ORIGINAL

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 and 2)	

Conference Room B
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois

Thursday, June 21, 1984

Deposition of JAMES MUFFETT and WILLIAM S. LITTLE, commencing at 2:03 p.m., pursuant to agreement of counsel, before Ann Riley, a Notary Public in and for the State of Maryland.

APPEARANCES:

On behalf of Applicant:

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On behalf of Intervenors:

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Also Present:

CORDELL WILLIAMS
Region III

C O N T E N T S

P R O C E E D I N G S

MR. GALLO: Let the record show that this is the third deposition in the series of depositions involving the NRC Staff witnesses.

At the moment we have Mr. Muffett and Mr. Little, who are appearing both by their agreement and the parties' agreement, voluntarily.

Are there any preliminary matters, Bill?

MR. PATON: No.

MS. WHICHER: No.

Whereupon,

JAMES MUFFETT

and

WILLIAM S. LITTLE

were called as witnesses and, having been first duly sworn, were examined and testified as follows:

E X A M I N A T I O N

BY MR. GALLO:

Q Gentlemen, I will be asking a series of questions. You are appearing as a panel, so what I will do is address my questions to either one of you. It should be clear just exactly who is being asked the question. If it is not, just

chime in, but the point is that I intend to ask the questions of particular individuals and not just send the question forward for the two of you to decide who is to answer it.

We'll start with Mr. Muffett.

Would you state your name and address for the record?

A (Witness Muffett) Business address?

Q Sure.

A James Muffett, 799 Roosevelt Road, Glen Ellyn.

Q By whom are you employed?

A U.S. NRC.

Q How long have you worked for the NRC?

A Approximately 11 months.

Q And what are your job responsibilities?

A I am a reactor inspector in the Materials and Process Section, and since I have been with the NRC, my basic tasks have been to review designs and analyses.

Q Did you say the Materials and Process Section?

A Yes.

Q What does that mean, when you say Materials and Process Section? What materials and what processes?

A The materials and processes associated with nuclear

power plants. It is our own designation. It includes the nondestructive examination people, welding, metallurgists, analysts.

Q And what is your particular area of responsibility within that group?

A Mechanical engineering design and analysis.

Q And have you performed these responsibilities with respect to the Byron Nuclear Plant?

A No.

Q Have you been involved in performing those duties with respect to the Byron reinspection program?

A Yes.

Q In the 11 months you have been with the NRC, have you conducted any inspections of other reactors located at Region III?

A Yes.

Q Can you tell me which ones those are?

A I have been to the LaSalle site and I have been to the Fermi 2 site.

Q What was your job responsibility with respect to Fermi 2?

A We're involved in clearing up some old open items

regarding the installation and design of pipe supports.

Q You say open items. Are these noncompliance items that you are reviewing?

A Open items are items under which some action has to be taken by the NRC or the Licensee to determine exactly the nature of the item.

Q And what was the technical area again that you were looking at? I've forgotten. You mentioned it.

A It's primarily pipe supports and design thereof.

Q Are you reviewing and evaluating those pipe supports for adequacy? Is that it?

A Yes, we are reviewing some of them for adequacy and we are reviewing the process by which they are designed and the various documentation associated with their design and formal procedures, et cetera.

Q What was your responsibility with respect to your visit to LaSalle?

A It had to do there with two issues. There was removal and replacement of some snubbers, and there was another issue concerning a-- this is a fairly complex notion, but there is a thing called a usage factor on a weld in a Class I system which we had reviewed.

Q Were you involved with the engineering evaluations of those two matters?

A Yes.

Q Please state your educational background.

A I have a B.S. in Physics from Purdue University, and a Master's in Mechanical Engineering from the University of Idaho. I am a Licensed Registered Professional Engineer in Indiana, Illinois and Minnesota.

Q Are you certified as a Level III inspector?

A No.

Q Can you -- by whom were you employed prior to your employment with the NRC?

A I was with a firm called NUTECH Engineers, Nuclear Technology, Incorporated, whose head office is in San Jose, California. It has a Chicago office, and we were involved doing modifications, design and analysis to some of the older nuclear plants.

Q What was your particular responsibility?

A I was manager of the design-analysis group.

Q And was your work involved with the evaluation of reactor systems, you say? Is that correct?

A Design and analysis of primarily structures and

piping systems. The main task that we performed in that time period was modifications to some of the older reactors at Dresden, Quad Cities, Monticello.

Q How long were you at NUTECH?

A Two years.

Q Where were you employed prior to that time?

A For the two and a half years previous to that, I was outside the nuclear industry, involved in development of analytical methods.

Q Did you work with a private concern?

A Yes. I worked for International Harvester and Cummins Engine Company.

Q So how many years experience have you had in the nuclear area, then?

A I would say 10. I had three years experience at Sargent & Lundy from 1972 to 1975, and three and a half years at the Idaho National Engineering Laboratory.

Q Two years at NUTECH and almost one year at the NRC?

A Yes.

Q What did you do at Sargent & Lundy?

A I was involved in the engineering mechanics department and employed as a stress analyst. Significant

portions of that time I was involved at sites -- at the construction site at Zion and also at the plant at Fort St. Vrain, dealing with some of the field problems and how they interfaced to the stress analysis.

Q What were you conducting stress analyses of?

A Piping systems, pipe supports.

Q How long did you say you were at Idaho National Lab?

A Approximately three and a half years.

Q What were your duties there?

A I was the group leader in the applied mechanics branch. We were again dealing with stress analysis in the design of pipe supports for the experimental reactors there.

Q Were you an employee of the government, or one of the contractors?

A Site contractor.

Q Who was that?

A It changed during my s tay there. Toward the end it was EG&G, Idaho, Incorporated.

Q Mr. Little, would you state your full name and address for the record?

A (Witness Little) William S. Little. And the

address, 799 Roosevelt Road, Glen Ellyn, Illinois.

Q And by whom are you employed?

A The NRC.

Q And how long have you been with the NRC?

A Almost 13 years.

Q What are your job responsibilities at the present time?

A I am Engineering Branch Chief in the Division of Engineering.

Q Who do you report to?

A Lee Spessard, Director of the Division of Engineering.

Q And just in general terms, what are the work responsibilities of the Division of Engineering?

A It is to provide engineering expertise in support of the inspection program for both the reactors in operation, as well as those under construction.

Q Does Mr. Muffett work for you?

A He is in one of the sections that's in my branch.

Q Is there a level, a management level, between you and Mr. Muffett?

A There is a section chief in between myself and him.

Q Who is the section chief?

A Duane Danielson.

Q How long have you been the Engineering Branch Chief?

A Since January of '82.

Q What was your position prior to that time with the NRC?

A Prior to that time I was a project section chief, responsible for four operating sites, supervising resident inspectors.

Q Was that here at Region III?

A That was here at Region III. I held that position for about two years, and then prior to that time I was the section chief of Nuclear Support Section for about five years here in Region III.

Q Have you spent your 13-year career here at Region III?

A No. Prior to that, I was in Region II, where I was a principal reactor inspector for four years, primarily in the areas of pre-operational and start-up testing.

Q Please state your educational background.

A I have a Bachelor's Degree in Chemical Engineering

from Georgia Tech in 1953. I completed the course work for a Master's in Nuclear Science at the University of Idaho. I completed the course work in, it was about '66 or '67.

Q And what is your -- strike that.

What was your work experience prior to joining the NRC?

A Prior to that time I was with Babcock & Wilcox for approximately three and a half years as a licensing supervisor, responsible for coordinating all of the licensing activities on TMI-2, Crystal River and Davis-Besse, Bellefonte.

Q Who did you work for prior to B&W?

A Prior to that time I worked for Phillips Petroleum Company for 12 years at the Idaho National Engineering Lab.

Q What is the extent of your total nuclear experience, then?

A 28 years.

Q How much of that 28 years of experience is applicable to your present duties in the engineering branch?

A Well, I'd say all of it.

Q Mr. Little, are you aware of the Licensing

Board's decision in this case?

A Yes.

Q Have you had a chance to read it?

A I have not read the complete transcript.

Q How about you, Mr. Muffett? Are you aware of the decision?

A (Witness Muffett) Yes.

Q Have you had a chance to read it?

A No.

Q I was asking you, Mr. Little, with respect to whether or not you read the Licensing Board decision. It appears you said you have not read the full transcript.

A (Witness Little) I didn't read the transcript of the hearing. I read that part of the decision that affected me. I'm not sure whether I read the whole thing or not.

Q All right. You read the QA portion?

A (Witness Little nodding.)

Q Okay.

MS. WHICHER: Are you asking him a question, Joe, or are you testifying as to what he read?

MR. GALLO: Well, I thought he nodded that he had

read the QA portion.

WITNESS LITTLE: I read those portions that affected the reinspection program and the QA part, yes.

BY MR. GALLO:

Q Mr. Little, what is your understanding of what the focus of these further hearings in this case are -- or is, rather?

A (Witness Little) Well, I have read the Appeal Board's decision and I know that they have directed the Board to reopen the hearing, and the subject of the hearing primarily -- and again I'm speaking from those things I'm most concerned with, would be the reinspection program, and specifically as it affects Hunter and Hatfield and PTL.

Q Was that your understanding as well, Mr. Muffett?

A (Witness Muffett) I didn't catch everything he said. I'm sorry.

Q You didn't hear it?

A I didn't -- I didn't catch it.

MR. PATON: Both you witnesses, would you mind -- it's a lot easier, rather than making people strain to try to hear you, just talk louder. It's just easier for everybody.

BY MR. GALLO:

Q Well, strike that last question.

Mr. Little, were you involved in the CAT inspection at Byron?

A (Witness Little) I was the branch chief at the time, yes. Yes, I was involved.

Q And you were involved in the decisionmaking in the original noncompliance involved in the certification of those QC inspectors?

A Yes. Our branch was involved with the planning of the CAT inspections. Duane Danielson, who was the team leader, was one of my section chiefs, and I was involved in the review of the report and the subsequent activities that went on from the time of the inspection until they proposed the reinspection program.

Q I assume, Mr. Muffett, that was before your time; right?

A (Witness Muffett) Correct.

Q Mr. Little, did you participate in reviewing the proposals made by Edison at the time when the reinspection program was first conceived?

Do you understand my question?

A (Witness Little) Not exactly, no.

Q All right. My understanding is Edison had suggested various forms of the reinspection program in terms of structure, and there was a give-and-take between Edison and the Region. I was wondering if you were involved in that activity?

A Yes, yes.

Q What was your responsibility during that involvement?

A Well, as the branch chief responsible for the CAT team inspections, it was our branch's primary responsibility to evaluate the Licensee's responses to the items of noncompliance, and to make a decision as to whether the response is adequate or not.

Q Did you have an opinion with respect to the formulation of the reinspection program as initially submitted to you?

A What are you calling the initial submittal now?

Q The letter of February 23rd, 1982 from Commonwealth Edison. '83. Mr. Stiede.

MS. WHICHER: Maybe you could either establish some independent recollection of that letter or show him a

copy of it, or are you testing his memory?

MR. GALLO: I'm doing both, but I don't have a copy with me, so I'm going to have to test his memory.

WITNESS LITTLE: I know what you're talking about.

MR. GALLO: The witness says he knows what I'm talking about.

MS. WHICHER: I have copies of those letters here if you'd like to use them for exhibits, Joe.

MR. GALLO: Let me take a look at them and see if I want to.

BY MR. GALLO:

Q Do you need to refresh your memory by looking at this letter, Mr. Little?

A (Witness Little) No, I don't think so.

Q My question is, at the time this was submitted, it's my understanding that the Region ultimately sent back a letter indicating its concurrence with the proposal.

A Yes.

Q Is that an accurate statement?

A We never officially approve or concur, but we sent back a letter acknowledging the receipt of their letter. I think we had a couple of suggestions as to things that they

should do, but, yes, the letter definitely indicated that we had approved the program as submitted in this letter, with a couple of comments that we made there.

Q Did you have any reservations with respect to the program as it was formulated at that time?

A No.

Q Are you aware of any others in Region III that did?

A Oh, yes. Anything like this, you know, you've got the whole spectrum of positions.

Q Do you recall who had reservations with respect to the program?

A The -- well, certainly Bill Forney did, although at the time when we finally -- after the February letter, I think our impression was that he was satisfied.

Q That ultimately turned out not to be the case, though, as I understand it, from his testimony before the Licensing Board. Is that your understanding?

A Well, you know, I think he would qualify that. Yes, I'm aware of his testimony.

Q Any others that you can recall besides Mr. Forney?

A Well, when you get into a thing like this and you

go through many meetings, evaluating things, you will have people that move from side to side. I don't recall anyone as vocal as he was.

Q How about Mr. Spessard? What is your recollection of his views?

A I really don't recall. He was not my boss at the time.

Q I see.

How about Mr. Danielson?

A His -- he was satisfied with the program.

Q And Mr. Keppler, do you have any knowledge with respect to his views?

A To my knowledge, he was satisfied with the program. I didn't spend much time talking to him about it.

Q Mr. Muffett, at this time were you involved with this interaction that Mr. Little and I are discussing?

A (Witness Muffett) No.

Q Mr. Muffett, when did you first begin to work on the Byron reinspection program?

A It was late 1983, I believe, and we received a document -- it might have been early '84 -- we received a document which was in essence a copy of this reinspection

report, but it wasn't the final copy, and we had a public meeting at the Holiday Inn.

I was given that report and asked to investigate the engineering evaluations performed as part of it.

Q Are these the evaluations of the weld discrepancies?

A Yes, and a number of other things, also.

Q For the record, I think that was mid-January 1984.

Are you familiar with the reinspection program report prepared by Edison that is in front of you now?

A Yes.

Q Can you identify for me what sections you had responsibility for reviewing in that report?

MS. WHICHER: Joe, would you please establish which copy of the report is in front of him, since there have been several preliminary reports.

WITNESS MUFFETT: This is February 1984, the final report on the Byron QC inspector reinspection program.

BY MR. GALLO:

Q All right. Can you identify for me what portions of that report you were responsible for reviewing?

A (Witness Muffett) The easiest way for me to

characterize that is the engineering evaluations which include the subjective evaluations and the objective evaluations.

Q When you say subjective, you mean subjective attribute evaluations and the objective attribute evaluations?

A Yes.

Q Mr. Little, with reference to the same report, were you responsible for reviewing any aspect of the report?

A (Witness Little) Yes. My branch was responsible for reviewing the entire report.

Q Did you personally review any aspects, or did you just review their work?

A I have read the entire report, and spent more time on some areas than others.

Q What areas did you spend -- did you particularly pay attention to?

A Well, the evaluation of the results, the reinspection.

Q In the final report of the reinspection program, there is the use of statistics as a tool upon which to draw judgments. Who reviewed that aspect of the reinspection report, Mr. Little, for adequacy?

MR. PATON: Joe, excuse me, can we go off the record?

(Discussion off the record.)

MR. PATON: Mr. Gallo, would you please ask the witness if he is familiar with the matters that you just referred to?

MR. GALLO: Certainly.

BY MR. GALLO:

Q Mr. Little, are you aware that the final report of the reinspection program utilizes statistics as a tool for making some of the judgments and conclusions that are reflected in that report?

A (Witness Little) Yes.

Q And can you identify for me what some of those statistical tools are that I have referred to?

A I guess I'm not -- don't understand your question.

Q Let me strike that.

Does the use of the acceptance criteria of 95 percent and 90 percent involve a statistical tool?

A In my mind, no.

Q It does not? All right.

How about the -- with respect to the results of

the reinspection program which was, as I understand it, performed on a sampling basis; is that correct?

A Right.

Q And were inferences drawn from the sample as to the total population of inspectors?

A Yes.

Q Is that a statistical enterprise?

A No, not in this case, not from our approach.

Q Can you explain why not?

A We do not believe that this type of reinspection program is a good program and -- I don't know how to say this right -- I don't think statistics is a good tool to use when you have a program that has so many variables. We have inspectors, different inspectors, different expertise, many different attributes that they are inspecting.

The conditions under which the inspections are carried out are far from lab conditions. They are very diverse, and in our opinion a program of this type -- I would say it would be extremely difficult to divide it up into homogenous groups then that you could independently randomly sample. You know, if you can do that, well, then, yes, I think you can use statistics.

It was the Region's position that that would be an almost insurmountable task to considering all of these variables, to divide it up into the homogenous groups that would be required to draw some good conclusions from the resulting statistics.

Q Do you consider yourself an expert in the field of statistics?

A I don't consider myself an expert. I have had six semester hours graduate school course in mathematical statistics. I have used statistics in experimental design and the evaluation of experimental data. I have used it. I don't consider myself an expert, but I do know what some of the basic rules are.

Q Did anyone from the Region with a background in statistics review the reinspection report? And I'm referring to the final report.

A The -- Jim Muffett has read that, it's my understanding. I myself -- I do not know how many people have. We do not put great weight on the statistical portion because of what I just described to you.

Q But you were in charge of getting the reviews done, weren't you?

A Right. Right.

Q Did you give it to anyone with statistics expertise?

A No. No.

Q Mr. Muffett, do you have that expertise?

A (Witness Muffett) I would say I am in the same category as Bill. The only difference is I have a little more time to dig into it because that's my job. But I am basically a user of statistics. I would not consider myself an expert. And we never really considered this a statistical program for the reason that Bill delineated, so that we can review it for that.

Q All right. Mr. Little, what is your understanding of the purpose of the reinspection program?

A (Witness Little) Well, you can be very basic and say the purpose of the reinspection program was to satisfy the item of noncompliance 82-05-19.

Now, to go beyond that, our CAT inspection identified that there were problems with being able to prove that quality control inspectors were certifiable. We believe the basic purpose of the reinspection program was to determine if those inspectors who may not have been certifiable -- if

they overlooked any significant numbers of safety-related hardware deficiencies.

I would say that, we feel, is the primary purpose.

Q Is it fair to say that the purpose was to determine the qualifications of those inspectors that you referred to?

A You can infer from results things about the qualifications of those inspectors.

Q Was the report also used to make a statement about work quality?

A Yes. Yes.

Q And that was a purpose as well, then?

A That was to us, anyway. It was a very important conclusion you can draw, but the program, as we saw it, was not conceived with that as the primary objective.

Q Do you agree with that characterization of the purpose of the reinspection program, Mr. Muffett?

A (Witness Muffett) Yes.

Q Mr. Muffett, how many inspection reports involving the reinspection program have you been involved with?

A One.

Q And that one is?

A 84-13 and 84-09.

MR. GALLO: Let the record show that that is Love Exhibit No. 3.

MS. WHICHER: 83-13? Is that what you said?

WITNESS MUFFETT: 84-13, 84-09.

BY MR. GALLO:

Q How many of the inspection reports involving the reinspection program have you been involved in, Mr. Little?

A (Witness Little) In one way or another, all of them. Those that were conducted by inspectors in my branch, I reviewed all of them. Those conducted by the resident inspectors, I have read those areas of their report which pertained to the reinspection program.

Q Would this include 83-39?

A Yes.

Q It comes to mind what that is?

A I think that's Kavin Ward's report; right?

Q Yes.

MR. GALLO: Let the record show that was Ward Deposition Exhibit No. 1.

BY MR. GALLO:

Q Gentlemen, do you have a copy of 84-13 in front of you? I'm going to ask a series of questions.

A (Witness Muffett) Yes, I do.

Q Mr. Muffett, looking at this inspection report designated as 84-13, what portions were you responsible for in terms of writing the report?

A The initial summary and conclusions I did not write, but they were based upon our decisions between Kavin Ward and myself.

The part which I was an author of is Section 2 on page 27 of my report, review of calculation and engineering judgments.

Q Mr. Little, were you involved with writing any of the portions of this report?

A (Witness Little) I wrote the summary and conclusions.

Q Just to be clear, is that the material on pages 2, 3, 4, and 5?

A Well, if you include Table 1, it would go through page 7. 2 through 7.

Q Page 7. All right. So you wrote the conclusions appearing on page 5; is that correct?

A Yes.

Q Do you still stand by those conclusions?

A Yes.

Q Mr. Muffett, do you agree with those conclusions on page 5?

A (Witness Muffett) Yes, I do.

Q Do you have any reservations or concerns or disagreements?

A No.

Q Mr. Muffett, as you indicated, you said you authored the section starting at page 27.

A Yes.

Q Does that deal with your review of the engineering evaluations conducted by Sargent & Lundy?

A Yes.

Q And this is for both subjective and objective attributes?

A Yes.

Q And to be more clear, the discrepancies in those areas?

A Correct.

Q Can you turn to page 27, please.

A Okay, I have it.

Q I'm looking at the top of the page, and it is stated that the reinspection program, or I should say the report on the reinspection program -- and I'm quoting now -- "found a number of instances where either ASME Code, AWS Code or General Design Intentions were violated."

What did you mean when you used the term "General Design Intentions"?

A The designer had meant, using a couple of examples, for a pipe support to be in a certain location and it was constructed slightly out of location. It was the intent of the regional designer to have it somewhere and because of many different things or reasons, it could have been slightly displaced.

Q Is that the same as a deviation from design requirement or not?

A It's a very fine line. I don't feel that it is.

Q Can you explain why not?

A The design requirement would portray that that's -- if we still stick with this hypothetical example, for that support to carry some amount of load. If it's six or seven inches out of place, it would still carry the load, and it

would have very minimal impact on the support -- on the structure that it was supporting, whether that was a cable or a pipe.

Q Are you testifying that just physical mislocation is not enough to show a discrepancy or a departure -- or what was the term you used? I've forgotten now. Deviation from the design requirements?

A That's right.

Q You have to also look at the loads to make that --

A That's correct.

Q During yourinitial review of the evaluations continuing on page 27, you state that you reviewed the evaluations for technical methodology. What does that term mean as you used it here?

A What I mean there is the method that they were dealt with, proper analytical equations or the proper equations drawn from codes were used in the calculations of stresses and loads.

Q Did you find any circumstances where the technical methodology was not appropriately used?

A I have three instances noted in here in the report itself, where we had a minor disagreement. But those

disagreements in no way impacted the safety or the ability of the components to perform their function.

Q Could you identify the three areas?

A If you look to paragraph -- if you look on page 31 at the bottom, there is an asterisk which says, "See paragraph 1(c) of this section of the report," which is on page 44. If you'd like me to delineate these three items --

Q Yes, go ahead.

A There were two welds that were resolved by S&L, stating that a lack of fusion existed in only the first or last quarter of an inch. It was our position that you couldn't know that until you physically ground the welds out and determined that it was only a quarter of an inch long. These welds were replaced and this had no safety significance.

Discrepancy HE-121, Inspector's Report 2219, had no calculation backing up the disposition at the time of the review.

Through my complete inspection this was the only incident where this happened, and the third one was a difference in methodology, where the reinspection found slag in a weld. I believed it was more conservative to reduce

the length of the weld than to reduce the cross-sectional area. But as it turns out, the case was reviewed, the consideration was satisfactory using either method.

Q I see. For the one example that you pointed out on page 31 in the column entitled "NRC Resolution," apparently you concurred in the evaluation even though you had this element of disagreement; is that true?

A Yes. Well, basically we concur with that asterisk which sends you back here and says that these welds were replaced and so at this time there's no safety significance. So we concur with the final disposition. We had a slight difference of opinion about how to get there but it appeared to be immaterial.

Q In each case was the weld replaced?

A I believe so, yes.

Q Was that the central basis for your opinion that there was no safety significance?

A There was additional evidence in that I was given a report by a QC inspector from the field that when they had ground this out, that the lack of penetration was only a quarter inch long, and -- I'm sure you were aware that many things were replaced that didn't have to be.

Q So your concurrence again, looking on what I guess has been designated Population No. JC-27 on page 31 -- would it be fair to say your concurrence was based in part on data you received from the field, and the fact that they had replaced the weld?

A Yes.

Q Where else is there an asterisk?

A HE-121, I forgot what page that's on.

Q Take your time.

A Okay, this is page 38.

Q Okay.

A Okay, and if you see the last one, it says "Description: No calculation. Present calculation prepared during inspection." And that calculation was reviewed and accepted.

Q Explain this one for me. This was a discrepancy involving -- what kind of discrepancy was it, first of all? Can you tell?

A No, I couldn't tell you right now, but I believe that it had to do with a conduit support.

Q And what calculation was missing?

A Well, generally in this type of thing, I'll

characterize the conduit supports. The member was different from what we specified. It was in a slightly different location, or the attachment was slightly different from the original design drawing. When these things were identified, the engineers at Sargent & Lundy evaluated that member or that type of connection or that location through a short calculation.

Q And that was the calculation that was missing in this instance?

A Right.

Q When this was brought to their attention, were they able to recreate the calculation?

A That's correct. As it says, they prepared the calculation during my inspection. A lot of these things are fairly trivial to repair, and it was given to me by the end. But they were completely forthright with me that it was an isolated incident, or they were forthright that they did not have a calculation.

Q Did you find any other instances like this?

A No.

Q How about the last item? Maybe or page 40.

A At this time I cannot take you to a specific

instance of that.

Q It's not the one on page 40?

A It might be.

Q Why don't you turn to page 40 and take a look?

A That's it, yes.

Q Now explain again your opinion about how this slag matter differed from what S&L had to say.

A It was my opinion that when you had slag included in the weld, to discount that part of the weld that had slag in it and remove it from a load-bearing calculation, so that you in effect reduced the length, you took part of the length out. In this instance, the Sargent & Lundy people, instead of reducing the length, had changed the cross-sectional area of the weld.

Q What was the effect of that?

A Well, they were able to show that the weld could perform its design function. But I'd like to highlight why these things were brought out in the report.

Q Go right ahead.

A When we find methodology that we disagree with, we like to highlight it, so that it doesn't appear that we're giving a blessing to a methodology that we have

misgivings about. But in all these cases the objects were able to perform their design functions.

Q Regardless of this difference of opinion on methodology?

A Right. Doing it either way.

Q Was it in fact done both ways?

A Yes.

Q All right.

MR. GALLO: Let the record show that we have just been talking about discrepancy No. PAP-733 on page 40.

WITNESS MUFFETT: And --

BY MR. GALLO:

Q Do you have further to add?

A (Witness Muffett) It's PAP-850 discrepancy number.

Q Returning back to page 27, you indicate that the calculations were reviewed for completeness. What baseline did you use to determine that? And let me explain what I'm getting at. Did you use your own engineering judgment, or was there some code requirements that provided a baseline for completeness?

A That is one measure and also the design specs that the things were designed to which delineate which are

the loads that they see, and also for the completeness of methodology, and by that I mean the man didn't just stop at calculating the loads, where he should have carried the calculation on to determine a stress.

Q I think in answer to my question -- at first you said that is one method and I had put my question in the alternative. I initially said did you use engineering judgment, or did you use the codes as a baseline against which to measure completeness.

You said that was one measure. Which one were you referring to?

A I would say that it's both of those.

Q Both of those. All right.

Finally, you indicate on page 27 that you reviewed the calculations for proper references. What did you mean when you used that term?

A What that refers to is oftentimes in an engineering analysis, the engineer will need a number from somewhere else, an acceleration of the floor due to an earthquake, a temperature of a piping system, a weight per unit foot of conduit. Now these numbers have to come from some other document. In safety-related calculations it is

required that you reference where these numbers came from, and that is what that refers to.

Q I see.

Did you find in your review any references that were not accurate, to the best of your recollection?

A In my initial review -- and this report covers two inspections -- I believe that there were two instances.

Q Do you remember what those were?

A Delineating where an acceleration had come from, and I believe that they were both related to that.

Q Do you remember the discrepancies?

A No, I couldn't -- I don't believe I could tell you at this time.

Q Was any corrective action taken when you identified these two?

A Well, the way these things typically go is I will review the calculation, I will have a Sargent & Lundy contact, and I'll say, "Where did you get this number?" And he will throw up his hands and say, "Oh, that should be referenced," and go get the reference and show it to me, and then change the calculations.

Q In these two cases, was it the wrong reference or a

lack of reference?

A Lack of reference.

Q I see. I guess I will ask the same question with respect to completeness. Did you note any calculations that you reviewed that were incomplete?

A No.

Q Although I have been asking questions with respect to your initial review on page 27, my questions have been general and they could be interpreted to also apply to your second inspection.

A That's correct.

Q If I were to repeat those questions, would your answers be any different?

A No.

Q So there was no new technical methodology problems noted by you, no new completeness problem, or no improper reference problem?

A (Witness Muffett shaking head no.)

MR. PATON: Jim, you have to answer.

WITNESS MUFFETT: No, there were none of those things.

BY MR. GALLO:

Q All right. Thank you.

Can you describe for me the general approach used by Sargent & Lundy to evaluate the welding discrepancies?

A (Witness Muffett) The general approach -- and this is a fairly complex subject -- is where these discrepancies were identified, in a large number of cases that part of the weld with the discrepancy identified was removed from the calculation and the calculation based on the reduced or the satisfactory part of the weld was done.

Q Did you only look at the discrepancies that were -- strike that.

You didn't look at all the discrepancy engineering evaluations, did you?

A No.

Q You looked at a sample of them; correct?

A Correct.

Q With respect to the ones that you looked at, was your review limited just to those that were evaluated on the basis of calculations?

A There were a number in there that were evaluated

by judgment, which I looked at the judgment and concurred, and in the inspection report they are categorized as X, Y and Z, where one category is okay by judgment, one is a strength reduction of less than 10 percent, and the other one is a more detailed analysis where the strength reduction is greater. I reviewed some of all of those.

Q Are you also familiar with the terms A, B-1, B-2 and C?

A Yes. Yes.

Q Can you tell me what A is?

A These designations were used in the earlier report, I believe, and they were essentially a categorization of, A was okay by judgment; the B was the reduction of strength by --

Q I'm being unfair to you. Why don't you turn to C-2 of the report. No need for a -- it's Appendix C-2, Exhibit C-2 in Appendix C. The categories are shown, for example, on page 6 of 15 of Exhibit C-2.

A Yes.

Q So A was essentially no structural impact?

A Correct.

Q And what does that mean to you?

A This was the type of thing that was either purely cosmetic or had to do with a change in requirements or something like that, where it was obvious that there was no impact to the ability of the structure to perform its design function.

Q And Category B apparently there were -- strike that.

Welds included in Category B apparently involved a strength reduction; is that correct?

A Yes.

Q In your opinion, what is the significance of dividing those under 10 percent, those over 10 percent, if any?

A Personally, to me, the significance deals within that the methodology of designing welds has a lot of conservatism in it, and based on my experience and expertise, welds that are only reduced in their strength by less than 10 percent are a much less critical category than welds that are reduced in strength by greater than 10 percent.

Q So 10 percent is meaningful to you in terms of that kind of definition; is that true?

A Yes, correct.

Q My understanding is that during three

inspection programs, two cracked welds were discovered. Is that your understanding?

A Yes.

Q Did you review the engineering evaluation of those two welds?

A Yes.

Q Does that appear in your report any place?

T.3 A One of the welds, I don't believe, appears anywhere because it turned out that it was not a load-carrying weld and it had no relevance to safety-related issues.

The other one was on a cable tray.

Q Was it a Hatfield weld?

A I couldn't say definitively. I believe that it was.

Q I'm going to ask you what were the results of your evaluation if you can't find it, and you can still answer the question. Feel free.

A The results of the evaluation was that the initial calculation that had been done had some difficulties. When I mentioned these difficulties to the Sargent & Lundy people, they recalculated.

Again, it's a difference in methodology. When they recalculated, it was obvious that there was no safety

significance whatsoever.

Q And what were the initial difficulties that you are referring to?

A It was the way that a response spectra was applied, I believe.

Q Do you recall the circumstances of how the response spectra were applied?

A The initial calculation had been formulated with the cable tray having none of the other supports that it had. If you are familiar with a cable tray, they have quite a few supports. The analytical model that the engineer had set up had a section of cable tray with only that support on it, and with only one weld, the remaining weld would have a twisting moment and this twisting force was not taken into account. When this was brought to their attention, then we went back -- they went back and recalculated based on the conservatisms inherent in that initial calculation and showed that it was not safety-significant.

Q This twisting moment is a result of a seismic event; is that it?

A Yes.

Q Do you know how many engineering evaluations of

welds that you reviewed?

A I would say that it's around 80.

Q 80?

A (Witness Muffett nodding yes.)

Q And these were all of engineering evaluations of AWS weld discrepancies?

A And ASME.

Q And ASME weld discrepancies?

A (Witness Muffett nodding yes.)

Q Based on that review, did you draw any opinion with respect to the adequacy of the Sargent & Lundy engineering evaluation of weld discrepancies?

A Yes.

Q And what was that opinion?

A I believe they had an effective program to deal with this problem. The program was set up that so it kept effective records. I was able to trace back to inspectors' reports, original reports and methodology used was correct.

Q You hold this view despite the disagreements that you have told me about here today?

A These are very minor philosophical disagreements, I would say. I was pleasantly surprised that there were so few

Q I'm going to ask you this question, because I think it's a good question to ask early in the proceeding:

Was your judgment influenced at all in any way by the fact that you used to work for Sargent & Lundy?

A No, not at all. I left their employ nine years ago, and I feel no allegiance one way or the other. I'm a professional and I have my integrity, and I try to do a good job.

Q Good enough.

With respect to the objective discrepancies that you evaluated, my understanding is Sargent & Lundy used a different set of category markings for those discrepancies. Do you remember what those were? Appendix D of the report.

A I guess what you are referring to is the X, Y, and Z?

Q Yes. Did you review any discrepancies in Category X group?

A Yes.

Q What kind of discrepancies were placed in that group?

A These were things -- evaluations -- these were evaluations against present design parameters, and what I mean by that, tolerances had tended to change over the life

of the project. There were things that would be discrepancies under this program that wouldn't be a discrepancy now because of loosening of tolerances. That's an evolution that takes place when the plant is completed.

Q Again, did you review -- were some of the calculational evaluations that you reviewed in Category Z?

A Evaluation by engineer and calculations? Yes.

Q Did you review any engineering judgments in Category Y?

A Yes.

Q How did you make that review?

A These reviews, these judgmental reviews, are made in light of the loads that are applied and also based on experience in that after dealing with items of structural steel for a number of years, you can see that a load of 10 pounds is not going to make a big difference whether the thing is a quarter inch thick or a half inch thick, and these type of judgments come with experience.

Q Were the judgments made by Sargent & Lundy recorded some place so you could review them?

A Yes.

Q Where were they recorded?

A They were distributed or cataloged in a certain, I guess you'd say, notebook.

Q Were you able to review those judgments and form -- review those explanations and form your judgment with respect to the adequacy of the S&L judgment?

A Yes.

Q Were there any times that you disagreed with the S&L judgment?

A No, I don't believe so, at this time. I'd have to review my paper, but nothing sticks out in my mind.

Q Do you remember how many objective discrepancy evaluations were reviewed by you?

A My report is not split in objective and subjective, and the calculations -- really, whether the calculation is objective or subjective, that doesn't bear into it. I would say that on a total I looked at 120 different types of calculations.

Q You previously testified that 80 involved welds?

A 80 involved welds, but some of those are subjective and some of those are objective, and through the window of the calculations that really makes no difference.

Q All right. Let me ask you again, based on your

review, do you have an opinion with respect to the overall adequacy of Sargent & Lundy's engineering evaluations of the design discrepancies?

A Yes.

Q And what is that opinion?

A I believe it was handled correctly. The methodology was correct, the programmatic system set up to deal with these was effective.

Q Do you believe that any of these design discrepancies had design significance -- I'm sorry, strike that. Start again.

Do you believe that any of these discrepancies that were noted during the reinspection program had design significance, as that term is used in the reinspection program?

A I have not come across one which has, which leads me to believe that there were none.

Q What does the term "design significance" mean to you?

A Translated into laymen's terms, it means you had a piece of hardware out there that, because of the discrepancy, would require change to fulfill its intended

design function.

Q Turn your attention to the reinspection report, final version, and page 8 of 12 in Exhibit D-1. Do you have that page?

A Yes.

Q Do you see Note 4 at the bottom discussing discrepancy HE-129?

A Yes.

Q Did you review that particular discrepancy?

A If I could refer to this report.

Q Sure. Go right ahead. Or if you want to take time to read the note itself, feel free.

A (Witness Muffett reading.)

I am not aware of this discrepancy. I have not been involved in it.

Q This is a Hatfield discrepancy?

A Yes.

Q And at this moment you really don't have an opinion with respect to this item?

A No, I do not, and I would say that it's outside the area of my expertise.

Q Would you explain that answer?

A It appears to deal with the systems and electrical cables.

Q Who within the Staff would have expertise in that area? Maybe I should ask --

A I'll defer to Mr. Little.

Q Maybe I should ask Mr. Little that question.

A (Witness Little) As far as termination problems, as such, Ray Love would have the expertise. The effect of this damper not closing automatically, there would be several people in the office who could evaluate that.

To my knowledge, no one looked at this one in detail.

Q How about yourself? Did you look at this in any more detail than reading the paragraph?

A No, no.

Q Page 36, Mr. Muffett, of Love Exhibit 3. At the top we have a statement that "five welds with the lowest factor of safety were reviewed."

What is a factor of safety?

A (Witness Muffett) The factor of safety, as used here, is the ratio of the actual stress in the weld divided by the allowable stress as stated per code. This has a

number of definitions, and that is the one that we typically use here.

Q And what does the value 1.0 connote?

A That means that the stress in the weld is essentially the same as the allowable stress in the weld.

Q And therefore there is no margin?

A That's not strictly true.

Q Could you explain that?

A In that there's a lot of conservatism in the allowable and there's also a lot of conservatism in the design method.

Q When you say there's a lot of conservatism in the allowable, you mean the code developer built in conservatism in establishing the allowable limit?

A That's true.

Q And what was the result of your review of these five welds?

A The review -- the calculations were reviewed. We again had no problem with the methodology as this was part of the initial review, so that these five welds we didn't deem to be a problem.

Q You weren't concerned because the factor of safety

was only 1.0?

A No. In actuality the factor of safety here might have been .99 or .989, and even if it was 1.0, that is not a cause for alarm.

Q And why not?

A Because of the conservatism of the design method and the conservatisms of the allowable, the code does not preclude you from designing up to the allowable.

Q Does the location of the weld form any basis for that opinion, as well, in whether or not it's in a highly stressed area, for example?

A Well, the nature of the safety factor is the top -- is the stress in the weld. The bottom is the allowable stress. So to have a safety factor of one, it is obviously more highly stressed than the general population.

Q All right. Looking again at page 36, under paragraph B, it indicates that the reinspection program report, that is the final report, dealt with questions raised by, I guess your review during the initial review; is that correct?

A Yes.

Q What were those questions? I know they're referred to here, but could you elaborate, please?

A The questions which are answered are in the back of this report, the reinspection report itself, and I would say the first question deals with a point we have touched on before, which is the lack of penetration in the first quarter inch of the weld.

Another question we had was dealing with -- the welds that were evaluated in the initial report tended to be the ones that had the worst visual examination records. We thought it would be more proper to factor in what the loads on the welds were and look at welds that were "the more highly stressed welds," rather than just looking at the ones that had the worst visual examination records, because a weld that looked very bad could have been in a very lightly loaded spot.

Q So you prepared some questions which were ultimately sent to Commonwealth Edison for response; is that true?

A Yes. And a number of other people did, also.

Q And those questions were answered in the reinspection report, final version?

A Yes.

Q Have you had an opportunity to review the answers

to those questions?

A Yes.

Q Are you satisfied with the answers?

A Yes.

Q I noticed that in the final version of the reinspection report, there is a commitment to do additional engineering evaluation of certain discrepancies. Are you aware of that commitment?

A Yes.

Q I also understand that the NRC Region has not yet received that information. Is that your understanding?

A (Witness Little) Yes.

Q Do you expect the conclusions you testified to here today and those that are contained in this inspection report, Love Exhibit No. 3, would change based on the result of that information, Mr. Muffett?

A (Witness Muffett) It's my opinion now, based on my inspection of the program and the way things are handled that it wouldn't; but obviously I can't give you a definitive judgment on something I haven't seen.

Q Fair enough.

Same question to you, Mr. Love -- Mr. Little, I'm

sorry. Do you recall the question?

Do you expect that the information that Edison will submit to you would change any of the conclusions that you wrote on page 5 of the inspection report?

A (Witness Little) I don't expect that, and really, too, in 84-13, we followed up on many of those items that we could at that point in time.

Now most of them were not complete, but we did look into what the Licensee and Sargent & Lundy were doing in those areas when we carried out this inspection. And as I recall, we didn't see anything there that gave us any problem.

Q Is it fair to say that you've kind of kept abreast of the additional evaluations as they were being conducted?

A Yes, and looking at the information that was available during our inspections.

Q All right. Page 42 of Love Exhibit 3. I guess this is a question to you, Mr. Muffett. As I read this page, there appeared to be a potential problem with respect to some of the Hunter welding and the question as to whether or not the results showed a particular trend.

Could you explain better for me just what the point is here on this page 42?

A (Witness Muffett) I assume you mean the second paragraph?

Q Yes.

A At the time this review was going on, we realized that there were 50 instances where the original inspector had missed an incomplete weld, had missed the configuration check, and by that I mean the right pieces all being there in the right place, or both.

Now this was troubling to us, obviously, because these are the types of things that have a potential for safety significance. We wanted to make sure that those 50 errors were not all done by one inspector, or that there was a pattern of inspectors missing something important like this.

So these were delineated as to the exact discrepancy and also as to the inspector that overlooked the discrepancy, and that, in summation, is what we have on the two pages.

Page 42 is the exact discrepancies, and page 43 is the table broken down by inspector.

Q Well, explain to me how the table on page 43

should be read.

For example, I see Inspector B appearing a number of times.

A That's correct. And almost all the inspectors appear a number of times. We did not believe that there was a significant pattern emerging due to the hundreds of inspections that had been made.

Q By these inspectors?

A By these inspectors.

Q All right. Well, based on your review of the engineering evaluations performed by Sargent & Lundy, and this particular review that we just finished talking about, did you observe any pattern of a QA breakdown or a programmatic breakdown with respect to any of the contractors that were the subject of the reinspection program?

A In my review of the program at Sargent & Lundy and a limited time on the site, I never saw any evidence of a QA breakdown associated with this program.

Q What does that term mean to you?

A The quality assurance is a process and procedures whereby management tends to try to develop a system that will give reasonable assurance of the quality of the plant. It

has two facets, the quality assurance part, which is basically procedures for getting things done, and the quality control, which basically entails the inspections.

I did not see any evidence of a breakdown in either one of these facets in my inspection.

Q Do you have any judgment as to -- strike that and let me try it again.

How would you define breakdown? What would it take to convince you of a breakdown?

A A breakdown is evidence where you have a pattern of the procedures that govern the flow of the work not being done or a pattern of significant safety-related defects being overlooked. It is essentially indicative of a system that's in place not functioning.

MR. GALLO: Off the record.

(Discussion off the record.)

(Recess.)

bu1 BY MR. GALLO:

Q Mr. Muffett, turn to page 4. At the very bottom of the page it says, "The Region III inspectors have identified no significant areas of disagreement with these evaluations," and it is referring to the detailed engineering evaluations.

A (Witness Muffett) I can't find where you're at.

Q At the very bottom of page 4. Do you see it there?

A Yes.

Q It's referring to the prior sentence, I assume, which discusses or addresses detailed engineering evaluations. My question is the use of the word "significant" suggests there are some areas of disagreement.

Mr. Ward testified today that he had none. Does that mean you had some?

A I think what that really means there is that in a sense we always want everything done to the code, perfectly done, with no errors. That is a philosophical stance.

Now there were obviously discrepancies found and we wish they weren't found, but they were analyzed away, and we have no problem with that.

The significance there, I believe, refers to safety significance.

Q Well, I'm not so sure that's the case. Take the time to read the sentence.

A (Witness Muffett reading.)

Q I take the sentence to be referring to a potential

disagreement between the Region III inspectors and the engineering evaluations that were performed.

A I still stand by what I said before.

Q Let me ask this question:

The sentence refers to the Region III inspectors. Are you one of those inspectors?

A Yes.

Q And did you, in the drafting of this sentence, did you suggest that the word "significant" be included in the sentence?

A I could not remember to tell you.

Q You wrote this, Mr. Little. Can you shed any light on that?

A (Witness Little) Usually it's the type of word that management would put in, but I think, as Jim has described, there were some philosophical disagreements in the evaluations. We didn't consider those to be significant, and I guess that's what we intended to say.

Q All right. Mr. Muffett, I understand you are going to testify in the reopened hearings and be a witness; is that correct?

A (Witness Muffett) That's my understanding.

Q Do you know what the scope of your testimony is going to be?

A I would assume that it deals with these engineering evaluations.

Q Do you believe that to be the exclusive element of your testimony?

A As far as the reinspection program?

Q Yes.

A I would also testify as to my opinions as to what this demonstrates, if asked.

Q You mean the conclusions to be drawn?

A The conclusions to be drawn.

Q -- to the questions I asked. All right.

MS. WHICHER: Was there an answer to that last question, or did you answer it for him, Joe?

MR. GALLO: I might have done that again. If I answered his question the last time, I agree to strike it. I'm satisfied with the answer.

BY MR. GALLO:

Q Mr. Little, we have taken the deposition of Mr. Muffett, Mr. Ward and Mr. Love, and we have yet to find a witness that addresses the parameters of the reinspection

program as to whether or not it was structured properly in the opinion of the Region. I assume that you are that witness. Is that correct?

A (Witness Little) Yes.

Q I'm going to ask you a series of questions which will deal with the parameters, what I call the parameters of the program, the basic structure of the reinspection program.

Do you know how the contractors were selected for inclusion in the reinspection program?

A Yes.

Q Would you explain?

A First of all, they were those contractors who were doing safety-related work on the site.

Also, we excluded other contractors who, for other reasons, their work was already being reinspected.

So it was essentially the contractors that worked at Byron in performing safety-related activities.

Q Do you know how the inspectors were selected as candidates for reinspection?

A They were listed chronologically, and then we selected the -- or they selected the first person, and then every fifth person after that selected chronologically for

each of the contractors.

Q Did you find that a reasonable approach?

A Yes, I think especially when we biased it by the addition of two to four additional inspectors for each contractor.

Q How were you able to bias the selection?

A Well, we had Mr. Forney, who we thought knew more about the inspectors than anyone else at the site. He worked for the NRC. He performed the original CAT inspection and interviewed, I think, about 30 inspectors. So we thought that he already had some opinions about inspectors who were on site. He was very familiar with the certification program, so we thought that he, by reviewing the certification records, if there were any weaknesses there or weak individuals there, well, he would be the best person to select an inspector who may be questionable.

Q So it was biased in that fashion? Mr. Forney used his information and based on his opinion, he selected inspectors as candidates which he thought might be suspect for qualification?

A Right. Right.

Q Why shouldn't Edison -- why shouldn't they have

reinspected all QC inspectors? Wouldn't you have gotten a better result?

A We think that the program that was finally agreed upon was adequate for the problems that we had identified. Neither we nor Commonwealth -- and I'll say we in our previous inspections, we had not identified safety-related hardware problems which we could contribute to lack of quality control inspector certification or capability, in that light, in that there was no history of those sorts of problems.

Also, based on Mr. Forney's interview of the -- I think it's 30 inspectors -- we found those interviews usually to be very revealing. If there's dissatisfaction among inspectors, if they feel like they have not been properly trained ar . such, they usually are not bashful about telling you that.

So our CAT inspection there did not indicate any problems of this sort. I would say that based on what we knew about hardware problems, what we knew about the quality control inspectors, we felt that the one out of five, 20 percent, biased by the additional selections, was really a very conservative approach.

Q Are you testifying that the sample of one in five is adequate to provide information that is representative of the total inspector population?

A Yes, we believe it is.

Q Isn't that a judgment based on statistical expertise?

A No, it's more a judgment based on experience.

Q Engineering judgment?

A Yes.

Q Did you arrive at that engineering judgment yourself?

A Not individually, no. No.

Q Well, do you have an opinion as to whether or not the sample of one in five is adequate for representation -- I'm sorry, for purposes of representing the total population of inspectors?

MR. PATON: Joe, you have referred a couple of times to one in five. His previous response was in terms of one in five, plus the additional inspectors.

BY MR. GALLO:

Q All right. Wherever I referred to one in five, it's modified by the bias that you referred to.

A (Witness Little) Yes. I think that, coupled with the other parts of the program, we get a very conservative approach.

Q So it is your opinion that the selection of one in five inspectors, biased as you explained, is representative of the total population of inspectors?

A Yes. And especially then with the remainder of the program. We took the first three months of each inspector's activity, which would be the period when he would be most likely to make mistakes if he was not capable or properly trained.

There were provisions then that if he didn't pass that, well, then it was expanded to the next three months, and provisions then that if he didn't pass the second three-month period, well, then, you add 50 percent of the original number of inspectors, if there were that many left.

Taking all of those things into consideration, yes, I think that it was a very -- it was an adequate sample, and it was conservatively applied, and overall a conservative approach to answer what we thought was a question that should be answered.

Q In exercising your engineering judgment in this

matter, did you rely in any way on what you have previously described as the use of statistics in your work effort?

A Sure. Indirectly. We have had other programs at other sites. There have been programs where we have tried to use statistics even where it was much easier to divide the sample size up and do a homogenous group. We have used statistics in other places. It is being used at Clinton right now in a reinspection program, and we have gone to statisticians in these other programs. One thing they always emphasize to us is that you have got to be able to divide your sample up into homogenous groups. And like I have already mentioned before, we felt this was an extremely difficult task to do in a program of this type.

So we have had other experience trying to do similar things with statistics.

Q What is there about a group of inspectors that makes it impossible to divide them up into homogenous groups?

A It's not a group of inspectors. Yes, I think you can divide them up, but when you are talking about a group of inspectors, their expertise will vary, their experience will vary. But even that, I think, if you were just thinking about inspectors alone, it wouldn't be too

difficult to come up with your homogenous groups.

The thing that gives me the problem is that you have many different attributes you are looking at, and you can divide it up into the different attributes and I don't have any problem there.

The big problem, I think, is the conditions under which the reinspection is conducted, and being able to say that they were similar or the same as the original conditions.

In order to conduct the reinspection today, you know, it involved crawling down cable trays and things like that, just to get to a weld that possibly in the original inspection the man did not have to do.

There are so many -- such a large variety of inspection conditions, to me, that's the big problem in dividing it up into the homogenous groups.

If all of these things were inspected and the lab conditions under the same conditions, then it would be easier to do it.

Q Now how much of each inspector's work was subject to reinspection?

A The -- well, each inspector, we looked at the first

30 days.

Q First 30 or first 90?

A First 90. I'm sorry. I was thinking of three months. Of the first 90 days. And if his work passed either the 90 or 95 percent acceptance criteria, his work was considered to be acceptable. If it did not, we took the next 30 days.

Q You said it again, 30 days.

A 90 days, I'm sorry. I'm sorry. I don't know why 30 days is in my mind. We took the next 90 days.

Q What happened if that inspector didn't pass the second 90 days?

A Then if he didn't pass the second 90 days, why, then, we expanded the sample and if there were that many inspectors left, we expanded it by 50 percent of the original sample.

In other words, if we were looking at 12, why, we would then add six additional inspectors.

Q Is that mechanism you just described called in the trade an expansion criterion?

A Yes.

Q Are you familiar with expansion criterion in other

plants that the region has been involved with?

A Well, in general, yes. I can't quote you what they were.

Q I'm going to ask how this one compares with your other experience.

A Reasonably well.

Q Were the inspectors who were selected as candidates for the reinspection program, were they screened to make sure they had a certain number of inspections in the first 90-day period before they were included?

A I think -- was it Hatfield had to have at least 50 in the first 90 days period.

Q And if they didn't have 50, what happened?

A Well, you could go to the next man in order chronologically.

Q Do you recall how many were required, how many inspections were required for a PTL inspector?

A No, I don't, but it seems like they were less for PTL.

Q You previously testified that the safety-related work was reinspected. If we used the terms in the questions I asked Mr. Muffett, attributes, what does that term mean to

you?

A Well, it's just a breakdown of the inspection activity. The attributes as listed in the report there for Hatfield, you had pan installation, you can conduit installation, you had terminations. Each of those were attributes.

Q Particular kind of work activities?

A Work activities, right.

Q Were all attributes reinspected?

A I think so. I think so, but I would like to check the report to be sure of that.

Q What about the ones that were determined to be inaccessible? Were they reinspected?

A All types of attributes were reinspected, but, no, not all attributes. If they were inaccessible, if they were buried in concrete or underground or such, those were not inspected.

Q Was there another category of attribute that was not inspected?

A Those that couldn't be reproduced.

Q Recreatable?

A Recreatable.

Q What does the term "inaccessible" mean? You gave an example, so I think that's probably a pretty good answer, but maybe you'd answer the question, anyhow.

A Accessible?

Q Inaccessible.

A Those which could not reasonably be gotten to without tearing up something.

Now the Licensee did remove insulation, they did remove fireproofing, they did remove paint. So those were not considered inaccessible, they could get to those. It would be like conduit inside of a concrete wall, those sort of things; inaccessible.

Q In the reinspection program, was the Licensee's implementation of the program reviewed to see whether or not they were properly or appropriately applying this term "inaccessible"?

A Yes. You know, our inspectors -- they were always aware of this, and anything that they saw that they would disagree with, well, certainly they'd bring it out to us. There were interpretations which the contractors wrote up, and many of those dealt with accessibility or recreatability, and we have reviewed, our inspectors have reviewed all of

those interpretations.

Q Can you think of any categories of work that were deemed to be inaccessible that the Region thought otherwise about?

A No, I don't recall any.

Q What does "nonrecreatable" mean?

A Well, things like in welding, the inner pass temperature, you can't go back and recreate that condition. Cable pulling, the actual tension that was put on the cable when it was pulled. Rigging of equipment and installation, things like that. You can't go back and reproduce those things so that you can inspect them again.

Q Again, when the Licensee applied that term in implementing the program, did the Region check to see that they were appropriately categorizing things as nonrecreatable?

A Yes. And again, like I say, we reviewed their interpretations and our inspectors, like Mr. Ward, he went out and picked various types of welds to look at himself, some of all categories. I think he satisfied himself that they were looking at what they could look at.

Q Are there any areas of disagreement between the Region and Edison on this point?

A I don't recall any.

Q Do you know what bolt torquing is?

A Yes.

Q And do you think that's a recreatable attribute?

A To a degree, yes. Yes. You know, the bolts tend to relax, so if you go back a few months later, you may not be able to get the torque value that was originally there when the installation was completed. But, yes, you can go back and check on the torque and within a range check to see if it was torqued to the right value.

But like I say, it would usually be less than the original torque value, because the bolt relaxes over a period of time.

Q Is there some basis to determine the relaxation? How do you know that a relaxed bolt -- let me start again.

How do you know that a loose bolt simply relaxed rather than wasn't properly torqued?

A Well, if it was properly torqued, it shouldn't be loose, because in the design, you know, they specify the torque, and the designers are aware that they will relax. So they would specify a torque such that you shouldn't find it loose.

Q All right. Well, if you are torquing it, say, -- can you give me an example of a normal torquing value, how many footpounds?

A Any example I would give you would be purely a guess.

T.4 You know, you will find all kinds of values, from 30 up to 100 or more.

Q If you are interested in inspector qualification -- strike that.

In your experience, is it common for equipment that is bolted during the course of construction to be unbolted so that other work can be performed, or that kind of thing?

A This happens, yes.

Q Do you have any opinion with respect to how frequently it might happen during the course of construction over the years?

A No, no.

Q Do you think it's a large number of occurrences? Not many?

A It's almost impossible to make a good guess.

Q All right. What were the acceptance criteria that were used in the reinspection program?

A We used 90 percent for subjective and 95 percent for objective.

Q Let's look at the objective attribute criterion of 95 percent. Now what does that mean and how is it applied to determine whether or not an inspector is qualified?

A Well, in this case, what it means is that in the reinspection, 95 percent of the time the reinspection should agree with the original inspection.

Q Is that an acceptable criterion, in your opinion?

A Yes, it is.

Q Why shouldn't it be higher than 95 percent?

A Well, I think from experience -- and I think this experience is documented in the quality control area -- you know, human beings are doing this work. I think you will find it is documented in the quality control handbook that a human inspector will miss 20 percent of the defects out there, on the average. And so I think you take these sorts of things into consideration, and I think 95 percent is a commonly accepted criteria in industry. If you get 95 percent agreement, we consider that really pretty good in the objective area.

Q What is an objective attribute?

A An objective attribute is one that usually you can

measure with the use of a gauge or some equipment. Human error also is involved in objective.

Q Shouldn't you expect two inspectors to measure the same item in the same manner and come up with the same result?

A The -- you say should I expect to? It depends on what it is. It depends on what the tolerances are that you are inspecting to. If they are very close tolerances, yes, I wouldn't be surprised if one of the two didn't disagree with the other at times.

Q Have you been involved in any other reinspection programs involving the qualification of inspectors besides the one at Byron?

A The -- let me think.

Like I say, we have similar programs that are getting started at Clinton now.

Q Is this going to involve the reinspection of QC inspectors?

A The reinspection of their work.

Q Will they use criteria similar to the 95, 90 criteria for subjective and objective inspections?

A I haven't gotten up to speed on Clinton. I have

been involved with Byron. I haven't gotten that.

Q All right. Now for subjective attributes, criterion -- acceptance criterion, I believe you said, was 90 percent; is that right?

A Right.

Q And what does that mean, that the first inspector's inspections should match up to the second inspector's inspections 90 percent of the time?

A Yes.

Q And do you believe that's an acceptable criterion?

A Yes, I think it's a very conservative criterion.

Q And what is the basis for that opinion?

A Well, again, primarily I think the published data that we have says that an inspector will be -- he will miss 20 percent of the defects that are out there. That, coupled with the experience of our inspectors such as Mr. Ward who has been in the business for over 30 years, he in his experience, it's even difficult in the subjective areas for him to go back and reproduce his own inspection results greater than 90 percent of the time.

So I'd say based on what we know about human beings as inspectors, and based on our own inspectors'

experience over a considerable period of time.

Q There's a five percent difference between the subjective and the objective. What accounts for that?

A Well, since it is subjective, we didn't think the requirement should be as stringent. To say we have a real concrete reason for saying five percent less on subjective, we don't. We don't have that. That's based on experience, based on the fact that, like I mentioned, you would expect an average inspector to miss 20 percent of the defects.

You could argue for an 80 percent acceptance criterion.

Q You have mentioned that a couple of times. Is that a published figure in the literature?

A Yes, that's in the -- I can get the reference for you. It's a quality control handbook, 1977 edition. It's based on a lot of experience.

Q All right. So the handbook indicates that to you, at least, that an acceptance criterion of 80 percent in subjective area would be appropriate if it had been --

A I would say you could argue for that. I don't think -- I'm not saying we would ever have accepted 80 percent.

Q I see. All right.

You mentioned -- you explained to me the expansion criterion is applied in case an inspector failed the first 90 days. Did that in fact ever happen?

A Yes.

Q Did it ever happen that the inspector failed the second 90 days?

A Yes, I think so. At least once.

Q Did that then cause more inspectors to be the subject of reinspection?

A Right.

Q Do you remember what contractor that was for?

A I think that was PTL.

Q All right. Let's talk a little bit about the results of the reinspection program. They are published in Section V of the final report.

Based on your review of the report, what do you believe the results of the reinspection program to be?

A Now the primary result I think I have already mentioned, and that is the fact that you did have quality control inspectors who may not have been certifiable, that those inspectors did not overlook significant numbers of safety-related hardware deficiencies, and those -- that was

our primary conclusion.

Q Did you draw any conclusion with respect to qualification of those inspectors?

A I think you can infer that from the reinspection program results, that, yes, those inspectors were properly qualified. There's some problems in that -- in arguing that absolutely.

Q Is that because one has to infer, make an inference with respect to the information shown in the report?

A No, not with respect to information shown in the report.

Q Well, then, please explain your reservation.

A Well, you ask yourself the question, okay, why did they get such good agreement? It could be because the craftsmen did unusually good work and there were not many defects for them to find.

It also could be that the inspection work itself was such that the man learned very quickly on the job. He may have learned to do the job right within one or two days, even though he may not have been properly certified. So there are various things that can happen.

Now we assume that the craftsmen at Byron made as

many mistakes as the average craftsman would anywhere. So if you make that assumption, why, then, yes, you can say that the results indicate that those quality control inspectors were qualified for --

Q Well, it's not an assumption, is it? It's in fact the case that the craftsmen made as many mistakes as you might see at other reactors, based --

A Yes, that's based on our judgment. We don't have any data that we can compare the plants by, but, yes, I'd be willing to --

Q But would a review of the NCRs reflect the degree of discrepancies that the craftsmen were involved or had performed or produced?

A It may, but we would have to have data from other sites that we could compare it with, which I do not have readily available.

Q All right. But are you aware of the number of NCRs that have been written on the Byron docket?

A No, no.

Q Do you know whether or not a large number have been written?

A I have nothing in my recollection that I can

compare them with.

Q You don't know how many yourself, personally?

A No. No.

Q Assuming that a number of NCRs had been written with respect to the work performed at the Byron site, would that tell you anything about the question in your mind as to whether or not one should assume that the craftsmen were perfect?

A I don't know if that would help or not, and there is no question in my mind that they were perfect. If I give you that impression, that was a wrong impression. I think they are average craftsmen. This is based primarily on the judgment of the inspectors who work for me, and they have inspected all of our construction sites in this region, and I think they made the average number of mistakes.

Q If I turn to the final reinspection report, page V-3 --

A Oh, you're talking about this?

Q Yes, the Edison document. If I look at that table V-1, there is a listing of the contractors that were the subject of the reinspection report.

It indicates that with respect to inspectors

performing objective inspections, seven of the eight passed at 100 percent. Do you see that?

A V-1?

Q Yes.

A I guess I don't see the number seven of the eight.

Okay. You're talking about seven of the eight contractors.

Q For example, Hatfield, 100 percent passed. Do you see that?

A Right.

Q Hunter, 100 percent passed. PTL, 100 percent passed. What does that mean to you?

A The -- I guess I would like to read the conclusion that they have drawn from this again, to be sure.

Q Sure. I think the conclusions are listed in the front of the section.

A Right.

(Witness Little reading.)

That would indicate that, you know, 100 percent of the inspectors, say, with Hunter, 100 percent, those met the acceptance criterion.

Q If I look at the first conclusion on page V-1, it

says passed the established acceptance criteria, this is No. 1, and were qualified. Would you agree with that statement?

A I would, based on, you know, the statements I have made previously.

Q Would that also apply in a subjective area, to, say Hatfield, Hunter and PTL?

A Yes. Yes.

Q Turn to page 5 of the inspection report, Love Exhibit 3. You previously testified that you wrote the four conclusions that are listed on this page. The first one says the Byron reinspection program was conducted in accordance with the program described in Mr. Stiede's letter of February 23, 1983, as modified by the Region III letter to Edison, dated March 22.

Now, did you determine that, or did some of your inspectors determine that?

A It was really a determination by the inspectors as reviewed by regional management.

Q And did you play a role in that determination?

A Yes.

Q And you agree with this statement as it is so written?

A Yes.

Q Let's look at Conclusion No. 2. It talks about the final report accurately describing the reinspection results and the evaluation and disposition of identified discrepancies.

Did you make this determination, or did you rely on Mr. Muffett?

A I relied on Mr. Muffett as well as others in the office.

Q Conclusion No. 3 says the contractor QC inspectors who may not have been properly certified prior to September 1982 did not overlook significant safety-related hardware deficiencies.

Now did you derive that judgment, or was it someone else in the organization that worked for you?

A It was a collective judgment that was arrived at, really, by the Region. We had many people involved.

Q And does that reflect your opinion as well?

A Yes.

Q I have to ask you this question, since in some cases there were nonagreement between the first inspector and the reinspector, sometimes as much as 10 percent and greater in some instances, how is it that you are able to make this

statement because of that fact?

A Well, first of all, we think that the acceptance criteria were adequate and were conservative, and the program as it was carried out was also carried out very conservatively. Our inspectors believe that in many cases they were identifying things as discrepant that they themselves would not have identified. So I think it is based on all of this information.

Q All right, but --

A And, you know, as to whether they were significant safety-related deficiencies, we relied on Mr. Muffett and others who evaluated the disposition of those, evaluated the margins involved.

Q Table V-1 indicated, for example, the subjective attribute inspections that Pittsburgh Testing passed at a 92 percent rate. That means there was disagreement between the two inspectors of 8 percent; is that right?

A Right.

Q How do we know in that 8 percent there wasn't a significant safety-related hardware deficiency?

A We have, in our inspection effort, we have looked at many of those. We have asked the Licensee, and the Licensee did identify worst case. We tried to concentrate on the worst

cases, the worst weld, say, that had been identified, and look at those in the welding area.

We also had the Licensee pick out some highly stressed areas, and then we'd go in and look at the welds that actually existed in those areas. So, many things such as that, that we have done.

Q Well, one last question in this area.

I think you mentioned this QA handbook, or was it QC handbook?

A Quality control handbook.

Q And you said what was stated in there, that on the average an inspector missed 20 percent of what?

A Of the defects, you know, that exist.

Q Well, given that norm, that standard -- what would I call it -- is that a guideline, a standard, a truism, an axiom? What is it?

A It's a guideline based on data and experience.

Q Do you agree with it?

A Yes. Yes.

Q Well, in the face of that reality, how can you make this conclusion in No. 3 on page 5? Is it possible that because of that reality a significant safety-related hardware

deficiency exists?

A Oh, yes, it is. I cannot say with 100 percent assurance that there are no significant safety-related hardware deficiencies out there. I can say that based on our inspection program, based on the reinspection program we have, and based on their evaluation and disposition of the discrepancies identified, I think we have reasonable assurance that there are no --

Q So I should interpret the third conclusion as meaning that there is reasonable assurance that a significant safety-related hardware deficiency has not been overlooked?

A Yes. We can never say with 100 percent certainty that there is not one out there.

Q All right. Okay.

Turning to Conclusion 4, the conclusion states that safety-related work done by Byron contractors is of acceptable quality. Is that your judgment?

A It's a collective judgment.

Q Is it yours, too?

A Yes.

Q What is meant by acceptable quality?

A That means that it meets the design criteria, code

standards, whatever it is the design engineer says it should meet, and it meets it the majority of the time, a large majority of the time. Where it doesn't, they have adequately dispositioned those items.

(Discussion off the record.)

BY MR. GALLO:

Q Mr. Little, I want to refer you to the final reinspection report prepared by Commonwealth Edison and, in particular, Section VII, on page -- beginning on page VII-9, there is a section entitled "Inference of Work Quality From Reinspection Program." And there is a discussion on the next three pages, and in particular there are a number of tables which indicate whether or not there were any discrepancies with respect to the various contractors with design significance, and then there is a reliability statement, a reliability and confidence level column indicated in these tables.

Have you reviewed this part of the reinspection program report?

A (Witness Little) We have reviewed it. We have not, because we weren't relying on statistics, I would say we have not given it a -- we have not really scrutinized this

part of the report.

Q Did you give it any weight in forming the conclusions shown on page 5 of your inspection report concerning work quality?

A Yes, I think we gave it some weight in that, you know, if we had gone through and saw that the reliability was low, well, I think it would have raised a flag and we would have asked some questions.

It certainly helps our feeling that the program was good. Whether we agree in detail with everything that was concluded, we have not reviewed it to that extent.

Q I'm trying to get an assessment of the amount of weight that was given to this section. Did the information in this section form a centerpiece for the conclusion on work quality shown at page 5 of the inspection report?

A To me, it doesn't, no.

MS. WHICHER: I'm sorry, I missed that question. Could I have that question back?

(The reporter read from the record as requested.)

BY MR. GALLO:

Q Let me restate the question, because I think I left out a couple of words. The question was:

Did the information appearing in Section D beginning on page VII-9 of the Edison final report, play an important role in the formation of Region III's opinion with respect to work quality as articulated on page 5 of your inspection report, Love Exhibit 3?

A (Witness Little) It contributed. I would not call it an important role, not one of the major roles. We take areas like Exhibit VII-1, page 3 of 5, and look at objective attributes, terminations, knowing pretty well what the conditions are in which they inspect terminations. I feel pretty good about that 99.9 percent reliability, at 95 percent confidence level. You get into -- I guess pan hangers, depending on what they were doing, depending on the conditions. I guess I would have to know more about the conditions under which some of these other areas were inspected, to be able to hang my hat on some of these reliability figures. But some of them I don't have any problem with at all, and I'm not saying I have major problems with any of them.

Q To be quite candid on where I'm coming from, you have testified that you really didn't scrutinize this inspection very carefully. No NRC person with expertise in statistics reviewed the report. It would seem to me that

you could give very little weight to the section in forming your opinion that is shown on page 5 of your inspection report.

A I think we could give it greater weight. I think, yes, we know enough about the application of statistics that if -- we could give it greater weight. It was not our purpose in evaluating this program to use statistics. It is interesting to see what the statistics say and I'm not saying that it isn't saying meaningful things. If I were to give it greater weight, I would, say, want to know how you could substantiate that the subjective visual weld attributes -- that you make sure that you have a homogenous sample there primarily because of conditions under which they are inspected. But I'm not saying that this is without value. I think it is. I'm saying that we did not weigh it heavily in our decision.

Q Was it less than 50 percent?

A Less than 50 percent. Yes.

Q How much less? Can you give a judgment? 10 percent? 20 percent?

MS. WHICHER. I object to that. I think you are arguing with him.

MR. GALLO: I'm trying to quantify the amount of

weight that was given. I think it's a fair question.

WITNESS LITTLE: I'd rather not. It would be small. My guess is, say, 10 percent. But that's a purely subjective guess.

(Laughter.)

BY MR. GALLO:

Q And the primary basis for the judgment on work quality as shown in Question -- or on page 5 of the reinspection report was what, then?

Let me restate the question:

What was the primary basis for the conclusion on work quality as shown on page 5 of the reinspection report?

A (Witness Little) There you are talking about item 4.

Q Yes.

A It was based on the actual inspection results. Our evaluation of those results and knowledge that we obtained in the inspection that you interpreted the results very conservatively, and based on our experience with the sample that you have, you know, Hatfield and Hunter, you looked at 150 some odd thousand attributes. I think that tells you a lot about the quality of the work done by those two

contractors.

I would like to be able to use statistics with great confidence, but I have some problems with it, like I've already described to you.

Q Is it fair to say that you and the Region used engineering judgment in preference to statistics?

A Primarily.

MR. GALLO: That's all I have, Mr. Little.

MS. WHICHER: Let's go off the record for a minute.

(Discussion off the record.)

(Recess.)

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MR. PATON: I have, during the break, talked to the two Staff witnesses and they think it is appropriate that we make a clarification of something that was testified to just before the break.

Would you like to go ahead?

WITNESS LITTLE: It has to do with Conclusion 4 on page 5 of Report 84-13. I think it is important to point out the lead-in words there, that based upon the Region III inspections and the review of the report, we have arrived at these conclusions.

MR. PATON: Excuse me. Better make sure you know precisely which conclusion, unless it's applying to all of them.

WITNESS LITTLE: I mentioned Conclusion 4, to start with, I thought.

MR. PATON: I'm sorry.

WITNESS LITTLE: Based upon the Region III inspections and the review of the report, we have concluded that the safety-related work of the Byron contractors is of acceptable quality. So it goes beyond just the review of the report. It also factors in our inspection experience. That includes the inspection effort related to the reinspection program, as well as our inspection experience outside of the reinspection program..

BY MR. GALLO:

Q You're talking about inspection experience related to Byron?

A (Witness Little) Right.

E X A M I N A T I O N

BY MS. WHICHER:

Q To follow up on that, Mr. Little, you didn't testify at the original set of licensing hearings at Byron,

did you?

A (Witness Little) No.

Q Are you aware that the Region had made the same judgment based on their inspections at the time of the licensing hearing?

A I think that's what I just said, based on our inspections as well as the reinspection report, we have arrived at this conclusion.

Q Are you aware that the Region had made that same judgment at the time of the original licensing hearings before this report ever came out?

A Yes.

Q Mr. Muffett, let me start with you. Can you tell me, please, when you worked for -- I'm not sure I got the company right, Nuclear Technology?

A (Witness Muffett) NUTEC, yes.

Q NUTEC in San Jose, California?

A No, in Chicago.

Q Did you work on any Commonwealth Edison plants?

A Yes.

Q What plants were those?

A Dresden and Quad Cities.

Q What year was that?

A That would be 1981 and 1982, and I joined the Commission in August of 1983.

Q And when did you work at Sargent & Lundy?

A In 1972 to 1975.

Q And did you work on any Commonwealth Edison plants?

A Oh, yes.

Q What plants?

A Zion, specifically. It was a long time ago, but I'm sure that their primary business is dealing with Commonwealth Edison, and I have worked on a number of the plants, definitely Zion. Quad Cities, I believe.

Q Did you work on any preliminary plans for the Byron or Braidwood Plants?

A No.

Q How about Marble Hill?

A I was involved in some very early negotiations on Marble Hill.

Q You are aware that Marble Hill is a twin of Byron and Braidwood?

A I'm aware of that now. I'm not sure that that was a fact in that time frame.

MS. WHICHER: Let's go off the record for a minute.

(Discussion off the record.)

BY MS. WHICHER:

Q Mr. Little, to follow up on a question Mr. Gallo asked you regarding a February 23 letter from Commonwealth Edison to Mr. Keppler, which I will show you a copy of that letter --

A (Witness Little) February 23rd, '83? Yes.

Q That is the plan that was approved for the reinspection program, was it not?

A Yes.

Q And that was not the original plan proposed by Commonwealth Edison, was it?

A That was?

Q That was not the original plan that Commonwealth Edison proposed, was it?

A No, no.

Q In fact, they proposed a couple of plans before that one; right?

A Yes.

Q We will return to that topic in a few minutes.

Mr. Muffett, you recall Mr. Gallo asking you

some questions regarding the completeness of the calculations that you reviewed at Sargent & Lundy?

A (Witness Muffett) Yes.

Q Can you clarify for me, please, exactly what ought to be included in a calculation for you to consider it to be complete?

MR. GALLO: I object to the form of the question. We have to narrow that a little bit. What kind of calculation are we talking about?

MS. WHICHER: We're talking about the calculations that he reviewed at Sargent & Lundy and he listed, my notes show, a number of things that he looked for, and I want to make sure I have a complete list and I understand exactly what he did.

WITNESS MUFFETT: I'll try to give you a complete list. These are a very divergent set of things that I looked at, and the basic premise here is that you have to look that the calculation arrives at the number that's required. Now if that is the weight or if that is the load or if that is the stress, you have to check that the calculation comes to that conclusion.

You also have to check that the calculated weight,

force or stress is less than the allowable for that. I guess that is the best way to characterize it.

BY MS. WHICHER:

Q And what is involved in your review of the completeness of the calculation?

A (Witness Muffett) You actually physically get the calculation, get out your calculator, use your knowledge and experience, follow the steps that the analyst did, check some of the numbers, check his assumptions, make sure the references are labeled.

These calculations, per regulatory guidelines, are supposed to be recreatable by a knowledgeable person, and you should check that you can recreate the thought process and the conclusion that the analyst reached.

Q Now one of the things you mentioned when Mr. Gallo was questioning you was that you would check to see whether the proper references to, I believe the example, you used a number that was gotten from somewhere else, was contained within the calculation. Do you recall that?

A Correct. Yes.

Q Now did you check to see whether the reference was proper or whether the actual number pulled from the

reference was proper, or both?

A I would do a check to make sure that the reference is proper, but you have to realize that you have to stop an inspection somewhere. Now if I pulled a response spectra for elevation 474, east-west part of the building, and it's in 474, east-west part of the building, I'd say it's correct. If I had infinite time, I could go back and find out how that response -- if it was derived correctly.

But basically when you check the references, you make sure that they are correct.

Q I'm still unclear, Mr. Muffett, so let me try it once more.

Did you check to see whether the appropriate number was referenced, or did you actually go to the number and see if the appropriate number was used?

A I went to the number and the appropriate reference and made sure it was there. But what I don't want to give you the impression is that I checked the reference, okay?

Q You checked to see that the number was in the reference, but you did not ascertain the accuracy of the number as it was contained in the reference; is that right?

A Correct.

Q Thank you.

Mr. Muffett, as I recall the dialogue you had with Mr. Gallo concerning while you were at Sargent & Lundy reviewing the engineering evaluations, is it the fact that while you were reviewing calculations, you did more than just review the documents?

A No.

Q In fact, if you found a problem, Sargent & Lundy would recalculate it for you; isn't that the case?

A In some cases.

Q How many times did that happen?

A I will say approximately five.

Q Okay. And are those noted in your report anywhere?

A The ones that are noted are the differences -- three of the cases where we had some discrepancies are noted. When I say five, I mean approximately. It might have been those three.

Q Sargent & Lundy --

A I'm not trying to evade you. I did over 100 of these calculations, and this was months ago.

Q My point is, Mr. Muffett, Sargent & Lundy did some calculations at your request while you were there; isn't that right?

A Yes.

Q In response to a specific question you had; isn't that correct?

A Yes, that's correct.

Q And is it your testimony that each of those activities by Sargent & Lundy is documented in your report, or that you don't remember whether you documented each --

A I believe that I documented them. I believe it's the three documented cases.

Q You believe those are the only instances in which that happened?

A But I cannot tell you that with 100 percent assurance. That's my belief at this time.

Q Mr. Muffett, referring you to page 36 of your report, the welds listed at the top of the page with a factor of safety of 1, do you know what contractor's welds these were, which contractor was responsible for these welds?

A No, I don't right now, I don't. I did at the time. They're traceable by these weld numbers.

Q How would I go about tracing those by the weld numbers?

A You'd have to contact Sargent & Lundy and tell

them that you'd want to -- you're interested in those weld numbers.

Q These are Sargent & Lundy codes, these weld numbers?

A Yes.

Q Mr. Muffett, you also testified under questioning by Mr. Gallo that Commonwealth Edison had committed to doing certain additional evaluations; do you recall that testimony?

A Yes.

Q What are those evaluations?

A When the January, which I will call the initial report, came out, the welds that were looked at were the welds that had the worst visual examination records. We raised the question if it wasn't more appropriate to look at the most highly stressed welds, and I believe our question as contained in the back of the final inspection report asks for the most highly stressed welds.

In response to that, they then did an engineering evaluation of all the welds, all the discrepant welds.

Q You referred to some evaluations that the NRC has not yet received. Do you recall that?

A Yes.

Q What are the evaluations that the NRC has not yet received?

A I believe they are associated with PTL, and they are dealing with some weld maps of some specific welds and some evaluations of those welds. There might be more, but I'm only looking at it through the work areas that are my responsibility.

Q Are these weld maps concerned with equipment supplied by Systems Control Corporation?

A I don't know.

Q Aside from these PTL maps, are you aware of any other information or evaluations which Commonwealth Edison or Sargent & Lundy has committed to provide to the NRC that they have not yet provided?

A I have those highlighted in my book. I don't have those committed to memory. They are in this final inspection report.

Q Each additional commitment is in your report?

A No, no. CECo's final report on the reinspection program.

Q Is it your testimony, then, Mr. Muffett, that each commitment in Edison's final report to submit further

data or evaluations, those commitments have not yet been fulfilled?

A Not in their entirety.

Q Have some of them?

A I did an interim inspection of some of this work that was taking place while I was up there, but I'm not aware of anything that we have in its entirety yet. I'm aware that the work was taking place because I did an interim look at it and asked some questions about it while I was there.

Q When was that?

A Oh, I would say February and April. Definitely February.

Q Who promised you this information?

A Well, it's a commitment contained in this report.

Q Are you to get it directly from Commonwealth Edison, or do you get it directly from Sargent & Lundy?

A Well, as a matter of form, I guess it's Sargent & Lundy, with a CECo representative there. I'm not sure exactly who gives it to me. It's kind of irrelevant, but that is the process that usually takes place.

MR. GALLO: The information hasn't been provided

yet. It will flow from Commonwealth Edison to Region III.

BY MS. WHICHER:

Q Can you give me an estimate of what the volume of this information is?

A (Witness Muffett) Only a qualitative one that I believe it's a small part of the total reinspection program.

Q Can you give me any specifics as to what that information is?

A The part that I will deal with is again evaluations of the weld discrepancies.

Q Mr. Muffett, I'm not sure I understand your testimony, so if I -- I don't mean to be going over and over again with you on this, but is it -- is my understanding correct that the engineering evaluation that was requested in January of the most highly stressed welds has not yet been provided?

A No, I would not say that's true. The program as it's set up did some evaluation of all the discrepant welds they had, so they had done a vast number of those. There are some things left to be done, but it is my opinion that it will be a small part of the program.

MR. GALLO: It might be helpful if you look in

the Edison final report of the reinspection program and look at Exhibit C-2, page 10 of 15. If you look at A and B on that page, that is the additional information in part that is being referred to.

BY MS. WHICHER:

Q Do you agree with Mr. Gallo's testimony?

A (Witness Muffett) I would also like to refer you to the bottom of page 13 of 15 of C-2, and then the top of the next page which is 14 of 15, the first paragraph. I have these things highlighted.

Q Is there any other information of which you are aware that Edison has committed to provide you that has not yet been provided?

A I'm not aware of any other besides these issues, these items that we have just discussed.

Q When do you expect this information?

A Well, we had some preliminary discussions about when it would be available, and it was my understanding that it should show up some time in the near future here.

Q Can you be more specific than that?

A I believe that we had discussed approximately a June time frame for this.

MR. GALLO: Soon, Jane.

BY MS. WHICHER:

Q Mr. Little, do you recall a series of questions from Mr. Gallo regarding Mr. Forney's selection of additional inspectors to be added to certain contractors' samples?

A (Witness Little) Yes.

Q Do you recall that?

A Yes.

Q How do you know the basis on which Mr. Forney selected the inspectors he added to the program?

A As I recall, it is described in one of his inspection reports.

Q Do you recall which report that is?

A No, I don't recall the report number, but it's also based on conversations that I and others have had with him.

Q Mr. Little, can you describe for me briefly the reinspection program that you alluded to with respect to the Clinton Plant?

A No, I'm not that familiar with the details.

Q Do you know who is doing the reinspection at

that plant?

A No, I'm not sure.

Q Is it an independent contractor?

A I'm not sure right now.

Q Mr. Little, do you recall discussing briefly with Mr. Gallo some reinspection interpretations, using that term? Do you recall that?

A Yes.

Q Have you seen those interpretations?

A Yes.

Q When did you first see them?

A I really don't recall. It was probably late fall.

Q Mr. Little, let me show you what I will represent to you was produced to me shortly before lunch and represented as coming from your files, which is February 23 memorandum to you from Mr. Hayes, attaching copies of 21 interpretations used by Edison and its contractors, and ask you if that refreshes your recollection as to when you first saw the interpretations? The contractor reinspection interpretations?

A I have seen them before this. My inspectors had seen them before this. This was when Mr. Hayes officially gave them to us by memo, but I am not sure how early my

inspectors had seen all of these. They looked at some of these during the process of their inspections in the late summer and fall of '83.

Q Did your inspectors concur in each of those interpretations as the interpretations were generated?

A No, I don't think so.

Q Did they concur in them at some time?

A They have reviewed all of them and, yes, they concurred.

Q Is that documented in any inspection report?

A I'm not -- I don't recall now whether it is documented in 84-13 or not. It may be.

Q Who would be the inspector to have documented that particular item?

A We divided them up. I think Jim Muffett looked at some; Kavin Ward looked at some; Ray Love looked at some. And they all had the complete package available to them.

Q Mr. Little, following up again on a question asked you by Mr. Gallo, one which I may have skipped, can you define for me what is a subjective attribute?

A A subjective attribute is an attribute that you would not measure using a gauge or a micrometer or a ruler or

whatever the attribute might be. A subjective one is one that is inspected visually. The acceptability is usually dependent upon the person comparing in his mind what an acceptable item looks like. It's one that he doesn't use an instrument to measure. I guess that's the best and simplest definition.

Q Is it one which an instrument cannot be used to measure?

A Not necessarily.

Q Just that one habitually does not measure with an instrument?

A Right.

Q And who decides whether one habitually would not measure that attribute with an instrument?

A Well, basically it would be those people within the Licensee's organization who establish the acceptance criteria. It would also depend upon whether -- what the code requirements were.

Q Does that complete your answer?

A Yes, I think generally it does.

Q I just don't want to cut you off.

Mr. Muffett, I'd like to direct some questions

to you specifically, and they are in the most part based upon your portion of Report 84-13.

As I understand it, you actually went to the offices of Sargent & Lundy and reviewed certain engineering calculations and certain engineering judgments; is that right?

A (Witness Muffett) That is correct.

Q And can you tell me, to help me visualize in my own mind, what is contained in an engineering package? Is it a package or a simple sheet of paper, a series of drawings or what?

A An engineering calculation, a safety-related calculation, would generally be some sheets of paper and will contain generally a sketch of the situation, the loads, it will state the design criteria, it will state the references used, and it will be a series of calculations set up in a way that someone knowledgeable in the subject can follow what's going on, and there will be a conclusion that's reached at the end of it.

Q Who generates the sketch?

A The person doing the calculation. It's not a regulatory requirement that there be a sketch, it's just a habit of engineers to make a sketch of what's there. It's not

an official drawing, it's just -- there will almost always be a sketch on the calculation.

Q Where does the person who does the calculation and makes the sketch get the information?

A From a drawing.

Q Is that drawing contained in the calculation as well?

A It will be referenced.

Q It will be referenced, but not contained in the calculation package?

A Right. Now there are different ways that these things are assembled, and I'm trying to give you a general overview. But, you know, these are the components of a calculation.

Q And who produces the drawing that is referenced?

A That would be the engineering organization or contractor that was responsible. It could be any one of a myriad of people.

Q Is it the drawing of the particular item as it is installed?

A In these cases, yes.

Q And what is contained in an engineering judgment?

A An engineering judgment, when it's handled properly, should contain some statement of the situation and what the man's judgment was and what the basis for the judgment is.

Now these things tend to be very brief, in that when I say there's a reason why he made that judgment, the thing could be as brief as the load is two pounds and I have this size member, therefore it's okay, and that could be the end of it. When these things are handled properly, they should again be documented in a way that a person knowledgeable in the subject can recreate what happened.

Q With respect to the portion of the engineering judgment that you described as describing the situation, where does that information come from?

A In these cases it will come from the inspection reports and the applicable as-built drawings.

Q Are the inspection reports and as-built drawings in the engineering judgment package?

A They are tied to the engineering judgment package. They are not contained in it. They would be referenced. There is some way to get back to the right document. And Sargent & Lundy had set up a system where I was able effectively

to go back to the original QC inspector's reports.

Q Does that system still exist, to your knowledge?

A I would believe -- I would see no reason why it wouldn't.

Q Mr. Muffett, when you did your review, did you review items to which the ASME code applies?

A Yes.

Q And did you also review items as to which the AWS code applies?

A Yes.

Q So both codes were used by you; is that right?

A Yes.

Q You did your review after the January version of the reinspection report came in; is that correct?

A I did one review at that time, and I did another review after this final report was issued.

Q And are both reviews reflected in Love Exhibit 3?

A Yes.

Q And in no other document?

A That is correct.

Q Now starting at page 28 of Love Exhibit 3, which is the -- references your reviews of some Pittsburgh Testing

Laboratories' discrepancies; is that correct?

A Correct.

Q How did you select -- does this represent all of the PTL engineering calculations or judgments that you looked at, at Sargent & Lundy?

A With the two sections here -- and you have to excuse me, I'm not sure if PTL is contained in the second chart or not -- all of them are contained in this document.

It appears to me that th's represents the PTL effort.

Q Okay. And you did a review of six PTL packages; is that right?

A Yes.

Q Is there a way to tell from looking at page 28 which were reviews of engineering calculation packages and which were reviews of engineering judgment packages?

A Well, if you read the resolution, it is somewhat indicative of which were judgments. I'm sure that the third one was a calculation, the fourth one might have been a judgment, the fifth one was a calculation, and I believe the first one was a calculation.

Q How did you -- how many total Sargent & Lundy

evaluations were there for Pittsburgh Testing Laboratories?

A I couldn't tell right now. It's probably contained in here, but I really don't know.

Q At the time you went to Sargent & Lundy to do your first inspection, Sargent & Lundy had not evaluated all discrepancies; is that correct?

A That is correct.

Q And at some time they will have evaluated all the discrepancies; is that right?

A That's correct.

Q But they haven't done that yet; right?

A As we talked about before, the things that they still owe us.

Q Do you intend to go back there and do further reviews?

A I really couldn't give you a definitive answer on that right now, because we are under a lot of pressure with a lot of other items, and we have felt that they had a reasonable program and a reasonable methodology for handling these.

I really couldn't tell you right now.

Q How did it happen, Mr. Muffett, that you selected

these six particular items?

A These selections were based on two methods:

One was I just informed the Sargent & Lundy and CECo people that I wanted all the calculations on PTL which they would bring in a box or a crate or something. I would choose some randomly and also based on their initial January report, I would look for a couple that had special interest to ... , that looked like interesting situations, and by interesting, things that piqued your curiosity as an engineer as to how they handled them.

So those two methods were used to select.

Q Is that true for each of the --

A Yes, each of the contractors.

Q -- each of the contractors' engineering evaluations you reviewed?

A Yes.

Q Was there any reason for you to select the particular number six with respect to Pittsburgh Testing Laboratories?

A No, no. It was a matter of time, availability of time, and the amount, some general cognizance of the amount of work that each contractor had done, and which ones had

interesting discrepancies, and all those factors intertwined.

Q Okay. And you selected seven for Hatfield Electric; is that right? At least during your first inspection? Pages 34 and 35.

A Right. Seven for Hatfield on the first go-round.

Q And on page 38, are these additional Hatfield discrepancies that you reviewed?

A Page 37 and 38 are additional Hatfield discrepancies that were reviewed.

Q Mr. Muffett, I may have already asked you this. If I did, I apologize, but I simply don't recall.

Are each of the engineering evaluations that you reviewed referenced in this document?

A Yes.

Q I notice that under the column "NRC Resolution," you generally have one of two descriptions, and that is "concur" or "reviewed calculation."

A Right.

Q Can you tell me what it means when you -- and I assume this is your judgment or your entry -- what it means when you say you concur?

A Those are cases where it was either a judgment or

a lack of calculations, or the calculations were so totally simplistic that they didn't require a review, like an addition of two numbers, and those would take a concurrence.

And the ones where it says "review calculation," that is exactly what I did.

Q Turning your attention, please, to pages 45 and 46 of the report, and particularly at the top of page 46, you refer to a major reassessment program underway. Can you tell me what that reassessment program is?

A Could you refer me on the page where you are talking about?

Q 46, at the top.

A I can only sketch this out for you, but due to the change in the response spectra dealing with HVAC support, Sargent & Lundy is presently under a program to reassess those supports as they come in on as-built drawings.

Q What caused that change?

A In response spectra?

Q Yes.

A I would have to refer to some memos which were given to us under an anonymous allegation to actually give you the answer to that right now.

Q Mr. Muffett, how much time did you spend reviewing Sargent & Lundy's calculations and judgments?

A In this program here, or overall?

Q Well, in this program reflected in your report.

A I would say on the order of 80 to 120 manhours.

Q And about how many did you review?

A It's around 120 again, I guess.

Q And you concurred in every case except for the three or four that were qualified; is that right?

A (Witness Muffett nodding yes.)

Q And, in fact, Sargent & Lundy found that in every case no discrepancy noted had any design significance; isn't that the fact?

A Yes.

Q Did that raise any question in your mind, Mr. Muffett?

bu3 A Could you rephrase that question? I'm not sure --

Q Doesn't that seem like an awfully high agreement rate to you, Mr. Muffett?

A Well, I can understand how that would appear to be an awfully high agreement rate. The reason that doesn't surprise me is because of some knowledge that I have about

how these things are desi ed in nuclear power plants, and the large levels of conservatism that are in the design.

It is my opinion that it would take a very, very disastrous discrepancy or flaw to actually have safety-related implications. And I might add that that has generally been true of things we found in Region III over the years, according to my discussions with other inspectors.

Q What has been true?

A That it is very, very rare that there is a design error that is gross enough -- I shouldn't say design error, excuse me -- a discrepancy error, QC inspector error, that is large enough to cause a safety-significant hardware change.

Q Would you agree that enough small QC errors could amount to such a significance?

A Well, I hate to take a stance of blessing errors. We wish that none of them were made. I am not surprised by that number of these small errors, no. No, I don't believe that a number of small errors is safety-significant.

Q Do you believe that a number of small errors could amount to collectively something that could have safety significance?

A No.

Q No, you don't? Okay.

Mr. Muffett, is there a difference in your view between an attribute that does not comply with the applicable code and a discrepancy?

A A discrepancy as defined under this program?

Q Yes.

A I believe that the things that do not comply with the applicable code are a subset of the discrepancies.

Q What else is contained within the ~~university~~ UNIVERSE of discrepancies?

A Well, there will be a large number of things that are not code discrepant. One example would be piping supports located outside CECo's tolerance. There are a host of conduit supports, and there are instances where the wrong member size is in place, and that is not a code discrepancy, per se.

Q Can we agree, Mr. Muffett, that each noncompliance with the applicable code is a discrepancy?

A Yes.

Q I take it, Mr. Muffett, that you are of the opinion that there is a great deal of difference between a code compliance and design significance; is that correct?

A There is a difference. I don't know if there is a great difference. There is a difference there. There is a slight difference in meaning.

Q Something that is non-code compliant is not necessarily design significant; is that --

A That's true.

Q -- is that your opinion?

A Yes.

Q Mr. Muffett, you were not involved, I take it, in the formulation or acceptance of the program; is that correct?

A Not in the early days. The only involvement I have had is since last January. I have been involved in the discussions about why or how we felt about this program, what the results told us, and things like that.

Q You are aware, are you not, that a Level III inspector -- a Sargent & Lundy Level III inspector was used to review rejected subjective attributes?

A Yes.

Q Do you know who approved that?

A No.

Q Do you know, Mr. Little?

A (Witness Little) No. You mean from the Licensee's viewpoint?

Q No. At the NRC.

A Are you talking about the additional Level III that was talked about later on in the program, or the Level III required by the program?

Q I'm talking about the Sargent & Lundy Level III inspector who would review the rejected subjective attributes.

A That had been reviewed by the Level III that's required by the program?

Q I don't know that there is a required Level III review.

A There was a time when Commonwealth wanted to have an additional Level III beyond the program review the results which we told them was not acceptable. I guess I was wondering if you were talking about that one, or were you talking about --

Q I'm not talking about that situation. I'm talking about -- my understanding is that was a Commonwealth Edison Level III inspector. I'm talking about the use of Sargent & Lundy Level III inspector, which I understand is referred to in this report at times as the third-party

inspector.

A Right.

Q Who approved use of the third-party inspector to reinspect the rejected subjective attributes?

A That was part of the program as proposed. You know, we all -- people here in the office reviewed that and so Region III as a whole, I can't point to any one person as an individual.

T.6 Q And was it originally contemplated that the third-party Level III inspector would review only rejected subjective attributes?

A That is my understanding.

Q Why were only those attributes selected for review by the third-party Level III inspector?

A Because it is our experience, I think, as well as industry's experience that in the gray areas you need that additional level of expertise to make the decision. And --

Q I'm sorry, I didn't mean to interrupt you. Are you finished?

A Yes.

Q Was there any consideration given to having a third-party Level III inspector look at accepted subjective

attributes to see if those attributes had been properly accepted?

A I don't recall. That may have been discussed.

Q It was not in the program; is that right?

A No.

Q Why not?

A They didn't propose it, and we didn't think it was necessary.

Q Why didn't you -- do you think it would be a good idea?

A To say something is a good idea doesn't necessarily mean it's necessary.

Q Do you think it would be a good idea?

MR. PATON: I will object to that. Do you mean from a regulatory point of view?

MS. WHICHER: Let me withdraw the question and ask it this way, Mr. Little.

BY MS. WHICHER:

Q Do you think it would be an improvement in this program?

A (Witness Little) It wouldn't -- it could be considered as a slight improvement.

Q Mr. Muffett, when an evaluation of a weld containing a discrepant condition was made, it is my understanding that the length of the weld minus the length of the discrepant condition was calculated; is that right?

A (Witness Muffett) Was analyzed, yes.

Q Okay. Was analyzed.

And was there any leeway on either side of the discrepant condition that was taken out of the total calculus of the amount of weld length that was analyzed?

A No.

Q Why not?

A It's been the experience of the industry that even welds with some discrepancy in them have some strength, and it was felt that that strength in the discrepant part would tend to cover up or make the calculation conservative.

Q Did your reviews consist of welding reviews only, or of other attributes?

A Other attributes.

Q What other attributes?

A Well --

Q And let's limit our discussion right now to Hatfield, Hunter and PTL.

A Okay. Starting with Hunter, excessive bend and pipe ovality, whip restraint dimensions.

Hunter, Hatfield, and who else?

Q PTL.

A For Hatfield, conduit bends, a missing hanger, incorrect plate size recorded, incorrect tube steel dimensions, change of conduit radius, relocate supports, member too long; a large number of things.

Q Did you make any conscious effort to review a certain proportion of welding discrepancies vs. a certain proportion of any other type of discrepancy?

A No. As I told you, they were chosen randomly, and then based on the short description that was in the initial inspection report, items that we thought were of interest, we pulled along with the random ones.

Q When you reviewed a calculation, weld calculation, did you review the structural calculation to obtain the joint load for the weld calculation?

A Generally not. In some cases it was so simple or it was obvious that I would check that generally. In the more complicated stages, it just wasn't practical.

Q Did you recheck the design calculation model for

the assumptions and corrections used in the model?

A I'm not -- I guess I don't understand what you mean by that.

Q Did you look at any design calculation models?

A Well, a model is a pretty elastic model there. I mean a guy has some type of mental model of any type of calculation. If you are referring to the big structural analysis of the whole building, no, I wouldn't have gotten into that.

Q Did you -- as I recall your earlier testimony, some of the evaluations that you looked at -- and I believe it was the engineering calculations containing drawings or sketches, is that right -- did you ever take the drawing or sketch and take it back to the site and compare it with the actual item, to check it for accuracy?

A No.

Q Why not?

A Well, for the first thing, I was looking at results of something that had been overinspected or reinspected again by the reinspection program, and in a -- that was not a bone of contention, that was not the discrepant condition identified. A lot of times, particularly in the weld, it was

the length or the flaw of the weld, and there was no contention about this being a proper structure.

Now there are a number of these that are in here that are labeled as incorrect as-built data that the reinspectors found, and once they found that, I would -- you know, that -- I had no reason to disbelieve that.

Q With respect to the incorrect as-built discrepant conditions, how did you go about reviewing those?

A What they had there was that the reinspector had said that the as-built data was incorrect, and that the item was actually located in this position.

Q And is my understanding correct that you would check the position given by the reinspector to see whether that condition or that position was appropriate?

A Sometimes it did not have to be checked because it fell within their tolerance for location. They still called it a discrepancy, even if it fell within their tolerance for location, so that there was no calculations that had to be done, and that way it was just identified as incorrect as-built data.

Q It was not within the tolerance?

A Then there would be a calculation and I would

review that.

Q Mr. Muffett, you said that you use statistics in your work, but you are not a statistician by training; is that correct?

A That is correct.

Q Do you use sampling techniques in your work?

A It's very common in our work as inspectors. Our work by nature is sampling. We don't have the manpower or the time to do complete inspections, so we generally sample items. And a lot of times when we find discrepancies, sampling programs are brought about in response to our discrepancies.

Q Have you ever had any training, formal or informal, in sampling techniques?

A I have had one graduate course in statistics.

Q And did that course cover sampling techniques?

A Yes.

Q Do you consider yourself as having any expertise in sampling techniques?

A No, I would not say that I'm an expert. I can understand the equations and the terminology, and I think I can draw some conclusions from it. I do not consider myself

an expert.

Q Mr. Little, I'd like to talk with you a little bit about the Region's approval of the reinspection plan proposed by Commonwealth Edison that was ultimately implemented.

Was there ever any consideration given to having the entire reinspection program done by a third party who had not been involved in the plant before?

A (Witness Little) Not to my knowledge.

Q Why not?

A Well, in practicality, even if you do hire a third party, he would come and probably hire people out of the local labor pool to do a lot of the inspections, and he would end up possibly using some of the same -- same people.

We did not think it would provide that great an advantage to propose it.

Q And was the basis for your conclusion that it would not provide a great advantage based on the fact that the reinspector would be drawing on the same labor pool, or was it based on --

A No, not entirely, no.

Q What else was it based on?

A The -- I guess to go to an outside contractor, you

would have to have concern that what has been referred to as the "buddy system" would be in effect, in that you have people in organizations reinspecting their own work.

I guess we felt confident that with the controls that were established, that that was not a problem, and therefore there was no reason to request an outside contractor.

Q What were the controls here for the problems associated with what you referred to as the buddy system?

A First of all, the inspectors did not know whose work they were inspecting. They did not have the original inspection results available to them. The Licensee took those steps.

We have also looked at the number of inspectors who were on site at the time of the reinspection and, you know, there were a lot of the original inspectors that had left. They were not -- they were not there.

In my own mind, for a buddy system to work, you would really have to have an extremely large amount of data available to you almost instantaneously, so that when the inspectors went out to inspect these randomly-selected inspectors, they would have had to have had that information available to them.

In my mind, that would take a rather complex system to even get something set up where the buddy system could work.

That, to my knowledge, didn't exist there.

Q Did you consider the use of some time frame other than the first three months of an inspector's work?

A Yes. I think other periods were considered.

Q What other periods?

A I don't recall, but I'm sure it was discussed.

Q Was some later time frame in an inspector's tenure at the plant considered?

A I think it was considered. I think when the final concensus got to the point where we felt it was most conservative to look at the first 90 days, we felt that that was the best thing to do and we saw no reason to look at other periods in time.

Q As I understand the reinspection program, Mr. Little, one of the basic premises is that the -- a particular inspector's worst work would be performed during his first three months on the job. Is that correct?

A Yes.

Q Do you know of anything to support that theory?

A A lot of experience.

Q Is there anything in the reinspection program that would help you support that theory?

A There may be. I'd like to look at the data, before I would offer an opinion there.

Q Mr. Little, is there anything you could think of about the reinspection program that might result in a reinspector having some sort of bias?

A To the best of our knowledge, no. We have not detected anything.

Q Is there anything you can think of in the way the program is set up that might indicate some kind of bias to you?

A No.

Q Mr. Muffett, would you answer that question as well?

A (Witness Muffett) If you could explain what you mean by bias. There is a bias, a conservative bias in this report, in that Mr. Forney added some inspectors that he had doubts about, and there is a conservative bias in that they chose the first three months when the man would have the least on-the-job experience. Those are conservative biases,

if that's what you mean.

Q Can you think of any biases that are built in that might work the other way?

A I'm not aware of any right now, but I think that would take a lot of careful study to determine.

Q Mr. Little, it is my understanding that there were some Hatfield welds as to which the original inspector could not be determined. Do you recall that issue?

A (Witness Little) I don't recall the details of it.

Q Do you recall, Mr. Muffett?

A (Witness Muffett) Yes.

Q Were you involved in any discussions about that issue?

A This is one of the 21 interpretations, I believe, if I'm thinking of the same thing you are.

Q Let me see if I can find the interpretation. Let's go off the record for a minute.

(Discussion off the record.)

BY MS. WHICHER:

Q I'm going to hand you, Mr. Muffett, what was produced to me yesterday by Staff attorneys as a file labeled

82-05-19 reinspection program audits, and the first portion of that file contains a sheet -- has a sheet in it called Interpretations Summary, and ask you if you can locate in that document an interpretation pertaining to the problem we were just discussing before we went off the record.

A (Witness Muffett) Okay, I was incorrect. I believe this is Interpretation No. 8, or this is Interpretation 14, which -- it was Peabody.

Q That was Interpretation 14?

A Yes. And No. 8 deals with a similar issue.

Q Let's just take Interpretation 14 first. Do you have that in front of you?

A Yes.

Q Did you concur in that interpretation?

A Yes.

Q At what point?

A I believe it would have been in March 1984 that I first saw this.

Q And the other interpretation you referred to was Interpretation No. 8; is that right?

A Yes.

Q Okay. If you could turn to Interpretation 8 in

that file. Is that a similar issue?

A Yes.

Q How is that issue similar?

A If you read 14, it says we have problems tracing which welds thi[illegible] -- specific welds were inspected initially. That is 14.

8 says per our conversation we are considering that welds are nonreproduceable due to the fact that we do not have a tracking system to determine reworked items, and we cannot determine from our reports which welds on a given hanger were reinspected, which is in essence a problem of traceability.

Q And that is a Pittsburgh Testing Laboratory problem of traceability; right?

A Yes.

Q And did you concur in Interpretation No. 8?

A Yes.

Q At what time?

A The same time.

Q March of '84; is that right?

A Yes.

(Witnesses Muffett and Little conferring.)

Q I would ask you please not to confer unless it is a joint question.

(Discussion off the record.)

BY MS. WHICHER:

Q Mr. Muffett, aside from Interpretations 8 and 14, which we have just discussed, do you recall a similar problem with respect to Hatfield welds?

A (Witness Muffett) No. Before I could really make that definite determination, I would have to inspect these interpretations again. That does not come to mind. A number of these things do involve Hatfield Electric Company.

Q Mr. Little, as I understand the reinspection program, there are certain classes of attributes that are considered to be inaccessible or nonrecreatable; right?

A (Witness Little) Right.

Q And as I understand the program -- can you tell me whether you have made any determination as to whether for a particular inspector whose accessible work was reinspected, the results of the reinspection of accessible work can be transferred to inaccessible or nonrecreatable work done by that same inspector?

A We can make inferences, yes, from that.

Q And have you made such inferences?

A Yes.

Q What are those inferences?

A We have inferred from what we have seen that we have seen no trends that would cause us to suspect that work that was not recreatable or accessible.

Q And is the basis for your inference, the only basis for your inference the lack of trends?

A No, it would be really that our evaluation of the reinspection program and the data, plus all of our other inspections. We have inspected many of these areas that did become inaccessible in that they were not able to inspect in the reinspection program, and so the inspection history prior to that time influences us, too.

Q And, Mr. Little, have you made any determination as to whether the results of the reinspection program can be validly transferred to all QC inspectors who have worked at the Byron site?

A Just based on the reinspection program, can validly be transferred to all inspectors? No. But we think we can say that all inspectors have been capable based on inspections prior to the reinspection program and inspections after the

reinspection program.

Q And you are talking about Region III and NRC inspections; right?

A Yes. If I said all inspectors are capable, I'd say we have reasonable assurance that the inspectors are capable. We can never say that all are capable.

Q In your opinion, Mr. Little, does the program confirm the quality of the inspectors at Byron at the Byron Plant?

A Would you restate that? I was thinking about something else.

Q In your opinion, does the program confirm the quality of the inspectors at the Byron site?

MR. PATON: You mean all of them?

BY MS. WHICHER:

Q Yes, all QC inspectors.

MR. PATON: I object in part because I think he just answered, and also because I don't think that is an issue in this case.

You can go ahead and answer it, though.

WITNESS LITTLE: No, this program doesn't confirm the quality of all QC inspectors at the Byron site.

BY MS. WHICHER:

Q What does this program do, then?

A (Witness Little) It addresses those inspectors that worked at the site from the beginning up until the time in 1982 when they did make changes in the certification processes. Those are the inspectors that it addresses.

Q So, in your opinion, does it confirm the quality of the work done by the inspectors up until that point in time in 1982?

A It confirms -- and I will qualify that by what I have said earlier in the deposition. Yes, you can infer with confidence that, yes, those inspectors were capable.

Q Can you or have you made any inferences about the quality of construction at Byron based on the reinspection report?

A I think I have already answered that question, too, but, yes, certainly what we found out in the reinspection program does give us additional assurance as to the quality of the work.

Q Mr. Little, were you involved in the recertification aspect of the reinspection program?

A No.

Q You had no involvement in it at all?

A No, no direct involvement, no.

Q Did you have some kind of involvement?

A I was involved in meetings where it was discussed. I have read the reports written during that period in time, so I was involved to that extent.

Q Okay. Mr. Muffett, were you involved in the recertification aspect?

A (Witness Muffett) No.

Q Mr. Little, have you given any consideration to the safety significance of inaccessible work?

A (Witness Little) Yes.

Q And have you made any analysis of the safety significance of inaccessible work?

A We have concluded that there are no trends in the results of the reinspection program that have caused us to bring the inaccessible work's quality into jeopardy or into question.

Q How much of the total work at the plant is classifiable as inaccessible or nonrecreatable?

A I'm not sure.

Q Any idea?

A No. Whatever I'd say would be a very subjective guess.

Q Mr. Muffett, do you have any idea?

A (Witness Muffett) No, I could only guess. I really could not state it with any accuracy.

Q So neither of you have any idea; is that right?

A (Witness Little) Oh, in some areas. You know, you look at the work that Hatfield did, okay, you can say, okay, there is conduit that is buried in concrete, cable trays are there for you to see, terminations are there for you to see. My opinion would be that a large part of the Hatfield work was available, but that, I can't quantify that.

Q Would you say more than 50 percent or less than 50 percent?

A I would say that more than 50 percent was available for reinspection.

Q Have you given any consideration to whether nonrecreatable work is like or similar to work that is accessible or recreatable?

A Yes.

Q Okay. Can you explain any analysis or conclusions that you have drawn about that issue?

A Well, you know, there is some such -- there are some things possibly that relate to conduit that is buried that you can't get to that, yes, would be very similar to the conduit that is exposed that you can inspect.

We have had a lot of discussions in the office with our inspectors about this -- this subject.

Q And are there in fact, Mr. Little, nonrecreatable attributes that are dissimilar or unlike attributes that are accessible or recreatable?

A Yes, there are.

Q Okay. Can you list all of them for me that you can think of?

A You get into the concrete work that's done, pouring the foundation, the walls, the structural steel that later becomes covered up.

Q Can you raise your voice?

A I say structural steel that later becomes covered up. Those sorts of things. Yes, there are things.

Q How about anything in the welding area?

A Well, any piping that's buried, sure, that would not be available.

Q Mr. Little, as I understand the reinspection

program, if an inspector had attributes in several areas, but only failed the acceptance criterion in one area, his work for the next three months would only be looked at in the failing area; is that correct?

A Yes.

Q Have you given any consideration to the idea that the attributes which the inspector passed during the first three months, he might not have done such a good job on during the second three months?

A Yes, that's crossed our mind. That can happen.

Q Okay. Does the program cover that in any way?

A No.

Q To either of you who may know the answer to this, were there reinspectors in the program whose work was picked up in a sample of inspectors, whose work was reinspected?

Do you understand my question?

A Say that again.

Q Among the universe of inspectors whose work was reinspected, were any of those inspectors doing reinspection work under the reinspection program?

A I'm not sure. My guess, there probably were some.

Q Have you done any analysis as to the quality of their work in the reinspection program vs. the quality of their work during the original inspections?

A No more than is done by the reinspection program itself.

Q Does the reinspection program addres_ that issue at all, Mr. Little?

A It doesn't compare if there was an inspector who inspected in the reinspection program, it doesn't compare his results there with his results in the original program.

Q Mr. Little, it is a fact, isn't it, that some attributes, when they are originally inspected, an inspector will know that those attributes become inaccessible?

A Yes.

Q Is there any thought given to the idea that an inspection of an attribute which an inspector knows will become inaccessible might not be as thorough as an inspection of an attribute that an inspector knows will continue to be accessible?

A I think we are always aware that that could happen, but we have seen no indications of that, either prior to or after the reinspection program.

Q Where would you look for an indication of that?

A Well, in our inspections of work that was done before the inspection program to see if the inspectors did properly identify deficiencies on work that later would be covered up. I know of no trends that were detected in that area.

Q Do you know of any trend analyses that were run for such characteristics?

A No, but I think that's one thing our inspectors are always sensitive to.

Q But you don't know of any trend analyses that were run for that characteristic, do you?

A I don't know of any.

MS. WHICHER: Give me just a minute to go through my notes. I think I am about done.

(Pause.)

MS. WHICHER: I don't have any more questions. Thank you.

MR. GALLO: Any questions, Bill?

MR. PATON: No.

MR. GALLO: I've got one or two.

R E - E X A M I N A T I O N

BY MR. GALLO:

Q Mr. Little, are you aware that Mr. Ward conducted visual inspections of approximately 800 welds?

A (Witness Little) Yes.

Q These are welds that were inspected during the reinspection program?

A Yes.

Q Are you aware that he visually inspected some welds that were found to be acceptable by the reinspector?

A Yes.

Q Is this in the nature -- strike that.

Are these visual inspections in the nature of the inspection suggested by Ms. Whicher, that the Sargent & Lundy third-party inspector should conduct?

MS. WHICHER: I object to that. It is incomprehensible and confusing, vague.

BY MR. GALLO:

Q Did you understand the question?

A (Witness Little) Yes.

Q Go ahead and answer.

A Yes, I think it is. I would rate him as being

equivalently qualified to a Level III, and he has been a Level III inspector.

MR. GALLO: I have nothing more.

R E - E X A M I N A T I O N

BY MS. WHICHER:

Q Do you know how many of the 800 visual weld inspections Mr. Ward looked at, had been accepted by the reinspector?

A (Witness Little) No.

MS. WHICHER: That's all.

(Whereupon, at 6:20 p.m., the deposition was concluded.)

James Muffett
JAMES MUFFETT

William S. Little
WILLIAM S. LITTLE

STATE OF CHICAGO :

COUNTY OF DuPAGE :

Sworn and subscribed to before me this 20 day of July, 1984 by the said JAMES MUFFETT and WILLIAM S. LITTLE.

Marcia J. Smith
Notary Public

My Commission Expires: February 8, 1986

STATE OF MARYLAND :

COUNTY OF MONTGOMERY :

I, ANN RILEY, a Notary Public in and for the State of Maryland, County of Montgomery do hereby certify that I reported the deposition of JAMES MUFFETT and WILLIAM S. LITTLE, the witnesses herein.

I further certify that the foregoing 156 pages contain a true and accurate transcription of the testimony given by the said witnesses.

I further certify that said deposition was either transcribed by me or under my personal supervision.

I further certify that I have no financial interest in the outcome of this litigation.

Given under my hand and seal of office this the 26th day of June, 1984.

Ann Riley

My Commission Expires:

July 1, 1986