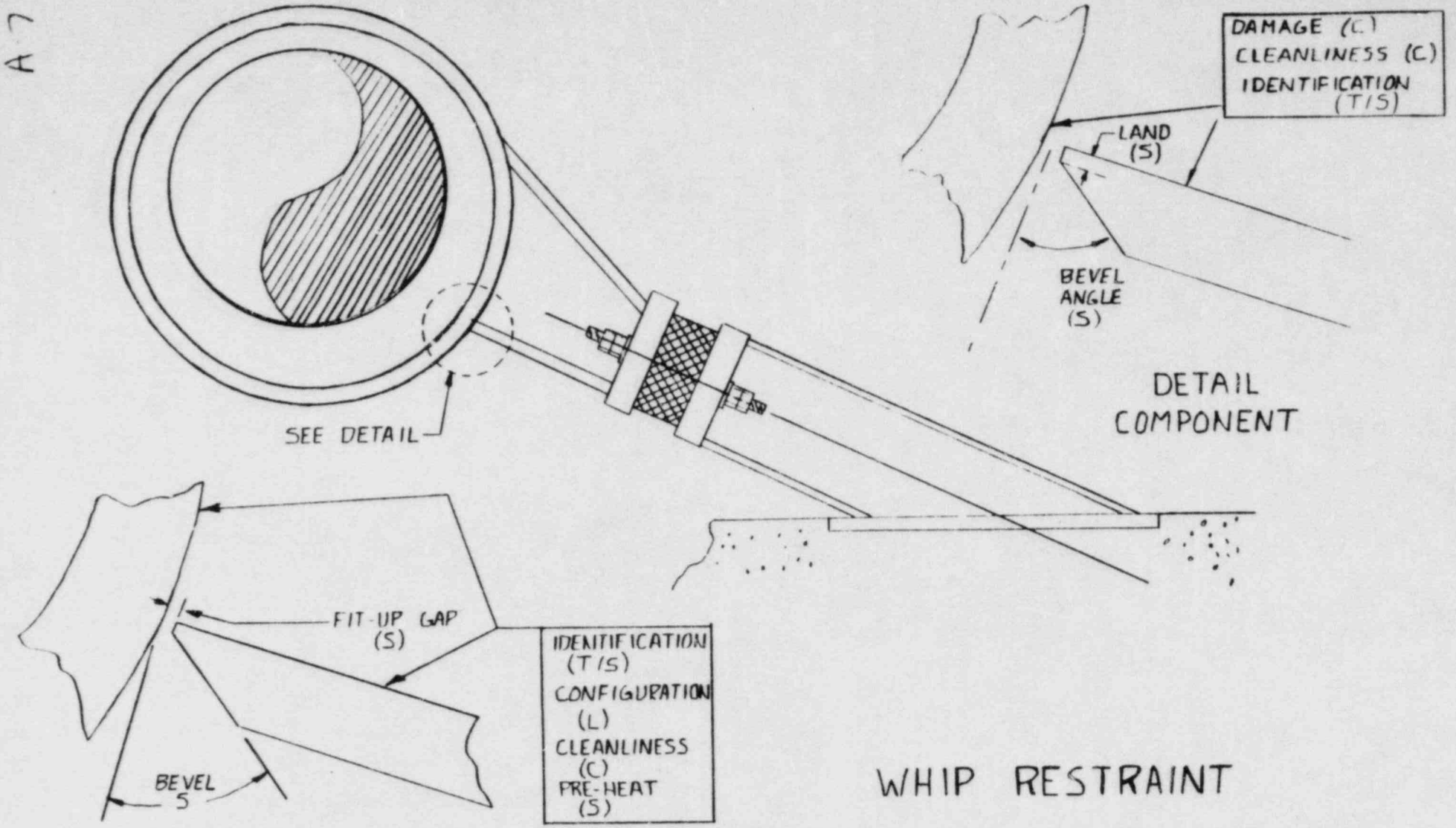
	INSPECTION REQUIREMENTS VERIFY THE FOLLOWING FOR SUPPORT TYPE IN QUESTION	FIRST INSPECTION	SECOND INSPECTION	THIRD INSPECTION
1	SUPPORT IDENTIFICATION			
2	CONFIGURATION AND ASSEMBLY PER CONST. DRAWING AND / OR REPORTED AS-BUILT			
3	ALL WELDING COMPLETE AND ACCEPTABLE			
4	ANY ABANDONED HOLES ARE PLUG WELDED			
5	OFFSET DIMENSIONS PER CONST. DRAWING ARE CORRECT			
6	ALL THREADED CONNECTIONS ARE LOCKED			
7	MINIMUM OF ONE MALE THREAD EXPOSED ON THREADED CONNECTION			
8	THREADS ARE VISIBLE THRU SIGHT HOLE TO SHOW THREAD ENGAGEMENT			
9	ALL PIVOT PINS SECURED WITH LOCKING DEVICES			
10	ALL SPHERICAL BALL BUSHINGS HAVE THRUST WASHERS (BOTH SIDES)			
11	CEA TRAVELLER COMPLETE (IF INSTALLATION EMPLOYS CEAs)			
12	MOVING PARTS ARE UNOBSTRUCTED (HGR FREE TO FUNCTION PROPERLY)			
13	TRAVEL STOPS IN AND SECURED			
14	REAR BRACKET PARALLEL TO PIPING LUGS WITHING 5°			
15	EXTENSION PIECE AND LOAD STEM WITHIN 5° OF MOUNTING BRACKET			
16	PIVOT PIN TO PIN DIMENSION PER CONSTRUCTION DRAWING			
17	COLD POSITION SETTING CORRECT			
18	AB / TB PROCESS SHEET COMPLETE (IF INSTALLATION EMPLOYS AB / TB)			
19	LOCATION COMPATIBLE UTILIZING SURROGATE (LCUS)			
20	PLASTIC WRAP APPLIED			

1st INSPECTION BY _____ DATE _____ INSPECTED TO _____
2nd INSPECTION BY _____ DATE _____ INSPECTED TO _____
3rd INSPECTION BY _____ DATE _____ INSPECTED TO _____

DATA ENTRIES COMPLETE AND INSPECTIONS PERFORMED APPROVED BY _____
INSPECTOR DATE

A-7

DIAGRAM 3


SEE DETAIL
DAMAGE (C)
CLEANLINESS (C)
IDENTIFICATION (T/S)
LAND (S)
BEVEL ANGLE (S)
DETAIL COMPONENT
FIT-UP GAP (S)
BEVEL S
IDENTIFICATION (T/S)
CONFIGURATION (L)
CLEANLINESS (C)
PRE-HEAT (S)
DETAIL FIT-UP
WHIP RESTRAINT

A-8

CONSTRUCTION COPY

CATEGORY I
PIPE WHIP RESTRAINT
PROCESS SHEET

HUNTER CORPORATION

JTP NO _____ WELD NO _____

CUSTOMER CECO PROJECT ☐ 4391 ☐ 4392 LOCATION 324 JOB NO C-751006

RECORD MATERIAL MK NO'S ☐ N/A ☐ REQUIRED | JOINT TYPE ☐ PARTIAL PENETRATION ☐ FULL PENETRATION ☐ BACKING STRIP ☐ FILLET ☐ SINGLE BEVEL GROOVE ☐ DOUBLE BEVEL GROOVE

PREHEAT TEMP °F TO °F | MAXIMUM INTER PASS TEMP °F | WELDING PROCESS & FILLER METALS ☐ GTAW ☐ SMAW AWS#

ROOT PASS N D E: MT ☐ PT ☐ NA ☐ | FINAL N D E: MT ☐ PT ☐ RT ☐ UT ☐ ☐ | POST WELD HEAT TREATMENT ☐ NOT REQUIRED ☐ REQUIRED

DRAWING NO _____ PROCESS SHEET ISSUED UNDER REV _____ LINE NO _____

MATERIAL TO BE USED	
COMPONENT #1	
SPEC & GRADE	
NOMINAL THICKNESS	
MK NO	
OTHER	
COMPONENT #2	
SPEC & GRADE	
NOMINAL THICKNESS	
MK NO	
OTHER	
BACKING STRIP (WHEN REQ)	

0 RELEASED FOR CONST

QA | DATE | REV | ENG | DATE | DESCRIPTION OF REVISION

REMARKS

SEQ NO	CRAFT	OPERATING DESCRIPTION INCLUDE INSPECTION AND NDE	HOLD POINT	PROCESS SPEC NO	REV	PERFORMED/INSPECTED BY & DATE
1	QC	COMPONENTS INSPECTION ☐ IDENTIFICATION				
		☐ DAMAGE ☐ PROPER WELD PREPS				
2	PF	FIT-UP AND TACK PER WELD PROCEDURE				ENTER WELDING DATA ON REVERSE SIDE
	QC	☐ PROPER FIT-UP ☐ CONFIGURATION				
	PFF	RECORD MATRL MK NO'S (IF REQUIRED)				
3	PF	ROOT PASS PER WELD PROCEDURE				ENTER WELDING DATA ON REVERSE SIDE
		— FOR FILLET OR SINGLE BEVEL WELDS, PROCEED TO SEQ NO 4 —				
3A	QC	INSPECT SECOND SIDE (FOR DOUBLE BEVEL)		PER PROCESS SPEC NO FOR ROOT PASS		
		☐ VISUAL				
3B	PF	SECOND SIDE ROOT PASS PER WELD PROCEDURE				ENTER WELDING DATA ON REVERSE SIDE
4	QC	☐ VISUAL ☐ REQUEST N D E FOR DOUBLE BEVEL BOTH SIDES				
5	N D E CONTRACTOR	PERFORM ROOT PASS D E FOR DOUBLE BEVEL BOTH SIDES		SEE N D E REPORT		SEE N D E REPORT
	QC	ENTER ACCEPTABLE N D E REPORT #				
6	PF	REMAINING PASSES PER WELD PROCEDURE				ENTER WELDING DATA ON REVERSE SIDE
7	QC	FINISHED WELD INSPECTION				
		☐ IDENTIFICATION ☐ CONTOUR				
		☐ REINFORCEMENT ☐ SURFACE DISCONTINUITIES ☐ REQ NDE				
8	N D E CONTRACTOR	PERFORM FINAL N D E		SEE N D E REPORT		SEE N D E REPORT
	QC	ENTER ACCEPTABLE N D E REPORT #				
9	PF	PERFORM P W H T (IF REQUIRED)				RECORD P W H T DATA ON REVERSE SIDE & PROD APP INST
	QC	CHECK SET UP PER PROD APP INST				

REMARKS _____

BY & DATE ☐ PFF ☐ QC W I

HN-4G 3 90

A-9

WELD RECORD FORM USAGE IN THE FIELD

SEQ NO. ...

WELD DESCRIPTION ...

WELD MATERIAL ...

WELD PROCDR REV NO ...

ENTRY BY AND DATE ...

PWHT CHART NO ...

PWHT EQUIPMENT NO(S) ...

PWHT PERFORMED BY AND DATE ...

PROCESS SHEET FORM USAGE IN THE FIELD

WELD RECORD

SEQ NO.	WELD DESCRIPTION	WELDED BY	DATE	TYPE	SIZE	WELD MATERIAL HEAT OR LOT NO	WELD REQ NO	WELD PROCDR REV NO	ENTRYS BY	DATE

FFP NO ______ WELD NUMBER ______ P W H T CHART NO ______

P W H T EQUIPMENT NO(S) ______ RECORDER ______ CONSOLE ______ THERMOCOUPLES ______

P W H T PERFORMED BY ______ DATE ______ P W H T ENTRIES BY ______ PROD SUPV ______ DATE

COMPLETED PROCESS SHEET AND WELD RECORD APPROVED BY ______ Q C INSPECTOR ______ DATE

A-10

DIAGRAM 4

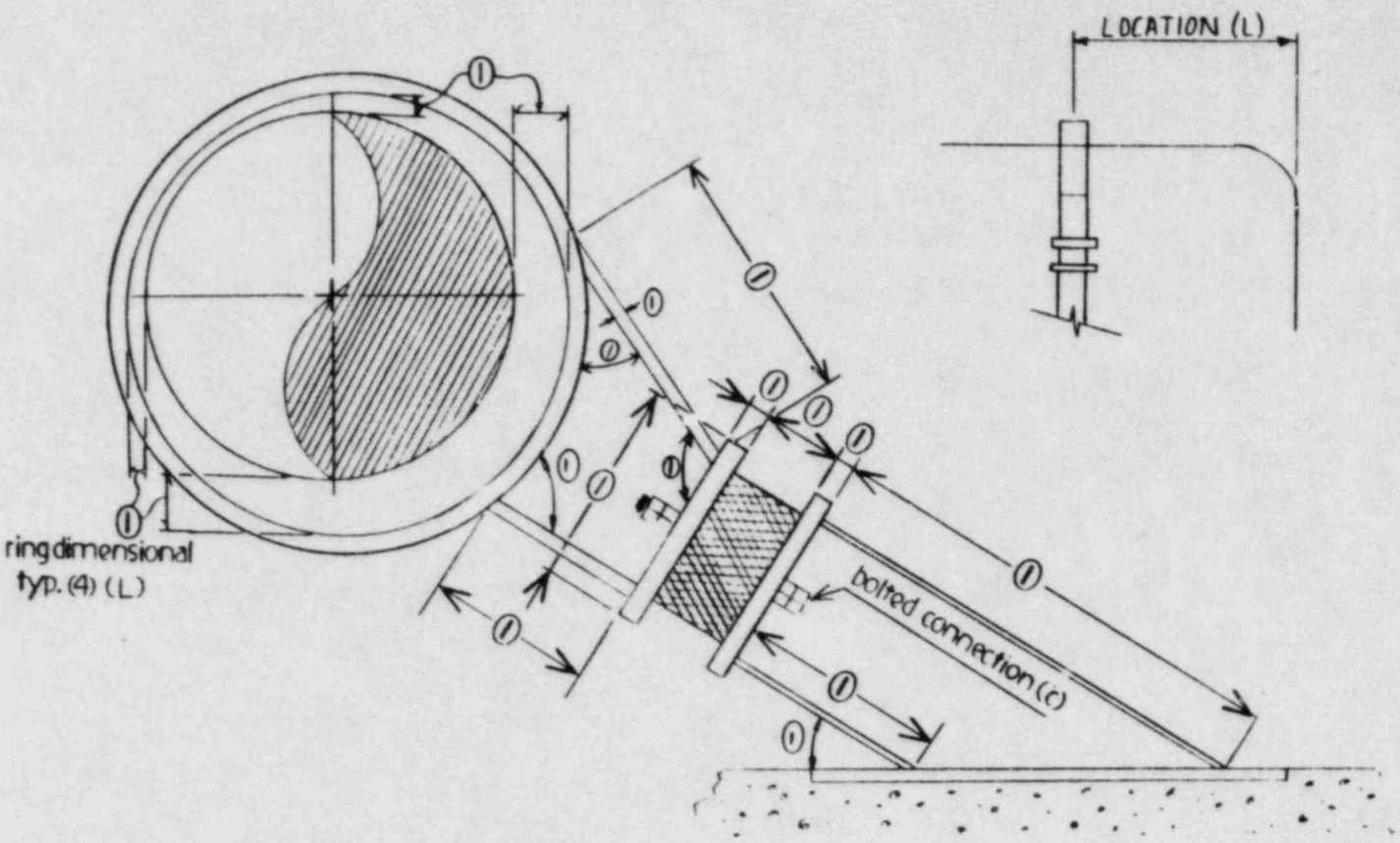
DAMAGE (c)

NOTE: ENTIRE ASSEMBLY IS INSPECTED FOR DAMAGE

WHIP RESTRAINT
TYPE 3

① DIMENSIONAL (L-S)

NOTE: ALL DIMENSIONS INDICATED ON CONSTRUCTION DRAWINGS ARE VERIFIED



COMPONENT SUPPORT/WHIP RESTRAINT/JET DEFLECTOR
FINAL INSPECTION REPORT

HUNTER CORPORATION

Job No. C-751896 Customer Commonwealth Edison

Hunter CCD _____

Revision No. Used for Initiation of FIR: Hunter _____ A & E _____

A & E Revision Change - Installation Not Affected

New Revision	Entered By	Date of Entry

Hunter Revision Change - Installation Not Affected

New Revision	Entered By	Date of Entry

REVIEW OF INSPECTION TYPE 2 DOCUMENTATION AND TYPE 3 INSPECTION

Note: Items 1 through 3 are the documentation of INSPECTION TYPE 3 for Faulted Condition Restraints and Jet Deflectors when applicable.

	QA Inspector/Date	QC Inspector/Date	ANI/Date
1. Process Sheets and Weld Records Complete (Inspection Hold/Witness Points Completed, Material Traceability Data Complete, NDE Performed and Referenced When Required, PWHT Charts Complete and Referenced When Required)		_____	_____
2. Installation matches CCD and/or as-built data supplied.....		_____	_____
3. Field Orders Included and Complete		_____	_____
4. Verify Type III Inspection Is Complete for Component Supports	_____		_____
5. Rework Requests Referenced and Closed Out ...	_____		_____
6. RNDs Referenced and Closed Out	_____		_____
7. NRs Referenced and Closed Out	_____		_____
8. Discrepancy Reports Closed	_____		_____

Comments _____

_____

_____ Inspector and Date _____

INSPECTION TYPE 4 (COMPONENT SUPPORTS ONLY) Drawing Revision No. _____

	QC Inspector/Date
1. Installation in Place, Intact and Undamaged	_____
2. No Hold Tags Attached	_____
3. Travel Stops Removed	_____

Comments _____

_____

_____ Inspector and Date _____

INSPECTION TYPE 5 (RESTRAINTS AND DEFLECTORS ONLY) Drawing Revision No. _____

	QC Inspector/Date
1. Installation in Place, Intact and Undamaged	_____
2. No Hold Tags Attached	_____

Comments _____

_____

_____

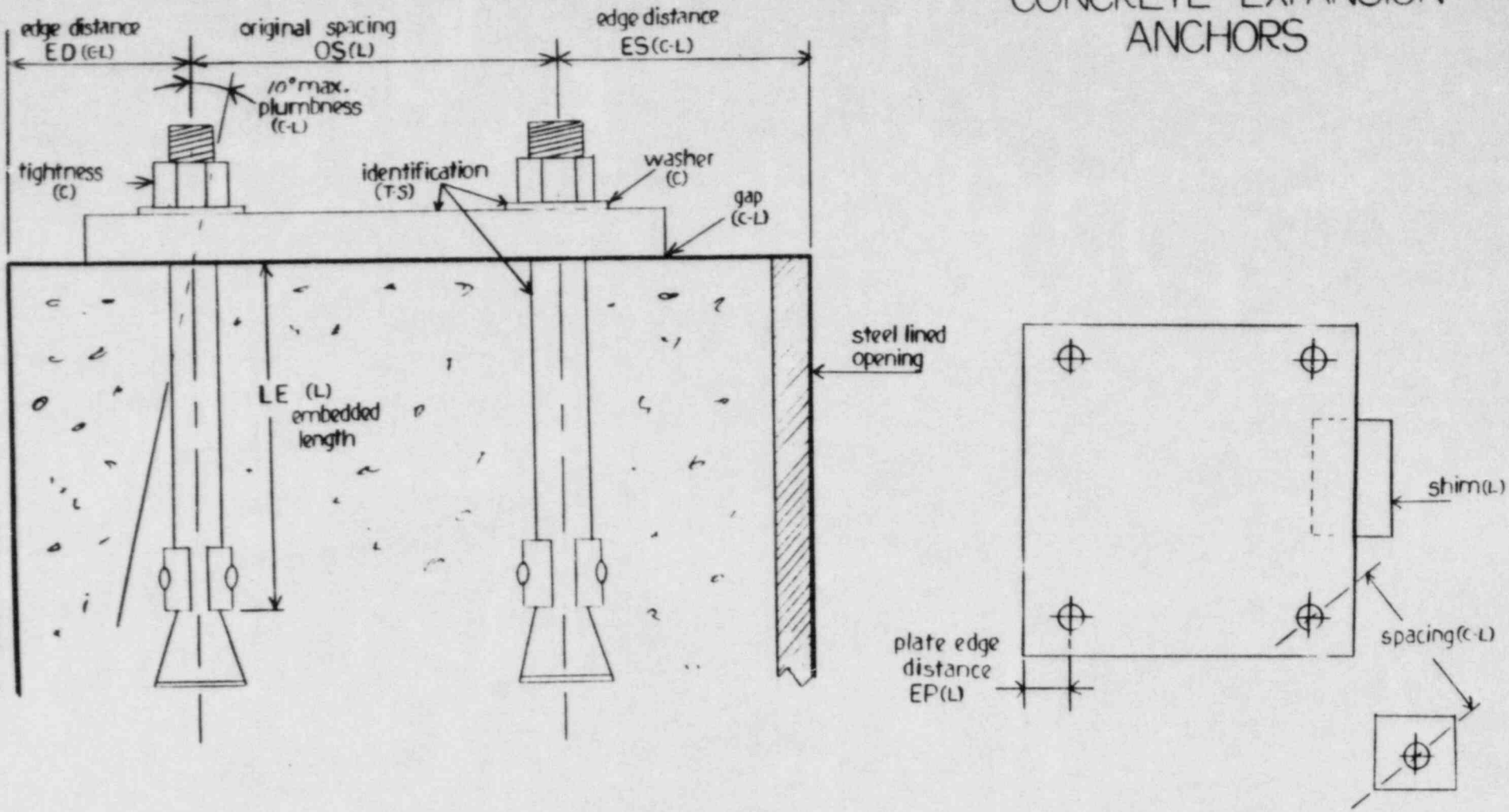
FIELD SUPERINTENDENT/PROJECT ENGINEER Approval and Date _____

CUSTOMER REPRESENTATIVES Acceptance and Date _____

A-12

DIAGRAM 3

CONCRETE EXPANSION ANCHORS



TRAVELLER NO. _____ (Form HC-106 2/83) **HUNTER CORPORATION**

PART A: LAYOUT SUMMARY FOR SAFETY RELATED STRUCTURE

1. Support No. _____ Quality Class _____

2. Area: ☐ See Support Drwg. ☐ Other

Thickness of Topping Slab _____

3. Anchor Diameter _____ Embedded Length Required _____

Anchor Length _____ No. Required _____

Comments: _____

_____

Prepared By _____ Date _____

PART B: QC CONCRETE VERIFICATION

1. 28 Day Cure Met ☐ Yes ☐ No QC _____ Date _____

If No, Document When Cure Will Be Met _____

2. Layout Over Concrete Repair ☐ Yes ☐ No QC _____ Date _____

PART C: INSTALLATION DATA

Optional: Hole Depth _____ QC Verification _____ Date _____

1. Mark Applicable Box or Enter N/A

EDGE DISTANCE AND SPACING PER			NO. OF HOLES DRILLED	NO. OF REBARS NICKED	NO. OF REBARS CUT	CUT REBAR REPORT NUMBER	MAX. # OF WASHERS ON ANY ANCHOR	PLUMBNESS REQUIREMENTS		
M919	DESIGN DRWG.	DY/BR/ CEA						$\leq 3^0$	$> 3^0$ but $\leq 10^0$	$> 10^0$

2. Unused Holes Dry Packed ☐ Yes ☐ N/A

3. Slotted/Oversize Holes and Required Washers ☐ Yes ☐ N/A

4. Beveled Washers In-Place ☐ Yes ☐ N/A

5. Concrete/Anchor Failure ☐ Yes ☐ No
If Yes, Date Copy of HC-106 Sent to Owner _____

6. Installation Torque Range _____ Date Torqued _____
Torque Wrench ID No. _____

Comments: _____

_____

Prepared By _____ Date _____

PART D: INSPECTION DOCUMENTATION

ACCEPT	REJECT	CORRECTED			
☐	☐	☐	_____	1.	Documentation (HC-106 completed)
☐	☐	☐	_____	2.	ID (Support/CEA number marked on item)
☐	☐	☐	_____	3.	Length code (anchors are end stamped with appropriate code)
☐	☐	☐	_____	4.	Anchor diameter (per const. dwg. or larger per SIP 20.513 or M919)
☐	☐	☐	_____	5.	Embedded length ("LE", depth in concrete, 1/16" tolerance)
☐	☐	☐	_____	6.	Thread projection (flush with nut, minimum)
☐	☐	☐	_____	7.	Plumbness (beyond 3^{o} but less than 10^{o} requires beveled washer)
☐	☐	☐	_____	8.	Washer quanity & distortion (max. of 5, min. of 1; no distortion)
☐	☐	☐	_____	9.	Plate size (per const. dwg. or larger per SIP 20.513 or M919)
☐	☐	☐	_____	10.	Spacing between anchors on assembly no less than or greater than "OS" (original spacing) plus or minus 2 anchor diameters.
☐	☐	☐	_____	11.	Plate edge distance ("EP" min. distance between anchor & plate edge)
☐	☐	☐	_____	12.	Edge distance ("ED" center of anchor to nearest concrete edge or steel sleeve > 12" Ø; "ES" center of anchor to nearest surface of steel lined opening ≤ 12") Spacing ("S" center to center between anchor in adjacent assemblies)
☐	☐	☐	_____	13.	Gap & load bearing: 1/32" gap considered "in contact". Gap along the width or length of the plate is acceptable provided extention under the plate does not exceed 1" (for plates "W" and "L" ≤ 15") or 2" (for plates "W" and "L" > 15") extention of gap beyond above stated 1" and 2", is limited to 40% or less of plate length or width. (Not applicable for Rod Type Supports in vertical loading only.)
☐	☐	☐	_____	14.	Acceptable tack welds on shim (if applicable) tacked on two opposite ends.
☐	☐	☐	_____	15.	Torque wrench ID No. # entered on HC-106 form.
☐	☐	☐	_____	16.	Equipment use report (Form HN-29) was verified at time of inspection for torque wrenches.

INSPECTION NOTES:

CEA Size	LE	S	ED	ES	EP	S-1"
1/4	5/8	2.5	3.25	1/75	1/2	1.5
3/8	3	4.5	5	2.5	3/4	3.5
1/2	4	6	7	3.5	7/8	5
5/8	5	7.5	8.5	4.25	1-1/8	6.5
1/4	6	9	10	5	1-1/4	8
1	8	12	13	6.5	1-3/4	11

A. Tack welds on washer plates shall be on two opposite sides 1½" long 3/16" fillets for 3/16" t plates, ¼" fillet for ¼"t or greater plates.
B. Edge distance to the side of embedded plates shall be the "S" dimension minus 1".
C. The "S" dimension between two anchors of different sizes shall be the average S.

Comments _____

By/Date _____

QCWI Acceptance _____ Date _____

Enter Acceptable Testing Report No. _____ By/Date _____

If Unacceptable Indicate Action Taken _____

(Backside HC-106 2/83)

ATTACHMENT B

Hunter Corporation

Inspector		Employment Status Inspector Termination Date		Subjective	Objective
Pep'tone	A	01/78	Trans. to HC Prod.	98%	--
Sturges	B	06/78	Trans. to HC Prod.	100%	97%
Ooten	C	04/78		100%	99%
Kilpatrick	D	06/78		100%	99%
Tucker	E			94%	97%
Cantley	F	01/80		97%	97%
Young	G	01/81		90%	100%
Madill	H	09/80		89%	100%
Saunders	I			99%	98%
Ferrigan	J	05/13/81	Trans. to HC Prod. (Term. 11/9/82)	--	99%
Campbell	K	04/82	Trans. to HC Prod. (Term. 5/82)	97%	98%
Geursten	L			100%	99%
Wyatt	M	04/81	Trans. to HC Prod.	--	97%
Pelikan	N	04/81	Trans. to HC Prod. (Term. 7/14/81)	--	98%
Baker	O	12/81	Trans. to HC Prod. (Term. 4/15/82)	--	98%
Kelly	P			95%	99%
Milroy	Q			98%	99%
Baker	R			98%	99%
Wells	S			100%	99%
Lindgren	T			--	99%
Wiedeman	U			98%	99%
Burstein	V			94%	--

0091k

MR. CASSEL: And if it will help to stipulate in, or anything else we can do to expedite, with Mr. Buchanan, I --

MR. MILLER: Actually, I have very few questions on supplemental direct of Mr. Buchanan. Really, I find that we have neglected to describe, in his testimony, what each of these sketches that are attached to his testimony prepared. And I would like to do that on direct.

Mr. Buchanan has not previously been sworn, Judge Smith.

JUDGE SMITH: We have received Mr. Somsag's testimony.

Whereupon,

JAMES K. BUCHANAN

was called to the stand and, having been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MILLER:

Q Would you state your name, please, for the record?

A My name is James K. Buchanan.

Q By whom are you employed, Mr. Buchanan?

A I'm employed by Hatfield Electric Company at the Byron nuclear site.

Q Do you have before you a document that is entitled Rebuttal Testimony of James K. Buchanan, consisting

of nine typewritten pages and three attachments identified as Attachments A, B, and C?

A I have.

Q Did you prepare that document?

A Yes, sir. I did.

Q Is it true and correct, to the best of your knowledge and belief?

A It is.

Q I would ask that Mr. Buchanan's testimony and the attachments be bound into the record as if read.

MR. CASSEL: No objection.

MR. LEWIS: No objection.

JUDGE SMITH: The testimony is received.

(The testimony of James K. Buchanan follows:)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454-OL
	)	50-455-OL
(Byron Nuclear Power Station, Units 1 & 2)	)	
	)	

REBUTTAL TESTIMONY OF
JAMES K. BUCHANAN

Q.1. Please state your full name and business address for the record.

A.1. James K. Buchanan, P.O. Box 448, Byron, Illinois 61010.

Q.2. By whom are you employed and in what capacity?

A.2. I am employed by Hatfield Electrical Company of Chicago, Illinois, as an Electrical Engineer at the Byron Nuclear site. Hatfield Electric is the Electrical Contractor for contract Electrical Construction at the Byron Nuclear Plant.

Q.3. What is your educational background and work experience?

A.3. I attended Eastern Washington State College and Purdue University, where I completed the majority of the

requirements for a degree in electrical engineering. From 1959 to 1979 I was employed as an electrical engineer with a variety of responsibilities, including project design, supervision and contract management, both by public utility companies and private electrical contracting firms.

From November 1979 to the present I have been employed by Hatfield Electric Company at the Byron Nuclear Plant. From November 1979 until April 1981 I served as the Quality Control Engineer; from April 1981 until April 1983 I served as the QA/QC Manager; and from April 1983 until the present I have served as an Electrical Engineer.

As QA Engineer my duties included supervision of inspection personnel, preparation of procedures and review of documentation. As QA/QC Manager I was responsible for all quality assurance and quality control functions for the electrical construction activities at the Byron site. These functions include drawing and specification interpretation, procedure preparation, scheduling of inspections, selecting and training of personnel, determining the status of construction activities, providing the point of contact with the Commonwealth Edison Quality Assurance department and the USNRC Inspectors.

Q.4. What is the purpose of your testimony?

A.4. The purpose of my testimony is to provide information relating to the similarity of inspector background, training and certification, and to provide information about the similarity of inspection technique as it relates to differing components.

Q.5. What program has Hatfield Electric Company implemented in selecting and training its Quality Control Inspectors at the Byron Nuclear Plant?

A.5. At the beginning of the project, in order to provide requirements to ensure satisfactory performance of our inspectors, we implemented a program which stipulated that the inspectors (1) shall be subjected to an initial determination of capabilty based on education and experience, (2) shall be physically capable of performing the tasks required and (3) shall be trained to perform the tasks required.

For entry into the QC program we required a minimum of a high school education and some experience relating to the inspections which we were required to perform, such as previous inspection experience or production experience. In lieu of experience a certificate from a technical training program was acceptable. Those individuals with education and experience levels which exceeded our requirements were preferred.

The physical capability requirements for performing the inspections were somewhat subjective. The necessity of inspectors to access items in difficult areas was explained to the individual; and if he or she was comfortable with same, his or her capabilities were acceptable to us. The only objective physical requirement was vision: this was determined by exam.

Once an individual was accepted as having sufficient education and experience for quality inspection tasks, he or she entered a training program designed to qualify him or her to perform the electrical inspections at the Byron site. The training program for inspection personnel included a lecture phase and an on the job training phase, both of which followed the format designated in the training program. The lecture phase consisted of formal classroom training, and was, occasionally, on a personal basis. On-the-job training relates to "hands-on" training whereby the trainer and the trainee work together performing a given inspection task. To demonstrate the trainee's understanding of the tasks, and ability to perform same, standard written examinations were given to each inspector prior to certification. A score of 70% was deemed to be the minimum level of acceptability.

To ensure a continued uniformity of inspector performance, we required a periodic re-evaluation of the inspector's capability. Although this period was recommended by others not to exceed three years, Hatfield stipulated the re-evaluation period not to exceed the annual anniversary of certification or one year. After the USNRC inspection of March 1982, the Hatfield Electric program for selecting and training Quality Control inspectors became more rigorous. Additional requirements for class room training and on-the-job training were implemented.

The inspection personnel were selected and trained in a similar manner. The cable pan inspector or conduit inspector or equipment inspector underwent similar selection review and similar training.

Q.6. Describe the inspection concepts applicable to inspection performed by Hatfield personnel.

A.6. There are only two classes of inspection: subjective or objective. Subjective inspections are inspections that can not be truly measured and are dependant on human senses and judgment. Objective inspections are inspections that can usually be quantified or measured. Objective inspections can be described in terms of four principal concepts: type, size, location and condition.

The type of object being inspected would require one to identify a class, a kind or a group which is set apart from others by common characteristics. The size of the object being inspected would require one to determine the physical extent, the dimensions or the magnitude of the item. The location is simply its situation with respect to other items or its place. Condition refers to the possible state of degradation of an appurtenance: that is to say its acceptability with respect to its fitness for use.

Q.7. Please explain how the four principal concepts apply to a specific procedure.

A.7. As the four concepts are applied to a specific electrical procedure, they result in individual inspection criteria which may be quite diverse. For example, electrical cable 'type' criteria require an identification of the cable with respect to the number of conductors in the cable and

the insulation voltage rating of the conductors. For this same cable, the 'size' of the conductors is determined by the guage of the wire in the conductor. The 'location' is determined for the cable as it is situated in the building. The 'condition' criteria of this cable would examine its ability to perform its function if it were slightly damaged or dirty.

Q.8. Can you further illustrate the applicability of the principal inspection concepts?

A.8. Yes. I have attached six (6) illustrative sketches which depict the application of these concepts to specific inspections (Attachment A). If you will examine sketch #1, you will note there are two objects shown: a conduit and a conduit hanger. The conduit hanger has three basic parts: the base, the strut and the clamp. The T and the arrow pointing to the strut indicate a type of material from which the hanger component is fabricated. The illustration depicts a metal shape of a commercially available product known as Unistrut. The particular shape shown is catalog number P1001. Hence the type material is P1001 Unistrut.

Now examine sketch #3. Here you will find a major piece of equipment, a cable with its 4 terminations and a termination lug depicted. You may note the letter T and its arrow occurs three times. One points to the equipment identification which indicates the equipment type. The second is directed to the terminal lug which depicts a "ring tongue" type lug. The third is directed to the cable type

code numbers 04146, which indicates a type of cable containing 4 conductors. There is a unique type code for each type cable used at Byron.

The size of the component used for the conduit hanger base in sketch #1 is shown by the letter S. The size criteria for the base would include its height, width and length. In sketch #3 the S is shown twice; both refer to the size of the wire gauge. The size of the wire shown is 14 gauge and gauge is a size. The size of the gauge is determined by the cable code. The second S indicates the size of the terminal lug or what gauge wire it is designed to terminate. The gauge of wire is stamped in to the metal part of the terminal lug or is color coded into the terminal lug insulation.

The location of the conduit hanger in sketch #1 is shown with respect to a grid represented by lines A and 1. In sketch #3 the location of the conductors is shown as being on terminal 1, 2, 4 and 7 which are located on terminal board TB-1B which in turn is located in Panel 1PM09J. Both are unique locations.

The condition of the cable in sketch #3 and the P1001 unistrut in sketch #1 are examined by similar criteria. Is the protective coating intact? The protection coating for the cable is a rubber like jacket. The protective coating for the P1001 is a layer of galvanizing.

Q.9. As the physical attributes of items become less similar can't the inspection attributes become less similar?

A.9. No. I have already demonstrated that conduit can be compared to cable. The collective physical attributes of these objects are certainly not similar. Yet they have been shown to have only 4 principal concepts to which the inspection criteria are distributed. The cable pan and conduit system with their respective subparts are certainly quite similar. So are the cable terminations and equipment modifications. Yet each inspection attribute has a set of inspection criteria which requires the determination of type, size, location or condition.

Q.10. How does the documentation aspect of inspection activity relate to your 4 principal conecpts or to your sketches?

A.10. Each inspection activity or procedure has an inspection checklist which provides a permanent record of the identity of the item inspected, the identity of the inspector, the date of the inspection and the acceptance or rejection of the item. The acceptance or rejection can occur throughout a number of criteria. As an example, form HP-201 (Attachment B), class I exposed condiut system inspection checklist would be used to record the inspection data or, in QC terms, to document the inspection. For the conduit shown in sketch 1, the criteria are exemplified as follows:

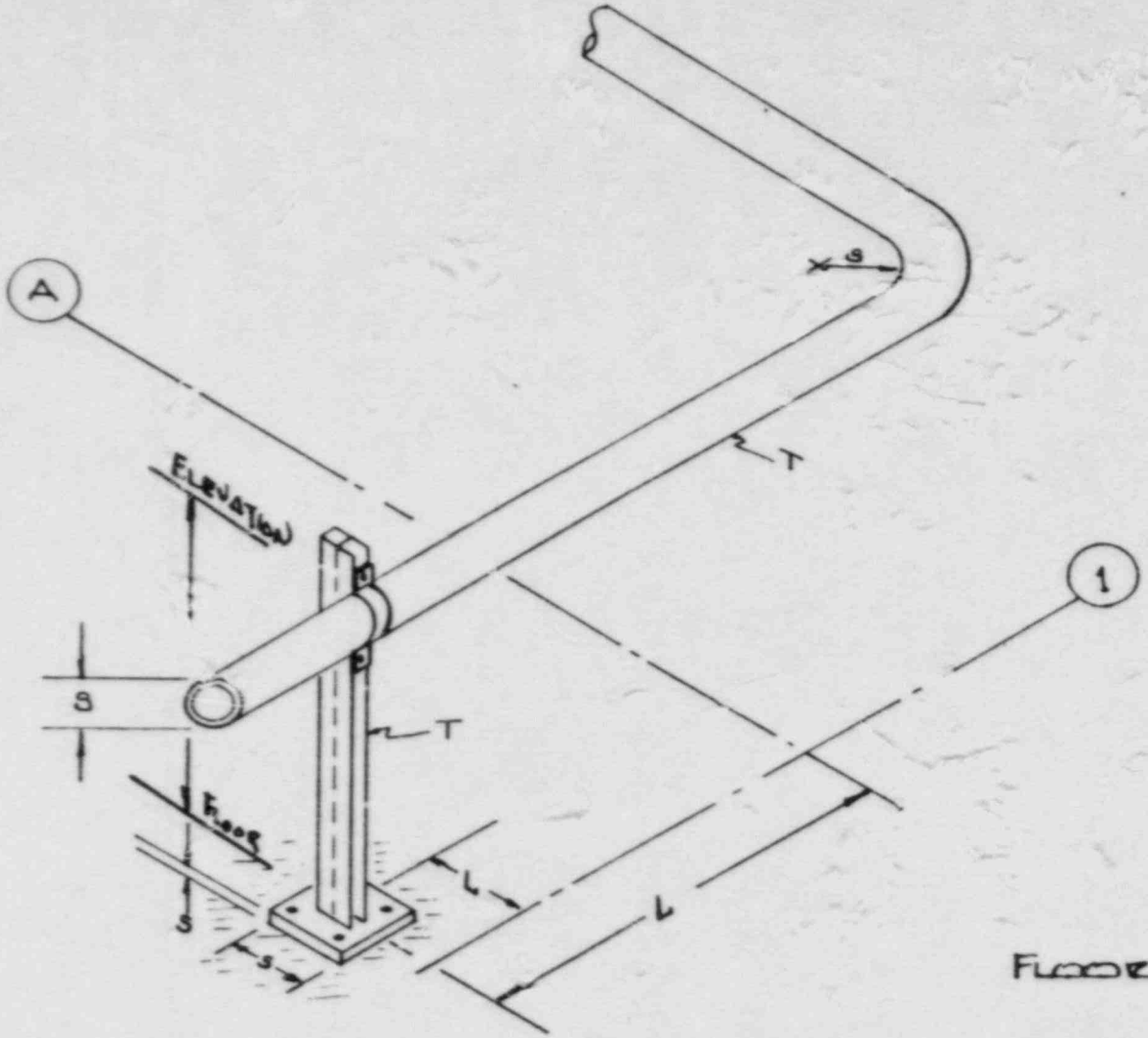
Item 1 is a size criterion for Pipe Diameter
Item 2 is a type criterion for Rigid Galvanized Steel
Item 7 is a location criterion for Elevation
Item 5b is a condition criterion for Cleanliness

This distribution of the 4 principal concepts occurs in all documents.

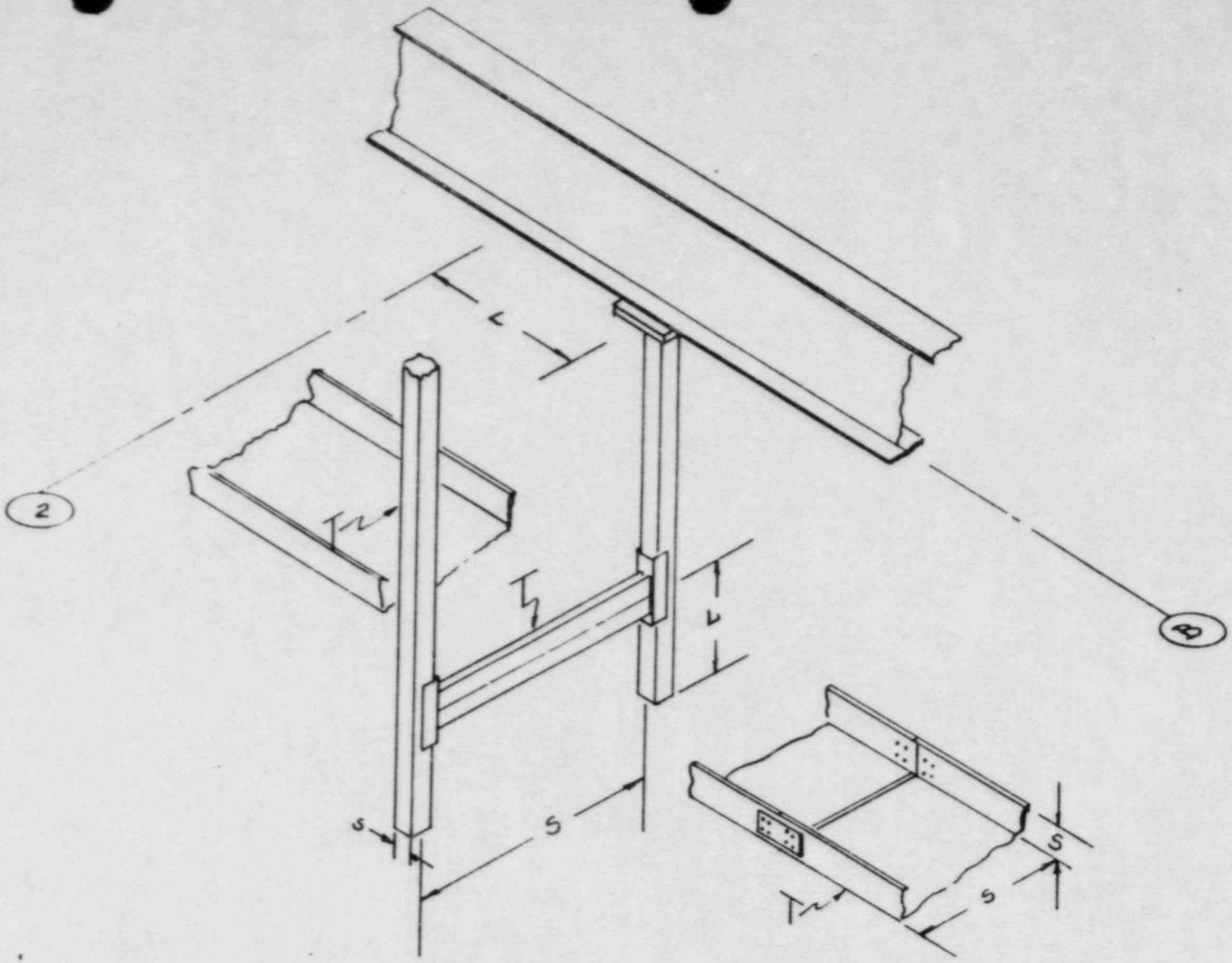
Q.11. Have you examined the Hatfield Electric Comapny reinspection program results?

A.11. Yes. I have examined the results of the Hatfield Electric Company Reinspection and I have determined the inspector employment status and their subjective and objective inspection performance. Attachment C (previously identified as Applicants Exhibit R-2) has been prepared under my supervision and lists these results in tabular form and these results are accurate.

ATTACHMENT A



FLOOR EL 426'-0"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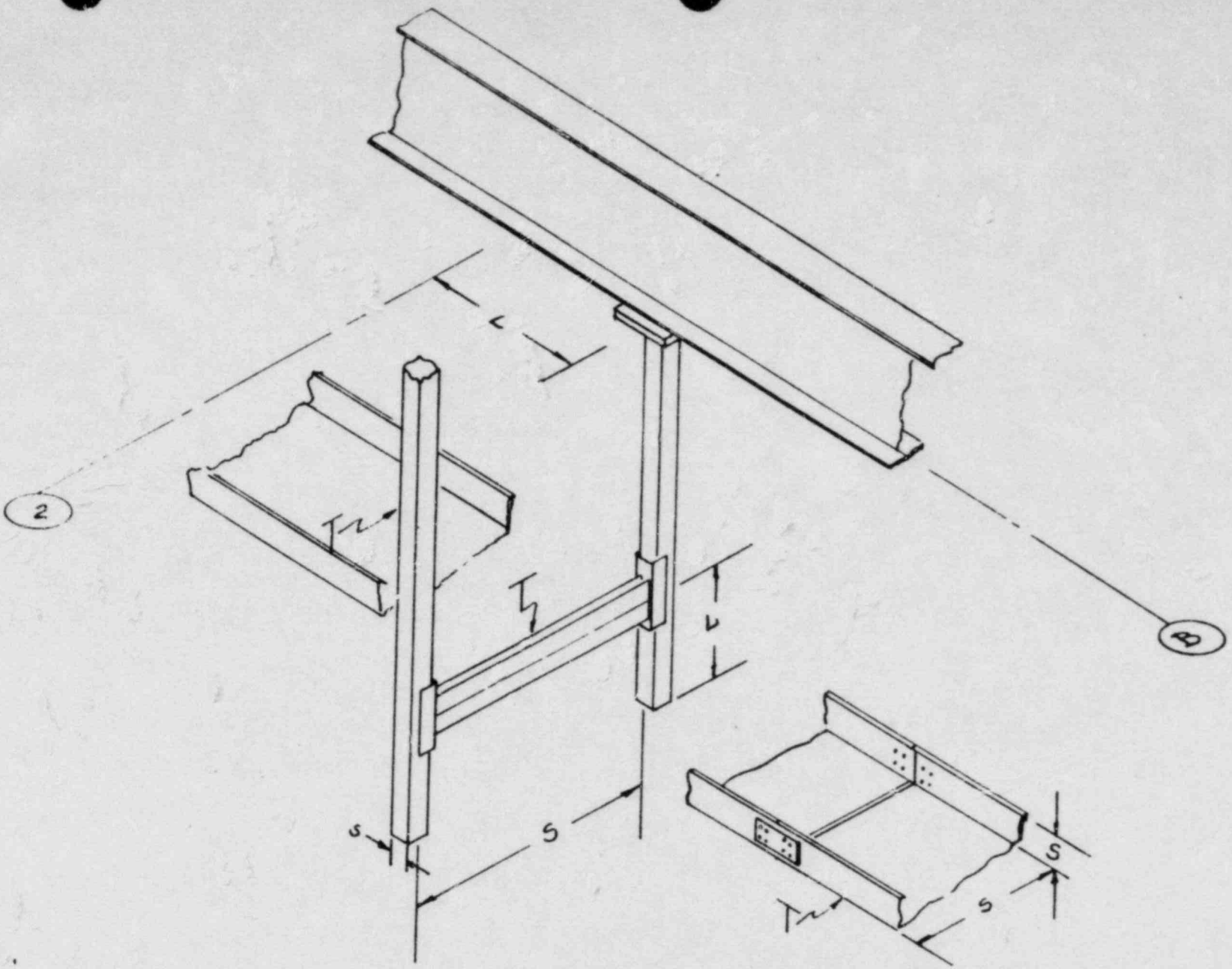
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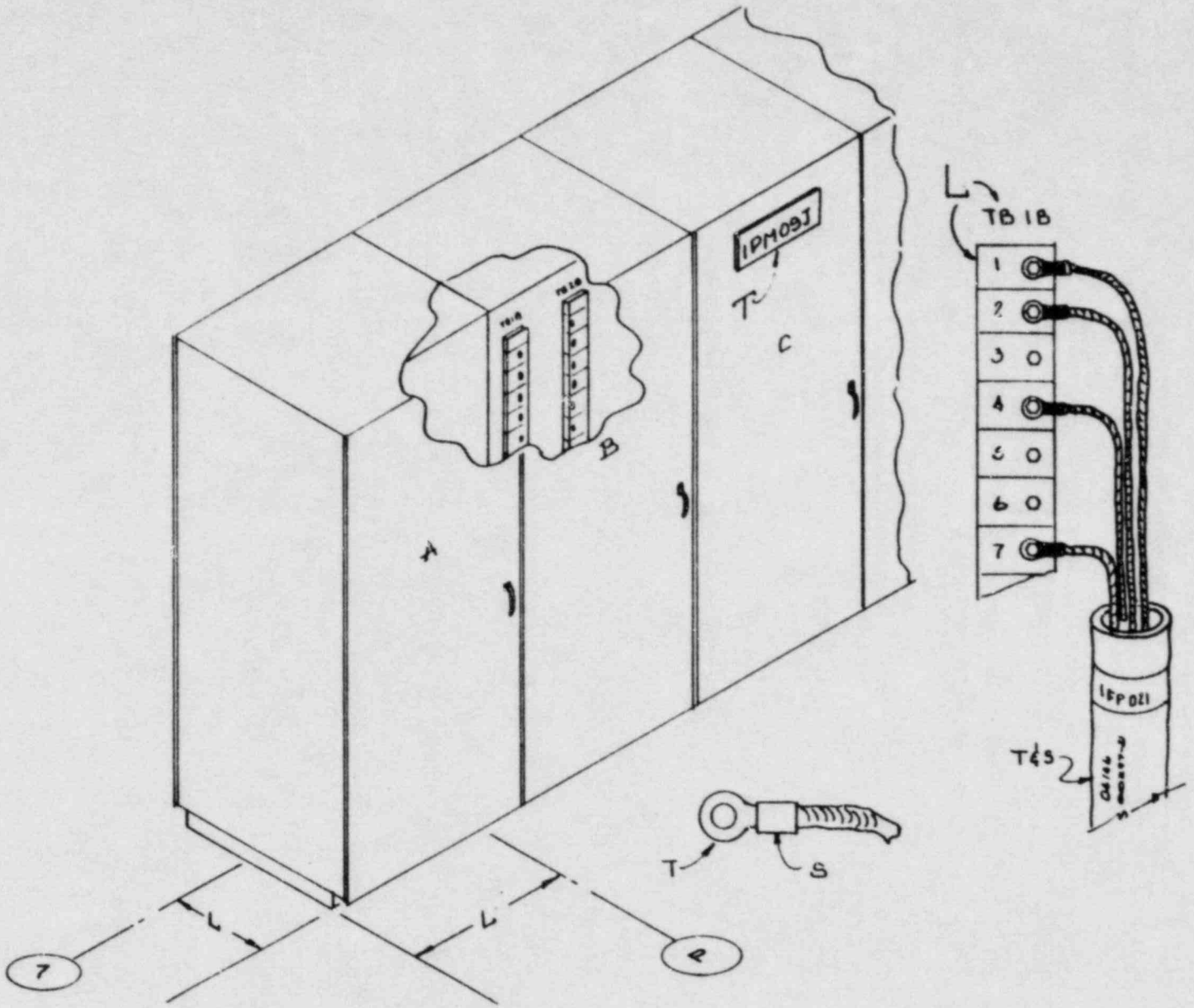
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TB1B
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1FP021
T
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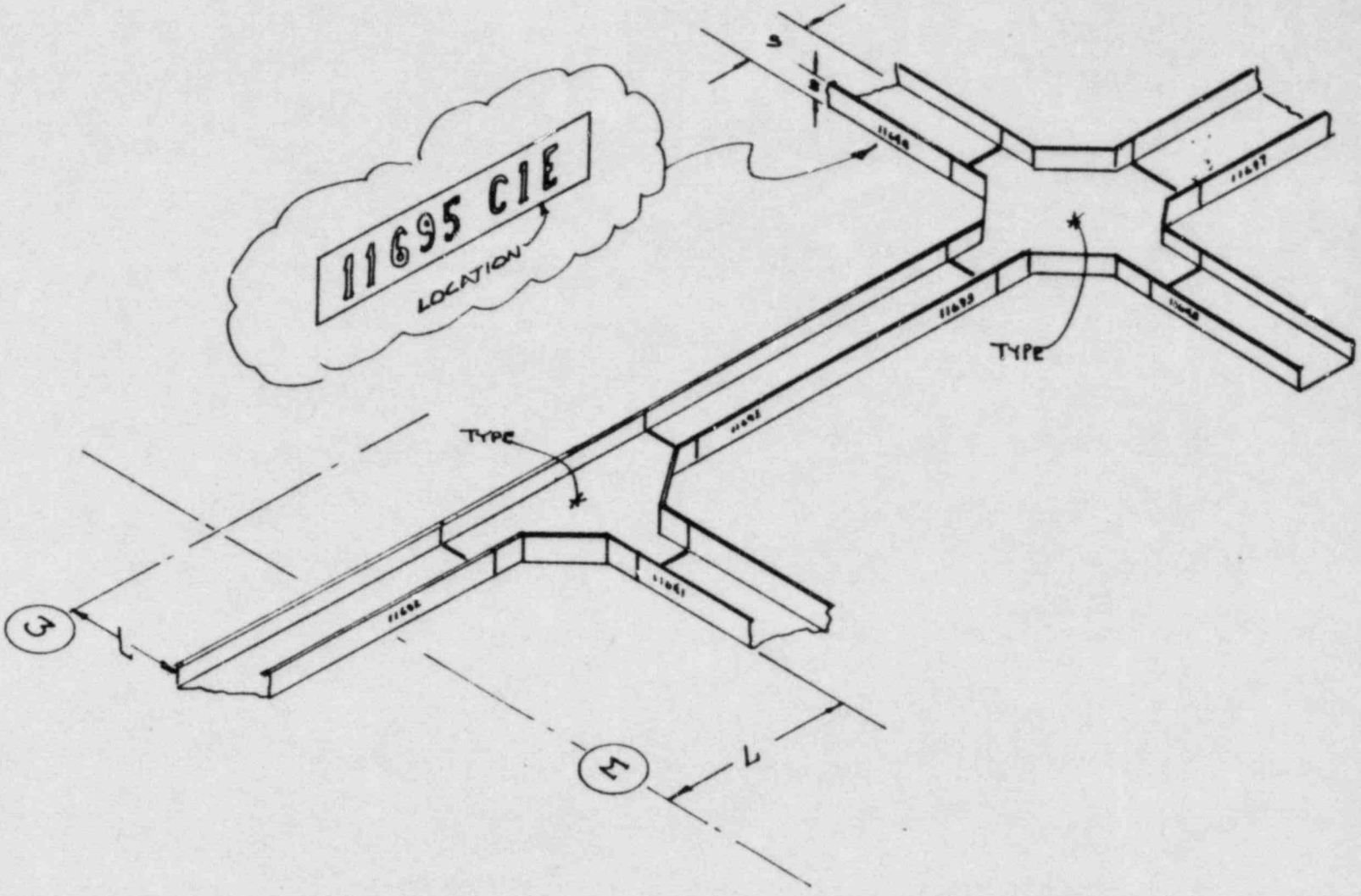
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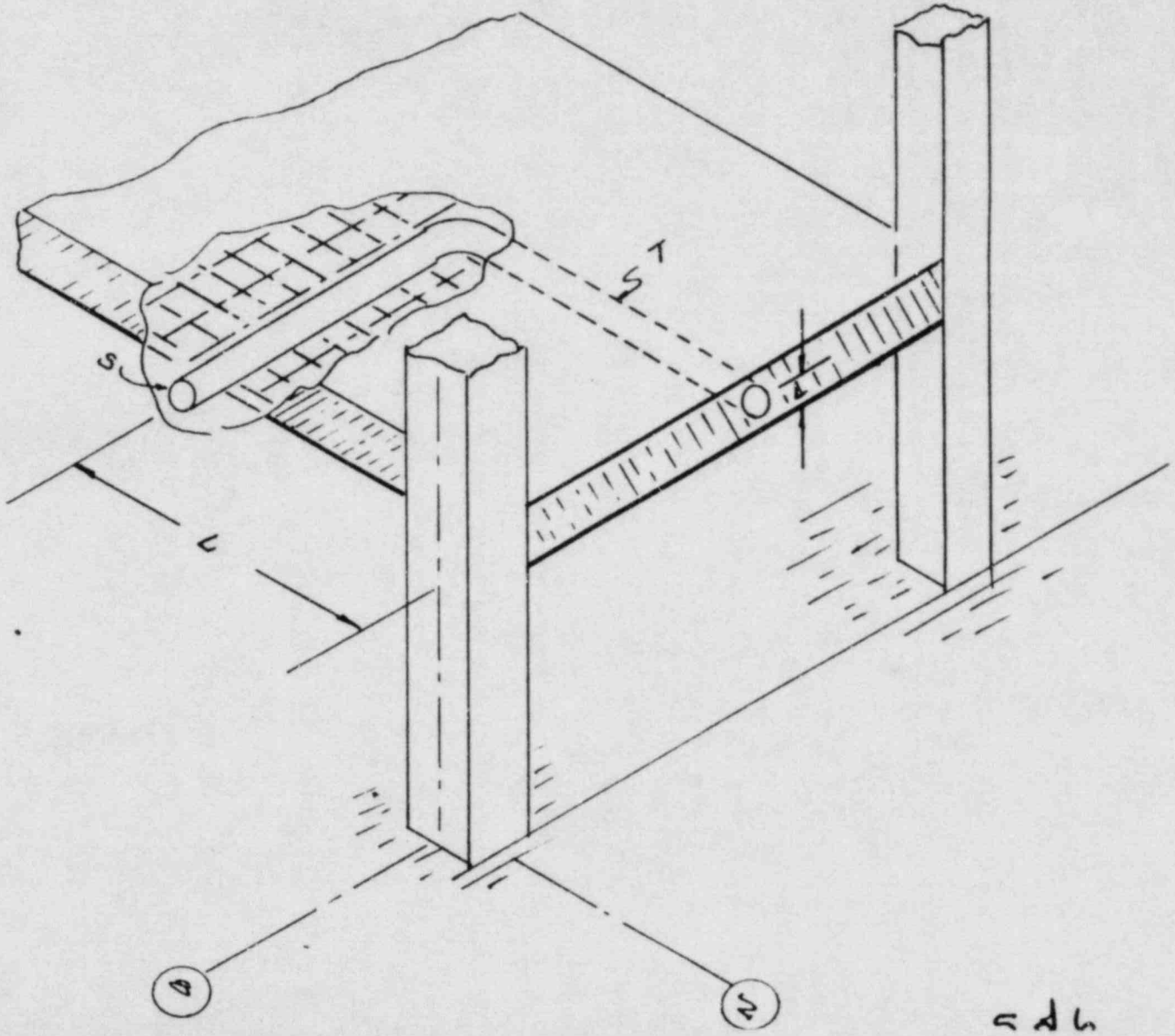
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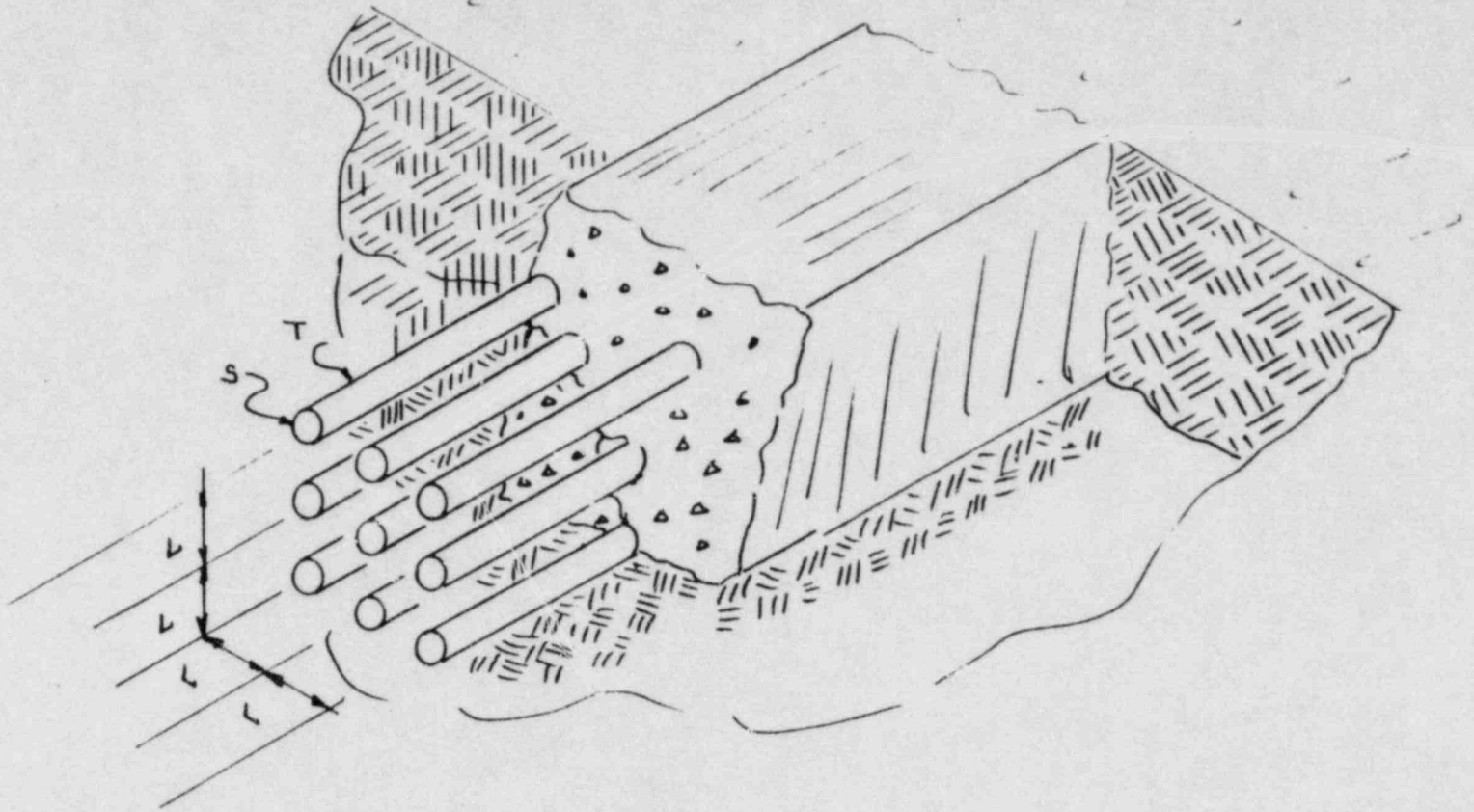
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ATTACHMENT B

File 13.20.01

Revision 14
Date 3-15-84
Form HP-201
Form revised 3-27-84

Class I Exposed Conduit System

Inspection Checklist

Report No._____

QC Inspector:_____ Date:_____

Conduit I.D._____ Cable No._____

Conduit from_____ Conduit to_____

Installation Drawing_____ Rev._____ HP-204_____ HP-206_____ _____
_____ _____ HP-203_____
_____ _____

INSPECTION ITEMS	INSPECTION A	U	N/A	COMMENTS	REINSPECTION DATE	QC	A	U
1. Conduit size per drawing (_____ in.)	O		S					
2. Seg. Code markers installed	O		T&L					
3. Supports per drawings	O		C					
4. Complete conduit run less than 270 degrees or as shown on the drawings	O		S					
5. J-Boxes per drawing a. I.D.	O		T&S&L					
b. Cleanliness	S		C					
c. covers installed	O		T&S					
6. Sealtite installation per drawing	O		T&S					
7. Conduit elevation and installation per drawing	O		L					
8. Grounding per drawing	O		T&S					
9. Bushings, locknuts, fittings and couplings installed	O		T					
10. Conduit joints tight	O		C					
11. Segregation separation meets requirements	O		L					
12. Bolts torqued per requirements Tool No._____ Calib. Exp. Date_____	O		S					

Comments:_____

Inspection Accepted By:_____ Level_____ Date_____

Final Review By:_____ Date:_____
(Level II or higher)

ATTACHMENT C

Hatfield Electric

Inspector		Employment Status Inspector Termination Date		Subjective	Objective
D. Rice	A	06/06/79		96.5	96.4
Anderson	B			--	96.4
Hoffman	C	03/XX/81	Blount QC Inspector	88.5	--
Buchanan	D	04/01/83	Transferred to HB Engr.	--	100.0
Getzelmen	E	08/26/82	JCI QC Inspector	91.7	99.6
Cripps	F	07/17/81		--	99.6
Dumas	G	10/04/81		93.5	98.2
Elgin	H			--	96.9
Smith	I	10/04/81		94.9	--
Halze	J			--	96.7
Keep	K			--	97.8
Hubler	L			--	95.0
Stoner	M			--	95.6
Wells	N			96.9	--
Koca	O			100.0	--
Emerson	P			--	96.2
Dehmlow	Q			--	95.3
Perko	R	04/30/82	Trans. to HB Prod.	--	96.1
Peterson	S			--	95.6
Lindberg	T	05/26/82		--	95.2
Hanson	U			--	98.9
G. Berry	V			--	95.6
P. Lane	W	04/18/80		90.0	--

0091k

App. Ex. R-2

sy61b4

JUDGE SMITH: I have a little problem with my set of it, though.

Off the record.

(Discussion off the record.)

end6

sy6lb5

BY MR. MILLER:

Q Mr. Buchanan, would you turn to Attachment A of your prepared testimony, please? That consists of six sketches of typical Hatfield installations of various kinds of components. Would you describe, for the record, please what each sketch represents?

A Yes, sir. I will. Sketch number 1 of 6 depicts a conduit and a conduit hanger. It is very elementary in form, as are all of them.

Sketch 2 of 6 depicts a typical cable pan hanger and how the cable pan might approach that hanger.

Sketch number 3 depicts a piece of a major switchgear component, a cable, a set of terminal blocks, and a terminal lug attached to wire.

Sketch number 4 is an isometric view of a cable pan assembly. It is, again, very small.

Number 5, sketch number 5, depicts an embedded conduit and a concrete floor.

Sketch number 6 depicts a number of conduits in a concrete encased duct system buried in earth.

Q Thank you, Mr. Buchanan.

JUDGE SMITH: I might comment that 1 through 4 were shown to the Board during our plant -- I mean examples of 1 through 4 were shown to the Board in our plant tour and Mr. Wright and Mr. Stokes and Staff.

sy61b6

MR. MILLER: Mr. Buchanan is available for cross examination.

JUDGE SMITH: You may proceed.

CROSS EXAMINATION

BY MR. CASSEL:

Q Mr. Buchanan, referring to your answer number 3, on page 2, it indicates that from April of '81 until April of '83 you were a QA/QC manager. And from April of '83 to the present you were electrical engineer. Is it correct then that you were either QA/QC manager or an electrical engineer whose duties included supervision of inspection personnel throughout the entire period of the Reinspection Program?

A No, sir. That is not correct.

Q In what way is it not correct?

A As an engineer, I had no interface with the QA/QC Department at all.

Q What is the reference, then, in the next sentence to "As QA Engineer my duties included supervision of inspection personnel." Is that a different time period?

A No, sir. If you will notice, in the same question that you just mentioned, I believe I directed your attention to the fact that my first duties at Hatfield were QA Engineer. And then I served as QA/QC manager.

Q I see. And you were a QA/QC manager until approximately when? In April of 1983?

sy61b7

A April 4th, 1983.

Q And were you also one of the inspectors whose work was reinspected in the Reinspection Program?

A Yes, sir.

MR. CASSEL: No further questions.

JUDGE SMITH: Mr. Lewis?

MR. LEWIS: No questions.

BOARD EXAMINATION

BY JUDGE CALLIHAN:

Q I have one general question, Mr. Buchanan. The same question I asked Mr. Somsag earlier this week. And this is a request for maybe a personnel response -- or professional, as you choose. If you want to speak only for yourself, or whether you can speak for Hatfield is your perogative.

How do you feel about the Reinspection Program? Do you think you've got a better plant because of it? What was your impression of the results of the Reinspection Program?

A I will speak for myself, not for Hatfield or Commonwealth Edison. I believe that the program was to demonstrate that inspectors were qualified to do a given function and I believe that we have demonstrated that without a doubt.

Q Does that say that you feel a little happier about

sy61b8

the situation then maybe you did this time last year?

A Well, yes. I feel far happier about it.

JUDGE CALLIHAN: Thank you very much.

JUDGE SMITH: Mr. Cassel?

MR. CASSEL: Nothing.

JUDGE SMITH: Thank you, Mr. Buchanan.

(Witness excused.)

JUDGE SMITH: Anything further?

MR. CASSEL: Nothing further, Judge.

JUDGE SMITH: Again, we want to thank the parties for their courtesy to the Board and their good humor. They have been cooperative and actually, to me, it was a little serious week, but it was also an enjoyable week. I just enjoyed it.

There has been interesting testimony and pleasant people to work with. And I really appreciate it.

With that, we adjourn and the record is closed.

(Whereupon, at 12:52 p.m., the hearing was adjourned.)

end6

CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the NRC COMMISSION

In the matter of: COMMONWEALTH EDISON COMPANY
(Byron Station, Units 1 & 2)

Date of Proceeding:

Place of Proceeding: Rockford, Illinois

were held as herein appears, and that this is the original transcript for the file of the Commission.

Mimie Meltzer
Official Reporter - Typed

Mimie Meltzer
Official Reporter - Signature

Suzanne Young
Official Reporter - Typed

Suzanne Young
Official Reporter - Signature