ORIGINAL

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Fewell Geotechnical Engineering, Limited; Thomas E. Murray, Radiographer

Docket No. 030-30870-OM

LOCATION: Honolulu, Hawaii

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U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of:

Fewell Geotechnical Engineering, Limited

Thomas E. Murray, Radiographer

Docket No. 030-30870-OM

District Court Building

1111 Alakea

Courtroom No. 10-D

Honolulu, Hawaii

Tuesday, February 12, 1991

The above entitled hearing commenced, pursuant to notice, at 9:07 a.m., the Honorable B. Paul Cotter, Jr., Administrative Law Judge, presiding.

APPEARANCES:

PANEL MEMBERS:

JUDGE B. PAUL COTTER, JR., PANEL CHAIRMAN

JUDGE PETER LAM

JUDGE RICHARD FOSTER

On Behalf of the Nuclear Regulatory Commission:

RICHARD G. BACHMANN, ESQUIRE
Office of General Counsel
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Washington, D.C. 20555

On Behalf of the Petitioner, Thomas Murray:

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Honolulu, Hawaii 96813

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[9:07 a.m.]

JUDGE COTTER: The hearing will come to order. Docket No. 03030870-OM, in the matter of Fewell Geotechnical Engineering, Limited. The action was precipitated by an order issued by the Deputy Executive Director for Nuclear Materials Safety Safegaurds and Operations Support on November 2, 1990, which provided that Fewell Geotechnical Engineering, Limited shall not utilize Mr. Thomas E. Murray in any licensed activities, including, but not limited to activities performed radiographers, radiographers' assistants and helpers for a period of three years.

By letter dated November 18, 1990, Mr. Murray requested a hearing and that is why we are here today. I am B. Paul Cotter, Jr. I'm the Chairman of this panel. To my right is Judge Peter Lam. Judge Lam is a nuclear engineer. To my left is Judge Richard Foster. Judge Foster is a fisheries expert or environmental scientist.

I guess with that preliminary statement, let me ask the parties to enter their appearance. Mr. Bachmann?

MR. BACHMANN: Yes, sir. My name is Richard G. Bachmann. I am counsel for the staff of the Nuclear Regulatory Commission. Also present beside me and whom I intend to call later on as a witness is Mr. James Lieberman, who is the Director of the Office of Enforcement of the NRC.

JUDGE COTTER: Thank you, Mr. Bachmann. Mr. Murray, would you identify yourself for the record and give your address, please?

MR. MURRAY: Thomas Edward Murray. My address is 802 Prospect Street, Apartment 601, Honolulu, Hawaii.

JUDGE COTTER: Thank you. Do you wish to make an opening statement, Mr. Bachmann?

MR. BACHMANN: Yes, sir, we do. I wish to inform the Board that I had a conversation with Mr. Murray on the telephone last night wherein no promises were made, recognizing that I'm an attorney, he is not, he is representing himself. We made certain suggestions going along with perhaps an inclination of the Board that perhaps we could settle the case.

Subsequent to that fairly lengthy discussion in which I explained to Mr. Murray all of his rights, similar to what Your Honor has explained to him this morning, I consulted my client, which is basically the staff and, more succinctly, the Office of Enforcement. The decision was made that we would proceed with the hearing as it was originally set up.

It is my client's belief that at this stage, there is no real room for a settlement. I informed Mr. Murray that I would talk to my client about what we had spoken about the previous evening, but that I could not promise

anything. I think Mr. Murray will verify that.

Therefore, going on to my opening statement, the --

JUDGE COTTER: What was the purpose of that? Is there any point in any further conversations at this point?

MR. BACHMANN: Yes, there is. The reason why no settlement was necessary is the belief of the staff that the actions or shall we say, in this case, the admissions of Mr. Murray, based on those admissions which led to the violations of either the regulations or the operating procedures of Fewell Corporation, amply support the sanction that was imposed.

While a hearing may become somewhat lengthy and somewhat tedious, it is the staff's position that, in this case, it is necessary to go forward, explain not only what Mr. Murray did, but also to explain why we consider it significant enough to justify the three-year suspension from the Fewell Operating License.

The reason I had brought up the earlier settlement terms was, first, of course, to keep the Board informed that I had talked to Mr. Murray, since he is not represented by counsel. Second was to emphasize the point that the staff's position is very strongly that the sanction imposed is as stated in the order.

Do you wish me to proceed or do you wish Mr.

Murray to make a statement at this point?

JUDGE COTTER: I'm going to give him the option before you proceed. Does that conclude your opening statement?

MR. BACHMANN: That concludes my opening statement, sir.

JUDGE COTTER: Do you wish to make an opening statement, Mr. Murray?

MR. MURRAY: Yes, sir. I'm primarily here to, as you gentlemen know from our conversation over the phone a few weeks ago, that I'm trying to get it reduced, that I think that the punishment is too strict, and that a lot of the things they bring up they're saying I did willfully, and I don't believe I did anything willfully.

I think there was some carelessness in the way I performed radiography, but I also don't believe I compromised the public safety. These are things I'm going to clear up. There's a lot of things that we'll bring up that I'm not going to refute; for instance, the stipulation.

So if we want to attack these things first, I think it will save everyone a lot of time. I have the letter and the stipulation is right here, Mr. Bachmann.

MR. BACHMANN: Responding to that stipulation, until it was executed, it obviously had no legal significance. I have sent a letter, a cover letter with a

stipulation to Mr. Murray wherein he would agree to the operative facts of the five statements that are in the order.

I indicated in the letter he would not be, by so signing, admitting a violation or anything else, other than on the days in question, he did or failed to do the things that were listed in the order. I believe, if Mr. Murray wishes to stipulate thereto, we could move right on to another segment of our presentation.

Let me lay a better foundation.

JUDGE COTTER: I'm a little leery of that, since Mr. Murray doesn't have counsel.

MR. BACHMANN: Let me lay a little better --

JUDGE COTTER: I find some considerable ambivalence in the record that I've seen so far in the discovery materials.

MR. BACHMANN: I will be off the record while I'm approaching the Bench to hand out to the Board copies of the order itself.

JUDGE COTTER: We'll stay on the record while you walk, Mr. Bachmann.

[Pause.]

JUDGE COTTER: I'm sorry. I thought you were giving me something related to a stipulation.

MR. BACHMANN: Yes, sir. It is related to it. I

will explain it a moment. On Page 2 of the order, starting at the bottom, there is a number one in parentheses, which then runs on to Page 3 through number five on Page 3. What Mr. Murray and I discussed about stipulating is to the facts contained after those numbers that are in parentheses.

JUDGE COTTER: This is language identical to that in the Federal Register Notice.

MR. BACHMANN: Yes, sir, it is. In fact, just to make the record complete, the Federal Register Notice citation is 55 Federal Register 47409, dated November 13, 1990. I used the original order because I believed that the Federal Register's print is a little bit small to keep referring to.

As I said, what I have discussed with Mr. Murray is --

JUDGE COTTER: Let me, just for the record. If it's not clear, what Mr. Bachmann has just given to the Board -- did you give a copy to Mr. Murray?

MR. BACHMANN: Yes, I did.

JUDGE COTTER: Is a copy of the November 2, 1990 order modifying license effective immediately that I referred to at the outset of this proceeding. It consists of the cover sheet dated November 2, 1990, a second cover sheet which is addressed -- the first cover sheet is a letter to Fewell Geotechnical Engineering, Limited. The

second page is a copy of a similar letter to Mr. Murray.

The balance of the item is the order itself, which numbers eight pages, including the distribution list on the last page. The order itself is seven pages.

Go ahead, Mr. Bachmann.

MR. BACHMANN: Judge Cotter, at this point, having given the citation and having had the description of the document put into the record, I would move that this document be received into evidence as Staff Exhibit No. 1 and bound into the record for the convenience of anyone who may be reading the transcript.

JUDGE COTTER: Is there any objection to that, Mr. Murray?

MR. MURRAY: No, sir.

JUDGE COTTER: It will be so received and bound.

[Staff Exhibit No. 1 was marked for identification and received into evidence.]

JUDGE COTTER: Is this preliminary to a continuation of the subjects of stipulation or are you going into your case?

MR. BACHMANN: No, sir. This was preliminary to the stipulation, because I wish to point out to the Board just specifically what it is that Mr. Murray would be agreeing to, no more and no less. That is the facts as

stated on the items one through five on Pages 2 and 3 of the order that has been entered into evidence.

I believe that it would be appropriate at this point, if the Board wishes, to ask Mr. Murray if he fully understands what he would be agreeing to.

JUDGE COTTER: Do you understand what you're agreeing to here, Mr. Murray?

MR. MURRAY: On the stipulations?

MR. BACHMANN: Right. Just those five items.

JUDGE COTTER: You have a choice here, Mr. Murray. You can either stipulate that these are the facts or you can require them to put on evidence to prove it.

MR. MURRAY: No, I don't think that's necessary. What I would like to explain, I would like to address each one of these stipulations.

JUDGE COTTER: You can do that after --

MR. MURRAY: After.

JUDGE COTTER: -- he finishes putting on his case.

MR. MURRAY: While they're presenting their evidence. I think that's the best way to go, then, because I just don't want to go through here and leave it sit just like this.

JUDGE COTTER: I understand that.

MR. MURRAY: I need to explain my actions on this particular day.

JUDGE COTTER: What you're saying is that these were the actions that you took.

MR. MURRAY: Yes. Basically, yes.

JUDGE COTTER: When you say basically, does that mean that this is an inaccurate description or is some other part of it that's missing?

MR. MURRAY: Well, I'll give you a for instance here. There are some things -- okay. Now, failed to prevent entry in the restricted area of individuals other than radiographers and radiographic assistants. This ties into how I establish boundaries and restricted areas, and the fact that I --

JUDGE COTTER: Let's start at the top, Mr. Murray. Let's take the first one. It says that you conducted radiographic operations without performing surveys to establish the radiation boundary on October 25, 1990. Is that correct?

MR. MURRAY: That's correct.

JUDGE COTTER: Item 2 says on October 23 and 25, 1990, Mr. Murray failed to rope off any portion of the radiation boundary and failed to post signs for most of that boundary. Is that correct?

MR. MURRAY: That's correct.

JUDGE COTTER: Item 3, on October 23, 1990, on at least 12 occasions, and on October 25, 1990, on at least

five occasions, Mr. Murray failed to perform surveys of the exposure device to determine that the sealed source had been returned to its shielded position after radiographic exposures. Is that correct?

MR. MURRAY: No. I don't know that. This is when --

JUDGE COTTER: That means that you do not wish to stipulate to Item 3, that that is a fact.

MR. MURRAY: Correct. To go back to No. 1 -- okay. That will come later. Go ahead.

JUDGE COTTER: I'm sure there are a lot of explanations and additional information.

MR. MURRAY: Sure. Okay, sir.

JUDGE COTTER: That's not what we're talking about here. We're talking about whether these events took place.

MR. MURRAY: I see. All right.

JUDGE COTTER: So far, if I understand you correctly, you are willing to stipulate to Items 1 and 2, but not Item 3.

MR. MURRAY: Let's put it this way. Item 3, on 12 occasions, I can't say that I exactly did -- if I didn't do it one time, and I'm sure there was one time I didn't do, then --

JUDGE COTTER: You don't know whether the number 12 is right or whether the number five is right.

MR. MURRAY: Exactly. But I can say that I've seen the videotape and I did not survey a number of times.

JUDGE COTTER: Then you do not stipulate to Item 3.

MR. MURRAY: Okay.

MR. BACHMANN: Do I understand correctly that the lack of agreement is the numbers, the specific numbers and nothing else?

JUDGE COTTER: Mr. Murray?

MR. MURRAY: They're saying that on October 23, 1990, on at least 12 occasions. I don't know if there was any occasions on the 23rd of October that I did not survey the exposure device. Number two, I -- well. There were two different situations on those two particular days, and I'm referring to my survey meter when I bring this up, and it did make a difference in the way I performed radiography, not having this particular survey meter as opposed to an older survey meter.

JUDGE COTTER: Right.

MR. BACHMANN: I understand there is no agreement on Item 3.

JUDGE COTTER: Item 4, on October 25, 1990, Mr. Murray failed to secure the radiographic source in the fully-shielded position after each of several source exposures. Is that the case?

MR. MURRAY: That is the case.

JUDGE COTTER: Then you agree to stipulate to Item 4?

MR. MURRAY: Yes.

JUDGE COTTER: Item 5, on October 23, 1990, Mr. Murray failed to prevent entry into the restricted area of individuals other than radiographers and radiographers' assistants.

MR. MURRAY: This is one that I'll have to not stipulate, that I'll have to go over with the NRC people.

JUDGE COTTER: All right. As it stands, you agree to stipulate to Items 1, 2 and 4.

MR. MURRAY: Yes.

JUDGE COTTER: All right.

MR. BACHMANN: Your Honor, the next item I wish to bring to the Board's attention is the Fewell Geotechnical Engineering, Limited materials license. As with the order, this has been previously supplied to the Board by me and it comes with certain attachments, which include the amendment to the license which put Mr. Murray on it, on the license as a named individual.

It includes the pertinent operating procedures which are Roman Numerals I and IV, which are cited in the November 2 order.

JUDGE COTTER: Wait a minute. You said the

license includes what?

MR. BACHMANN: The operating procedures, Roman Numerals I and IV, which are cited in the November 2 order modifying the license, as being violated. In other words, I am providing the Board, again, with the exact same documents that I mailed to the Board and to Mr. Murray previously.

JUDGE COTTER: Let's do them separately. Why don't you do the license first? I take it what you're doing is offering that as an exhibit.

MR. BACHMANN: Yes, I am, sir. The reason I put it together is because on the last page of the license, there is item No. 15. It then references three documents, which would be the documents that would be -- which, together with this license, comprises the entire license.

Mr. Murray, here is a copy of the document we're talking about. I think it would be easier for the Board if I had their particular --

[Pause.]

MR. BACHMANN: I'd like the Reporter to mark this as Staff Exhibit No. 2 for identification at this time. This would be both documents; the three-page license and the attachments.

[Staff Exhibit No. 2 was marked for identification.]

JUDGE COTTER: Do you want to identify the

attachments in a little bit more detail, Mr. Bachmann?

MR. BACHMANN: Yes, sir. The attachments, if you will look, as I said, at Page 3 of the license, there is Item 15. The license states that "Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures listed below."

"The Nuclear Regulatory Commission" --

JUDGE COTTER: You don't have to read all that.

MR. BACHMANN: All right, sir. The documents listed below are, A, NRC Form 313, dated October 24, 1988; two letters, one dated January 13, 1989 and a letter dated September 12, 1989. What the attachment consists of is that form, the January 13, 1989 letter, and the September 12, 1989 letter.

JUDGE COTTER: The January 13, 1989 letter, for the record, is two pages?

MR. BACHMANN: No. It's a number of pages, sir.

JUDGE COTTER: How many pages is it?

MR. MURRAY: It basically was a resubmittal of items, as you can see on the face of the letter dated January 13, 1989, a resubmittal of certain items that were originally attached to the Form 313, which is the first page. I do not represent that this letter -- the

attachments are all of the attachments.

What I have submitted are the same attachments that I have previously mailed to the Board and Mr. Murray, the pertinent parts of the operating procedures. There are a number of parts of the operating procedures which were not cited as being in violation and, therefore, have not been attached to your -- to keep the record a little bit more clean.

However, Section I and Section IV are attached to the January 13, 1989 letter and those are the ones that were cited in the staff's November 2, 1990 order.

JUDGE COTTER: The January 13, 1989 letter, then, is a little confusing since you're excerpting a document. What I have before me is your NRC Form 313, dated October 24, 1988 and signed by Richard B. Fewell, President, one page. I then have a one-page January 13, 1989 letter, followed by seven pages of attachments, which I understand were not all of the attachments which were included in the January 13, 1989 letter, is that correct?

MR. BACHMANN: That is correct, Your Honor. This is the complete --

JUDGE COTTER: Let me finish describing it.

MR. BACHMANN: Sorry.

JUDGE COTTER: Then I have a September 12, 1989 letter from Fewell -- excuse me. Let me elaborate. The

January 13, 1989 letter is from Fewell to the United States Nuclear Regulatory Commission, and signed by Mr. Fewell. The September 12, 1989 letter is also from Fewell to the United States Nuclear Regulatory Commission, also Region V, and the attachment to it is three pages, in this case, describing Mr. Murray's prior educational and radiographic experience.

MR. BACHMANN: Your Honor, to the best of my knowledge, the attachments to the September 12, 1989 letter are complete as they stand. I did not excerpt it. The prior letter was about two inches thick and I believed that it would probably unnecessarily clutter the record. The September 12, 1989 letter is --

JUDGE COTTER: Maybe you'd better describe each page of the attachments to the January 13 letter.

MR. BACHMANN: All right. The January 13, 1989 letter was a resubmittal of information originally contained with the NRC Form 313. It supplements and supports the Fewell application for its license. The first page after the cover letter states the types of equipment and the radiation activity of each piece of equipment that Fewell will have under its NRC license.

JUDGE COTTER: That's the page that's captioned "NRC License Application, Item 5."

MR. BACHMANN: That is correct, sir.

JUDGE COTTER: All right. The next attachment.

MR. BACHMANN: The next page is basic information on the --

JUDGE COTTER: Why don't you start with the caption, sir?

MR. BACHMANN: All right. This page is headed, at the top, "Source Changes," which gives the model number of the equipment used to change the sources.

JUDGE COTTER: Changers.

MR. BACHMANN: Changers. Yes, sir. Used to change the sources. That's followed then by Item 6 and Item 7, which describes how the license material will be used. It names Gary Martin as the Radiation Safety Officer and gives some of his background, which is continued on the following page which is headed "Construction Engineering Consultants," Loflandtown, Pennsylvania. This is a continuation of the description of Mr. Martin's experience.

Item 8 indicates that the training will be conducted by Mr. Martin.

JUDGE COTTER: I think it's sufficient to identify that that next page has headers which read Item 8, Item 9, Item 10 and Item 11.

MR. BACHMANN: Thank you, sir. The next page is taken out of the operating procedures. This is labelled Section I, General Safety Rules. There are six paragraphs,

beginning with 1.0 and going to 6.0.

The next page after that is Section IV. It's entitled "Radiographic Operations." It has paragraphs starting with 1.0, with subparagraphs, going through Paragraph 2.9.

JUDGE COTTER: That's two pages.

MR. BACHMANN: That is two pages. Yes, sir. The second page begins with Paragraph 2.6.

JUDGE COTTER: Very good.

MR. BACHMANN: The next item is the September 12, 1989 letter from Fewell to the NRC. This consists of one cover letter and three enclosed pages. This letter was sent to the NRC to amend the Fewell license to add Mr. Murray, by name, as a radiographer.

The enclosed three pages; the first one is titled "Thomas E. Murray." It gives his address and provides his radiographic experience, starting in June of 1978, proceeding on to the next page and ending in February 1989 on the second page.

The last page is a note or memo from H.G. Juan Lopez, who has signed it as an NDT, non-destructive testing examiner, and the subject is radiographic assistant qualifications of T.E. Murray.

JUDGE COTTER: Very good. I realize that's tedious, but if someone were to have to look at this a year

from now, they'd know exactly what we were looking at.

Do you have a question?

JUDGE FOSTER: Yes. The January 13 letter from Mr. Fewell would appear to be a tender of this information to the NRC. Is there something that goes along with this package that says it was accepted by the NRC as a part of the license?

MR. BACHMANN: Yes, sir. If you will look at the license, which is the three-page document, on the third page --

JUDGE COTTER: That's the Item 15 reference on the license, the license itself.

JUDGE FOSTER: So it was accepted.

MR. BACHMANN: Yes, it was and it's incorporated by reference into the license. Having gone through that, Your Honor, I would request or move the Board that the document which I have described as Staff Exhibit No. 2 for identification be accepted into evidence as Staff Exhibit No. 2.

JUDGE COTTER: I think to dot a procedural I, Mr. Bachmann, what you want to do is get Mr. Murray to stipulate to that.

MR. BACHMANN: That would certainly be easier. Mr. Murray, do you have any objection to entering the documents that I just described into evidence?

MR. MURRAY: No, not at all.

MR. BACHMANN: There being no objection, Your Honor, I move that it be accepted into evidence.

JUDGE COTTER: It will be admitted.

[Staff Exhibit No. 2 was received into evidence.]

MR. BACHMANN: Considering the somewhat complexity of the detail here, I would also ask that this be bound into the transcript for future reference, more easily than attempting to retain the documents themselves. These are the only exhibits that I intend to ask be bound into the record.

JUDGE COTTER: That's fine. Ms. Bryson, would you make a note of that? Thank you.

MR. MURRAY: Your Honor, would you have any objections of me having Phil Manly up here with myself? He's not my legal representative.

JUDGE COTTER: No. That's fine, if there's no objection.

MR. BACHMANN: The staff has no objection.

[Pause.]

JUDGE COTTER: Let's go off the record for a minute.

[Discussion off the record.]

JUDGE COTTER: Back on the record. Call your

witness.

MR. BACHMANN: Your Honor, the staff, the initial two staff witnesses which will be testifying as a panel are Mr. David Skov, S-k-o-v, and Mr. Philip Joukoff, J-o-u-k-o-f-f. Mr. Skov is an inspector for the NRC. Mr. Joukoff is an investigator for the NRC.

JUDGE COTTER: Never having met either gentleman, who is who?

MR. BACHMANN: Mr. Joukoff is the one on the left. Mr. Skov is the one on the right.

JUDGE COTTER: Gentlemen, would you stand please and raise your right hand?

Whereupon,

DAVID SKOV,

a witness, was called for examination by counsel on behalf of the Nuclear Regulatory Commission, and, having been first duly sworn, was examined and testified as follows:

Whereupon,

PHILIP JOUKOFF,

a witness, was called for examination by counsel on behalf of the Nuclear Regulatory Commission, and, having been first duly sworn, was examined and testified as follows:

JUDGE COTTER: Please be seated.

MR. BACHMANN: Your Honor, I will now approach the Bench and provide the Board and the Reporter with the

professional qualifications of my two witnesses.

[Documents proffered.]

MR. BACHMANN: Your Honor, I have provided the Board and Mr. Murray with documents entitled, in alphabetical order, Professional Qualifications of Philip Victor Joukoff and, the second document, Professional Qualifications of David D. Skov.

JUDGE COTTER: Are you going to mark these for the record?

MR. BACHMANN: Yes. I'd like them to be marked in alphabetical order as Staff Exhibits 3 and 4 for identification.

[Staff Exhibit Nos. 3 and 4 were marked for identification.]

JUDGE COTTER: Mr. Joukoff's professional qualifications would be Exhibit 3?

MR. BACHMANN: That is correct. Mr. Skov's would be Exhibit 4. At this point, I would like to ask Mr. Joukoff, because he comes ahead in alphabetical order, and then Mr. Skov, but first Mr. Joukoff if the information contained in his professional qualifications is true and correct to the best of his knowledge and belief?

WITNESS JOUKOFF: Yes, it is.

MR. BACHMANN: Are there any modifications or changes that you wish to make or any typographical errors

that we may have not caught?

WITNESS JOUKOFF: No. On a very fast review, it appears to be accurate.

MR. BACHMANN: Mr. Skov, I will ask you the same question. Are the professional qualifications, Staff Exhibit 4 for identification, true and correct to the best of your knowledge and belief?

WITNESS SKOV: From a brief review of this, it appears that they are.

MR. BACHMANN: I'd like to ask Mr. Murray if he has any objection to admitting these professional qualifications into evidence?

MR. MURRAY: No. Not at all, sir.

MR. BACHMANN: I, therefore, move, absent any objection, Staff Exhibits 3 and 4 to be admitted into evidence.

JUDGE COTTER: They will be admitted.

[Staff Exhibit Nos. 3 and 4 were received into evidence.]

MR. BACHMANN: At this point, I would like to proceed with my direct examination of the witnesses. Since we have one microphone and the witnesses will be testifying together, there may be a slight delay as we move the sound system around. I beg the Board's indulgence on that matter.

I will also address these questions basically in

alphabetical order, because it would be just simpler to understand. Therefore, Mr. Joukoff, the question we address to you, and then Mr. Skov, in that order.

DIRECT EXAMINATION

BY MR. BACHMANN:

Q On Page 2 of the staff's November 2, 1990 order, towards the bottom of the page; in fact, the last full paragraph prior to the (1), it states "An NRC investigator and an NRC inspector observed Mr. Murray conduct radiographic operations on October 23 and 25, 1990 at Candle Industrial Park, Oahu, Hawaii." I will just stop at that point.

Mr. Joukoff, Mr. Skov, were you that investigator and were you that inspector?

A [Witness Joukoff.] Yes, I was.

A [Witness Skov.] Yes, I was.

Q Is it true that you observed Mr. Murray on the two dates stated in the order?

A [Witness Joukoff.] Yes, I did.

A [Witness Skov.] That's correct.

Q Prior to your testimony in this hearing, and you have been in the Courtroom and have listened to Mr. Murray, you understand that of the five items on Pages 2 and 3 of the staff's November 2, 1990 order, that Mr. Murray disputes, to whatever extent, Items 3 and 5. You are aware

of that, is that correct?

A [Witness Joukoff.] Yes, I am.

A [Witness Skov.] That's correct.

Q I want to proceed to Item 3. Item 3 states on October 23, 1990, on at least 12 occasions, and October 25, 1990, on at least five occasions, Mr. Murray failed to perform surveys of the exposure device to determine if the sealed source had been returned to its shielded position after radiographic exposures.

Did you gentlemen witness these omissions as stated in the order?

A [Witness Joukoff.] I was present both times on October 23 and the 25th, and I did observe Mr. Murray fail to conduct the surveys of the camera after returning the sealed source to the shielded position.

A [Witness Skov.] I also was present on October 23 and October [illegible], 1990. I observed Mr. Murray failing to perform the surveys of the exposure device to determine that the source had been returned to its shielded position.

JUDGE COTTER: Speak up, please. We can't hear you. Do you want to start again?

WITNESS SKOV: On October 23, 1990 and also on October 25, 1990, I also observed Mr. Murray failing to perform radiation surveys of the exposure device to verify that the sealed source had been returned to its shielded

position after each radiographic exposure.

BY MR. BACHMANN:

Q The statement of facts in the order mentions 12 occasions on October 23 and five occasions -- let me go back. It mentions at least 12 occasions on October 23 and at least five occasions on October 25. Is this accurate according to your recollection as to what you observed on those days, the number of occasions on which Mr. Murray failed to perform surveys of the exposure device, etcetera, as stated in the order?

JUDGE COTTER: The record will be clearer if you'd address your questions seriatim and identify who you're addressing them to.

MR. BACHMANN: All right.

BY MR. BACHMANN:

Q Mr. Joukoff and then Mr. Skov, did you understand the question I asked you? The question was we are faced with a statement of on at least 12 occasions on the 23rd and on at least five occasions on the 25th. Is it your testimony that those numbers are accurate; that on the 23rd, on at least 12 occasions, and on the 25th, on at least five occasions, Mr. Murray failed to perform the surveys as stated?

JUDGE COTTER: Who are you addressing your question to?

BY MR. BACHMANN:

Q In order from Mr. Joukoff and then Mr. Skov.

A [Witness Joukoff.] On October 23, 1990, while we were observing Mr. Murray, Mr. Skov watched him the entire time that we were present. I did not watch him the entire time that we were present because I had to reload the camera. And Mr. Skov, being the inspector whose specialty is materials licensees, he watched him during the entire time we were there through binoculars. So I'd have to defer that question to Mr. Skov.

On the 25th of October of 1990, I personally operated a video camera that was videoing Mr. Murray and I can testify to the fact that it was on at least five occasions he failed to do the survey of the camera after the sealed source had been returned to the shielded position.

Q Mr. Skov, would you address October 23, please?

A [Witness Skov.] Yes. On October 23, I was watching Mr. Murray with binoculars during the radiographic operations that he was performing. It was my estimate that he had failed to perform these required surveys on the 12 occasions, at least 12 occasions, that he was performing those operations.

Also, on October 25, I was watching Mr. Murray with binoculars and on five occasions he also had failed to perform the radiation surveys of the exposure device.

Q On your answer just previous to the last answer or the last statement, you used the phrase "you estimated at least 12 occasions."

A [Witness Skov.] Yes.

Q Could you state categorically it was at least 12 occasions?

A [Witness Skov.] My estimate of that number is that it was possibly more than 12, but I felt it was at least 12 occasions.

Q Thank you. Returning to the November 2 NRC staff order, Item 5 states that on October 23, 1990, Mr. Murray failed to prevent entry into a restricted area of individuals other than radiographers and radiographers' assistants. You gentlemen have testified already that you were present and observing Mr. Murray on October 23, 1990. Did you observe him failing to prevent entry as stated in the order?

A [Witness Joukoff.] Yes, I did. I observed Mr. Murray while he failed to prevent individuals other than radiographers or radiographers' assistants from entering into the restricted area during source exposures.

Q Mr. Joukoff, before you pass the microphone, on what do you base your statement that these were individuals other than radiographers and radiographers' assistants?

A [Witness Joukoff.] Being specific, I was watching

Mr. Murray on that date through the lens of a 35mm camera with a telephoto lens on the camera. I observed a number of individuals who were workmen working on a pipeline project in Campbell Industrial Park. In my professional opinion, these individuals were workmen from their dress attire. And I also observed two employees of another testing laboratory in Hawaii and I observed them to be inside the area, also.

I also, previous to going out to do this investigation, reviewed the Fewell license and I understood that the only individuals on the Fewell license were Mr. Murray and Mr. Gary Martin, the Radiation Safety Officer. So I identified those two individuals. Consequently, any other individuals inside the restricted area would have to qualify as being non-radiographic personnel.

Q Mr. Skov, do you wish to add to Mr. Joukoff's statements regarding the 23rd and the unauthorized entry?

A [Witness Skov.] Let me also add that the only individual who was observed operating the camera was Mr. Murray. Since there were no other individuals listed on the license, as Mr. Joukoff has stated, I concluded that all of the other personnel present on the site were not directly associated with the radiographic operations as either radiographers or assistant radiographers.

Q I'll go back to Mr. Joukoff again. There appears to be a dispute as to what would have constituted the

restricted area. I believe Mr. Murray, and, of course, he can correct me if I'm wrong, indicated that as to where the particular boundary would be or not be might have been in dispute.

Why is it your belief that these individuals entered the restricted area?

A [Witness Joukoff.] It is my belief that these individuals entered the restricted area for a number of different reasons. On one side of the trench where Mr. Murray was conducting radiography, Mr. Murray posted signs that delineated what was, in his opinion, the restricted area. As a radiographer, he formed the restricted area by placing these signs.

Consequently, if an individual were to cross the signs and come inside that area, then I would assume that they are inside the restricted area. On the other side of the trench where Mr. Murray was conducting radiography, Mr. Murray failed to post any signs delineating the restricted area.

From my observations and my professional experience, I know that radiation would also go to that side of the trench and although there was no posting there, that there should have been posting and there was a restricted area boundary, be it imaginary in this particular case because it was not posted, and I also watched one individual

walk through that area.

That is why I feel that individuals entered into the restricted area.

Q Do you have anything to add, Mr. Skov?

A [Witness Skov.] I don't believe so. I believe that Mr. Joukoff has stated correctly why the area that was posted constituted the boundary of the restricted area, which is in accordance with the operating procedures of the license or referenced by the license.

MR. BACHMANN: Your Honor, at this time, the staff has for the Court, at its option, a re entation of a unit similar to that used by Mr. Murray. It's our belief that it might make the descriptions, the additional evidence a little bit more understandable, but it is strictly at the Board's option. I do not consider this particular demonstration as having evidentiary value, but merely to allow the Board to see what is happening.

We also have a further constraint that, from the placement of the microphones the explanation, we will probably not be able to make a very coherent on-the-record description. We could go off the record for it or we could stay on the record and do our best. The staff does not want to use this for evidentiary value, merely so that the Board can better understand how these cameras work, at the Board's option at this point.

JUDGE COTTER: I'm tempted to ask you whether you're offering your irrelevant incoherent evidence, but I won't do that. Let's go off the record here for a minute.

[Discussion off the record.]

JUDGE COTTER: On the record. We'll proceed. We think that this would be useful for illustrative purposes to give the Board some sense of how this kind of device operates, and certainly not for the purpose of giving any evidence as to what specifically Mr. Murray may or may not have done with the device that he used at the time that he was be observed on October 23 and October 25.

MR. BACHMANN: That's correct, sir.

JUDGE COTTER: Do you have any objection to that, Mr. Murray?

MR. MURRAY: No, I don't, sir.

MR. BACHMANN: We can either remain on the record or go off the record. There is a question out from Judge Cocter to Mr. Skov on the similarities and differences between this and Mr. Murray's device.

BY MR. BACHMANN:

Q Could you answer that now, please?

A [Witness Skov.] Yes, Your Honor. The device that we have here for demonstration purposes is a mockup Model 660 Tech Ops Camera, which is the same model device and manufacturer that was used by Mr. Murray during the

radiographic operations on October 23 and October 25, 1990.

JUDGE COTTER: It's called a Tech Ops Camera?

WITNESS SKOV: That's correct.

JUDGE COTTER: Tech as in T-e-c-h and Ops as in O-p-s?

WITNESS SKOV: That's correct, Your Honor.

JUDGE COTTER: You might give the Reporter a hand in this case when we get into jargon. Is this device used for training purposes?

WITNESS SKOV: Yes, it is, Your Honor.

MR. BACHMANN: At this point, I'm going to ask Mr. Skov to proceed over to counsel table so that the Board will have a better view of the camera, and then he can explain its workings at that time.

JUDGE COTTER: You might just pull that mike loose and carry it, speak into it.

WITNESS SKOV: I'm going to need my hands free.

JUDGE COTTER: Then Mr. Bachmann gets to hold the mike under your chin.

MR. BACHMANN: I will attempt to get the mike to where Mr. Skov can speak into it while he's explaining the use of the camera.

WITNESS SKOV: Your Honor, this Tech Ops Model 660 exposure device mockup is used for training purposes and we'll illustrate how the device itself operates. What I'd

like to do first is to just generally identify the various parts, the major parts of the camera and the connectors and the tubing attached to it.

First of all, we have the exposure device itself and attached to it is a representation, this is just a plastic tube that represents the source guide tube. It has a stop at the end of the source guide tube to essentially stop the source from moving beyond or outside of the tube.

JUDGE COTTER: What normally is that tube made of? Is it normally plastic?

WITNESS SKOV: No. It's made out of flexible stainless steel material.

JUDGE COTTER: Thank you.

WITNESS SKOV: At the other end of the camera is what is known as a control cable or a drive cable. It is coupled to a lock mechanism of the exposure device. At the other end of the control cable is a crank mechanism. The particular type of crank mechanism that Mr. Murray used on October 23 and October 25, 1990 was a reel type crank mechanism.

This particular type of crank mechanism is referred to as a pistol grip type of crank. The major difference with a reel type is that it allows the ability to reel in or to more easily wrap the control cable around this control mechanism as opposed to with the pistol grip type of

mechanism, you just have to carry the cables loose.

JUDGE COTTER: I'm not sure I understood that.

WITNESS JOUKOFF: Your Honor, the pistol grip, when you disconnect this mechanism from the camera, it leaves the cords dangling and consequently, typically, the cords are longer than this, also, so that the radiographer can get further from the device.

In the reel type, it's very similar to a hose reel like on a residential hose, where you have a crank typically on most people's residences. If you have a reel, you can take the control cables and wrap them around the reel, making a compact unit that's easier to move in the field rather than dragging your cables through the dirt.

WITNESS SKOV: Your Honor, this is a picture of the reel control crank assembly.

JUDGE FOSTER: I have a question. When you're operating the crank, how does that move the source?

WITNESS SKOV: Your Honor, the way that it would move the source would be -- first of all, let me just back up here by explaining that the lock mechanism prevents the source, which, in this particular case, is connected to a pigtail assembly

JUDGE COTTER: Pigtail?

WITNESS SKOV: Yes. That's another term that's used, it's jargon used in the industry for a sealed source

assembly. Basically, you have a source capsule, which is attached to a cable, which, in turn, would be attached to this control or drive cable.

I've already attached all these parts to show you how it's set up in the field. However, before the radiographer actually starts making radiographs or starts radiographic operations, he would need to assemble both the source guide tube and the drive cable to the camera. He would need to make those couplings.

The block mechanism here has to be rotated to the operate position from the lock position on the selector ring in order to allow the cable which is driven this crank mechanism to be pushed out of the exposure device, and I can demonstrate how that's accomplished.

Normally, this control cable would be something on the order of 20 to 25 feet long. So that would allow the radiographer to be positioned at a relatively safe distance away from the exposure device.

JUDGE LAM: So the locking mechanism prevents the control cable from moving the source.

WITNESS SKOV: That's correct, provided that the selector ring has been turned to the lock position.

JUDGE COTTER: Presumably it can't be turned to the lock position if the cable has been pushed through there and pushed the source out into the guide tube

WITNESS SKOV: That's correct. There are three positions on this selector ring. One is connect, and it has to be turned to the connect position in order to make this coupling between the drive cable and the camera. That is between the drive cable and the pigtail source assembly.

Then once that coupling is made, this is rotated to the lock position in preparation for radiography. The radiographer would make sure that the end of the source guide tube would be positioned at the radiographic focus; that is, the position where he wants to make the radiograph.

There is one piece of equipment is missing from this demonstration. That is that there is no collimator that's positioned on this source guide tube, whereas in the case where Mr. Murray was operating on October 23 and 25, there was a collimator.

JUDGE LAM: Are there indications anywhere indicating where the source is, because the source could be anywhere within that shielded box or anywhere in the guide tube?

WITNESS SKOV: That's correct, Your Honor. Once this source is in -- I'll go ahead and demonstrate it right now by turning this to the operate position. Perhaps you can see that this is -- the drive cable is now moving the source assembly out. You can possibly see it exiting into the source guide tube until it reaches the end.

JUDGE LAM: My question is is there an indication, do you have an indicator, a precision indicator, mechanical or electrical telling you where the source is?

WITNESS SKOV: Yes, there is, Your Honor. There is an odometer on the control assembly, which would indicate in feet where the source is located. However, this is not a foolproof mechanism because odometers can slip. They can be reset. Therefore, they may not be accurate.

If a radiographer, at the end of the exposure, cranks the source back in and does not crank it in all the way or if even if he believes that it has been cranked in all the way and it has not been, it is impossible for him to actually rotate this to the lock position, the selector ring to the lock position.

So that would be another way that he would be able to determine that the source, which is now here, has not been fully retracted to the fully shielded position. But the only sure way that the radiographer can determine that the source is in the fully shielded position is to perform a radiation survey with a survey instrument.

That is the primary method that all radiographers need to use to establish that there is no radiation hazard associated with the end of the operation, since the source can now be fully retracted to the fully shielded position.

In the exposure device here, we have a cutout

which shows a shield which, in this particular case, represents a depleted uranium shield. So the depleted uranium shield --

JUDGE COTTER: Are you referring to the black curve?

WITNESS SKOV: Yes. It's the dark color in here surrounding the tube.

JUDGE COTTER: Right.

WITNESS SKOV: The purpose of the depleted uranium is to provide an effective way for shielding the radiation from exceeding dangerous radiation levels and to ensure that there's not going to be a hazard once the source has been retracted to the fully shielded position.

Now, when it has been retracted to the fully shielded position, only then can this source selector ring be rotated to the lock position. So at that point, it is impossible to actually move the source assembly.

So one of the very important steps that a radiographer needs to make after each radiographic exposure is as he walks up to the camera with the radiation survey instrument, he needs also to be able to reach down and turn the selector ring to the lock position. What that does is ensure -- and also to depress this -- it's not doing it now.

He would need to rotate this to the lock position and that would prevent the source from accidentally being

moved out of the camera into a non-shielded configuration. So that is basically a brief description of how the radiographic exposure device operates. There are two key safety components associated with the radiographic operation. One is to lock the source in the secure position.

That prevents the source from accidentally being moved out of the camera, which could happen, for example, if the crank were accidentally hit. This has happened in certain cases, incidents where there have been exposures, over-exposures. The second, of course, is to use a radiation survey instrument to survey around the radiographic exposure device and the source guide tube.

JUDGE FOSTER: Why are there two tubes, control tubes going to the camera from the reel?

WITNESS SKOV: Your Honor, one tube, this one -- you're referring to, I believe, the second tube here.

JUDGE FOSTER: Yes.

WITNESS SKOV: That would be the take-up cable, because you have to have some cabling available to -- once you rotate or crank back the source, that excess cable has to go somewhere.

JUDGE FOSTER: All right.

WITNESS SKOV: So there is cabling in both tubes.

JUDGE FOSTER: One of them is just a chamber.

WITNESS SKOV: Correct. The second cable is emptied once you crank out the source. Once you crank it back in, then it occupies both spaces, both tubes.

JUDGE LAM: You are saying there are basically three levels of safeguards in terms of telling where the source is; one, the control cable odometer; two, the locking mechanism would only be in the lock position if the source is fully retracted; and, third is the radiation survey.

WITNESS SKOV: That's correct. The odometer, however, is not what I would consider to be part, a primary part of the safe operation. That is it can be used as a supplementary means of indicating where the source was located. However, it's not foolproof and should not be relied on.

JUDGE LAM: Then how reliable is the locking mechanism, by which I mean if the source is not fully retracted, can you still lock it?

WITNESS SKOV: No, you cannot, not with this particular camera. You cannot.

JUDGE LAM: So that is a reliable safeguard.

WITNESS SKOV: That's correct, Your Honor. But I should also point out that that is the way the lock device is designed. Of course, there have been certain incidents regarding different various parts of cameras which have become defective, as lock mechanisms can, for one reason or

another, malfunction. So again, you're left with the radiation survey as the really only primary reliable method of determining the location of the source.

JUDGE COTTER: How close to the source device -- in the case of verifying that it's fully retracted to the shielded position by using the locking mechanism, you're right on top of the machine. W... the survey devices, how close do you get to the machine, the source?

WITNESS SKOV: Before you would be able to detect that you have an exposed source?

JUDGE COTTER: Yes.

WITNESS SKOV: The way that would be accomplished would be with the survey meter in hand as the radiographer approaches the exposure device.

JUDGE COTTER: Right. So how many feet does he --

WITNESS SKOV: As he continues to approach the exposure device, if the radiation survey meter indicator keeps going up, changes scales in an upward fashion, that would indicate that there is a radiation hazard, that there possibly maybe an exposed source.

JUDGE COTTER: Assuming he was 25 feet away when he finished cranking and he then starts approaching with the meter. How many feet is he before he gets a pretty good idea that it's not fully retracted?

WITNESS SKOV: Yes. If he's using a survey meter,

he should be able to determine that at 25 feet.

JUDGE COTTER: So in terms of the radiographer's safety, the survey meter is the most effective.

WITNESS SKOV: That's correct, Your Honor.

JUDGE COTTER: Is there anything furtner on this?

WITNESS SKOV: I don't have anything to add, Your Honor, unless you have additional questions.

JUDGE COTTER: Is this an appropriate point to take a break?

MR. BACHMANN: Yes, sir. Upon return, the staff will move to introduce the video tape.

JUDGE COTTER: All right. We'll take a ten-minute break.

[Brief recess.]

JUDGE COTTER: The hearing will come to order. Proceed, Mr. Bachmann.

MR. BACHMANN: Your Honor, I would like to draw the attention of the witnesses to the November 2, 1990 order. The first page of the order itself, and specifically the paragraph that is titled Roman Numeral II.

BY MR BACHMANN:

Q Gentlemen, do you have that in front of you?

A [Witness Joukoff.] Yes, I do.

A [Witness Skov.] Yes, I do.

Q In that paragraph, certain sections of Fewell's

operating and emergency procedures are referenced. They are referred to as OEP, as indicated on the second line of Roman Numeral II. At the time you observed Mr. Murray, did you have some familiarity with the operating procedures at Fewell? First Mr. Joukoff.

A [Witness Joukoff.] As an NRC investigator, I would only have a general knowledge of those. My staff and investigation defers these specific types of areas to agency experts, like Mr. Skov. So my knowledge is only general. Mr. Skov has specific knowledge.

Q Is that correct, Mr. Skov?

A [Witness Skov.] Yes. I have specific knowledge of the operating and emergency procedures as contained in the Fewell license and have reviewed those before conducting the inspection on October 23 and 25, 1990.

Q I would refer you -- do you have a copy of Sections I and IV of those procedures in front of you?

MR. BACHMANN: These procedures, as earlier indicated, Your Honor, are contained in Staff Exhibit 2.

WITNESS SKOV: Yes, I do.

BY MR. BACHMANN:

Q Mr. Skov, I refer you to Section IV under Radiographic Operations, Paragraph 2.0, Job Site Operations, Subparagraph 2.5, do you see Paragraph 2.5?

A [Witness Skov.] Yes, I do.

Q Do you see where that is cited in the order under Roman Numeral II?

A [Witness Skov.] Yes, I do.

Q Would you read the first sentence of Subparagraph 2.5 of the operating procedures, please?

A [Witness Skov.] It says, "Expose the source and conduct a survey of the radiation boundary."

Q Mr. Skov, in your experience with radiography, how would you interpret that sentence? What sort of requirement, in your opinion, what does that require?

A [Witness Skov.] That would require a radiographer to, after the radiation source had been exposed initially, after the entire operation had been set up, at the beginning of site operations, that a confirmatory radiation survey with a survey instrument would need to be used in order to -- and I say confirmatory because it would be needed to confirm the location of the calculated boundary, radiation boundary, so as to exclude public access into the restricted area.

Q Mr. Skov, would you ever consider it acceptable to base that boundary on calculations, past experiences, or anything else other than an actual survey with a survey meter?

A [Witness Skov.] No, I would not. In every case, a confirmatory radiation survey with a survey instrument

would need to be conducted in order to verify that the radiation level at the boundary of the restricted area was correct.

JUDGE COTTER: Excuse me a minute, Mr. Bachmann. When you say survey, Mr. Skov, do you mean actually physically walking -- assume a square -- physically walking the four sides of the square with a survey instrument in your hand?

WITNESS SKOV: Yes, Your Honor, that is essentially correct. It would not necessarily need to be a square, but it would be -- the radiographer would need to conduct an instrument survey basically at the perimeter, wherever radiation levels from the source could be expected to occur.

JUDGE COTTER: Would that mean that you could satisfy that requirement by taking it at given points on the perimeter?

WITNESS SKOV: That is correct. However, that would depend upon the actual configuration, the specific configuration of the setup, because in many radiographic operations there are going to exist obstacles or other areas where radiation levels can be expected to vary as a result of any shielding that may be provided or as a result of any radiation scatter that may reach a particular point along the perimeter.

JUDGE COTTER: So that's a judgmental exercise on the part of the radiographer.

WITNESS SKOV: It's not necessarily a judgmental exercise because the radiographer would need to confirm what the radiation level actually was --

JUDGE COTTER: What I meant by judgmental was to what points he would go to take a reading.

WITNESS SKOV: Yes, that's correct.

JUDGE COTTER: Excuse me, Mr. Bachmann. Thank you.

BY MR. BACHMANN:

Q Mr. Skov, is there any situation that you can imagine, and I'm asking this as a hypothetical question, where --

JUDGE COTTER: I take it we're assuming that these witnesses are qualified as expert witnesses, is that what you're doing?

MR. BACHMANN: Yes, sir. Their professional qualifications have been put into the record as evidence. Rather than have them recite their background, I introduced their professional qualifications as documents. Is there any question in the Board's mind as to whether they're qualified or not to testify?

JUDGE COTTER: You didn't specifically qualify them as experts. I thought that was just sort of general

information.

MR. BACHMANN: Then I stand corrected and quite embarrassed. Mr. Skov is a qualified witness, as attested to in his professional qualifications, which, if you would like to refer back to Staff Exhibit 4 in evidence, indicates a very extensive background in the field of radiation.

JUDGE COTTER: I guess I'm not clear of the boundaries that you're putting on his expertise, if any.

MR. BACHMANN: As far as his ability to testify as to the procedures, the proper procedures used in radiography, I see no boundaries as to what he would know. If there is any doubt as to his qualifications or ability to testify, I would certainly be happy to perform a voir dire or entertain any questions from the Board as to Mr. Skov's qualifications for his testimony.

JUDGE COTTER: So you're offering him as an expert on radiographic procedures.

MR. BACHMANN: That is correct, and effects of radiation, if that comes up.

JUDGE COTTER: What kind of effects?

MR. BACHMANN: Such as what it would take, for instance, and I'm just using this as a general example, to cause an overexposure; not just simply the procedures of radiography, but the reasons for doing these things and why certain procedures would prevent, for instance,

overexposures, to that extent.

JUDGE COTTER: Do you have any objection to Mr. Skov testifying as an expert on radiographic procedures, Mr. Murray?

MR. MURRAY: No, not at all. This is strictly radiographic procedures and NRC rules and regulations, correct?

MR. BACHMANN: That's correct.

MR. MURRAY: No, not at all.

JUDGE COTTER: Then he will be so treated. But I do not think the record reflects anything other than we got his resume.

MR. BACHMANN: Then I stand corrected. In my zeal to move along the procedure, I perhaps --

JUDGE COTTER: That's deeply appreciated, Mr. Bachmann.

MR. MURRAY: Let me add something, also. The survey points and things like this, if it pertains strictly to saying what is in the 10 CFR, yes; but, for instance, when he says that it's necessary to take -- go run and do a full perimeter in order to get -- no. I don't think he can actually say that that is a requirement and that that should be done.

JUDGE COTTER: You can cross examine him on that.

MR. BACHMANN: I also might indicate that he not

only will have the advantage of cross examination of these points, but, of course, Mr. Murray is free to put himself under oath and testify to his own knowledge in rebuttal to whatever is said here.

I'm not certain where we were as to the last question.

WITNESS SKOV: Survey site, if I call, the boundaries.

BY MR. BACHMANN:

Q Mr. Skov, based on your experience, and I'm going to ask you a hypothetical question, would it be adequate for a radiographer to return to the same site, let's say, a day later and since he had established, let us assume, the previous day, would it be all right for him not to perform the survey since he's already done it the day before? Do you understand my question?

A [Witness Skov.] Would you rephrase the question?

Q I was asking you a hypothetical question where a radiographer would return to a site to perform radiography let's say the day after he had already done some radiography and had done the survey the previous day, had gone out to the boundaries; therefore, he was using the same camera, believed -- would it be, in your opinion and based on your experience, acceptable for that radiographer to say, well, I knew what the boundaries were yesterday because I did the

survey, I don't need to do the survey today? Would that be acceptable?

A [Witness Skov.] No, it would not.

Q Could you explain to the Board why not?

A [Witness Skov.] First of all, it would not be acceptable to do that because the -- first of all, it's not allowed by the licensee's operating and emergency procedures. Secondly, in all likelihood, the positioning of the sources relative to the job site would be different on the second day versus the first day.

The actual positions of the source used, in this particular case, on October 23 or October 25 at the job site, the positioning of the source relative to the pipes, the positioning of the source relative to the ground, the earth embankment and the trench, and the area surrounding the job site would differ.

The only way that I can see where one could expect the radiation levels to be exactly the same would be where there have been no changes in the positioning of the source or in the location of the job site.

Q You indicated earlier, I understood this was originally a hypothetical question, but for Mr. Murray, in particular, that the source was, indeed, moved, is that correct, and, therefore, was not in the same position each day?

A [Witness Skov.] That is correct.

WITNESS JOUKOFF: If it please the Court, Your Honor, perhaps I could interject just a little bit here on the physical description of the area where the radiography was conducted and some of the factors involved there. The pipes that Mr. Murray was radiographing were located in a trench. Without being an expert in the area, I myself know that depending upon which pipe Mr. Murray was working on, there would be either no pipes between that pipe and the public roadway or an accessible area or there would be some pipes in the way.

Obviously, if we have some pipes in the way, they're made out of steel and there is some shielding capability involved. That is one factor that has to be considered; where -- of the series of four pipes laying in a trench, which one of the four was being radiographed with varied radiation levels.

The other consideration that I think is important to note here is that in order to radiograph a pipe weld on a 360-degree circumference that Mr. Murray has to make multiple exposures in order to do this. Not just one exposure will capture the weldment all the way around the perimeter of the pipe.

So if we were to look at a cross-section of the pipe and inscribe a clock face on that, it takes three

exposures typically to shoot the weldment all the way around 360 degrees. One exposure is typically made the 12:00 position, wherein the source is located on top of the pipe and the radiation is directed down, basically into the ground which is located underneath.

The other two exposures are made at the 4:00 and 8:00 positions on the clock. Consequently, the way these pipes were configured, that would put the radiation envelope either towards the public roadway at an up angle because you're at the 4:00 position and not the 3:00 position. The other exposure at the 8:00 would direct the radiation the opposite direction.

So it's important to remember when we're talking about surveys and radiation levels here that there are numerous variables involved as far as making the surveys each time that the work is done in the field.

JUDGE COTTER: How close was the October 23 work to the October 25 work?

WITNESS JOUKOFF: My estimate is it was within 200 feet. We'd estimate 200 feet, Your Honor.

MR. BACHMANN: Your Honor, just to ensure the record is correct, I have not put forward Mr. Joukoff as an expert in radiography. So I would ask Mr. Skov at this point to indicate his agreement or non-agreement with what Mr. Joukoff stated insofar as the radiation fields are

concerned.

WITNESS SKOV: I would agree with the statements that Mr. Joukoff has made. I would also add that the October 23 and October 25 operations also differed in their geography inasmuch as there was a piece of -- there was an area that was at a different distance from the actual site of the operations which was accessible to the public, and that was the area -- the berm area that overlooked the site.

MR. MURRAY: Can I interrupt for one second?

JUDGE COTTER: You'll get a chance to ask him questions after he's finished.

MR. MURRAY: I didn't want to ask him a question. I wanted to go back to is he an expert in radiography or is he an expert in NRC rules and regulations? I must have misunderstood this. If you're saying he's an expert in radiography, I don't accept it. It you're saying within the NRC rules and regs. I accept it. I don't know if I misunderstood that or didn't hear it correctly.

WITNESS SKOV: Perhaps I should --

MR. MURRAY: To me, there's a difference.

WITNESS SKOV: Perhaps I should interject here by stating that I would not consider myself to be an expert in radiography inasmuch as the art of radiography; that is the interpretation of film, the actual ways in which radiography is to be taken of welds; in that area.

My expertise would only be limited to areas dealing with rules and regulations, NRC rules and regulations, and health physics, safe practices, and in the field of radiation in general.

JUDGE COTTER: With those qualifications, we'll accept your testimony as an expert.

MR. BACHMANN: Your Honor, I, at this point, would like to ask the Board to take official notice of two parts of the NRC regulations. They are brief and I will read them into the record. We are talking 10 CFR Section 34.43, which is entitled "Radiation Surveys." It has alphabetically listed sections. However, it begins with "The licensee shall ensure that," and then -- the general topic of this, I hasten to add, is precautionary procedures in radiographic operations. Then we are down to radiation surveys, then we are down to Section (b).

"The licensee shall ensure that a survey with a calibrated and operational" --

JUDGE COTTER: I'm sorry. What's the section number?

MR. BACHMANN: I'm sorry. It's 10 CFR 34.43(b). And this is required. "The licensee shall ensure that a survey with a calibrated and operable radiation survey instrument is made after each exposure to determine that the sealed source has been returned to its shielded position.

The entire circumference of the radiographic exposure device must be surveyed. If the radiographic exposure device has a source guide tube, the survey must include the guide tube."

I would ask the Board to take official notice of that NRC regulation.

JUDGE COTTER: All right.

MR. BACHMANN: I also have a second regulation. This is under Equipment Control. This entire section, beginning with Part 34, applies to radiography. 10 CFR Section 34.22(a) is entitled "Locking of Radiographic Exposure Devices, Storage Containers and Source Changers."

(a) reads, and it's relatively brief, so I'll read it into the record, "Each radiographic exposure device shall have a lock or outer lock container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The exposure device or its container shall be kept locked when not under the direct surveillance of a radiographer or radiographer's assistant or as otherwise may be authorized in Section 34.41."

The operative sentence is "In addition, during radiographic operations, the sealed source assembly shall be secured in the shielded position each time the source is returned to that position."

Now, I am going to ask a couple of questions, but, first, I would ask the Board to take official notice that

that is an NRC regulation.

JUDGE COTTER: Very well.

BY MR. BACHMANN:

Q Mr. Skov, the second section I read, and I'm referring to 10 CFR 34.22, what is your understanding where it states "During the radiographic operations, the sealed source assembly shall be secured in the shielded position each time the source is returned to that position," what is your understanding of that regulation?

A [Witness Skov.] My understanding of that regulation is that on each and every exposure of the source; that is on each and every time a radiographer or a radiographer's assistant would crank out the source to the exposed position outside of the camera, and that after the source was returned to the exposure device, that the source would be secured in the lock position.

Q And that is the lock position as you demonstrated earlier to the Board as being the locked -- where it can only be locked if the source is fully retracted, is that correct?

A [Witness Skov.] That's correct. In this particular case, that would require the radiographer or radiographer's assistant to actually reach down and physically rotate the selector ring from the operate position to the lock position. In so doing, that would

prevent the source from accidentally moving out of the shielded position. Therefore, it would be secured within the camera, the camera's shielded position.

Q A few minutes ago I read into the record 10 CFR 34.43(b), which referred to making surveys after each exposure. Is this requirement the same requirement that you were referring to when you were responding to Judge Lam's question as to the necessity of surveying earlier?

A [Witness Skov.] Yes, that is correct.

MR. BACHMANN: Your Honor, at this time, after I've laid the proper foundation, I would like to present the videotape which has been sent to all parties. I would also like to have Mr. Skov and Mr. Joukoff do a bit of narration as we proceed, since they were there. Let me lay the foundation, though, first.

JUDGE COTTER: Can't you just stipulate there was a tape taken on October 25 by these two gentlemen with Mr. Murray? Is there any objection to the use of this tape, Mr. Murray?

MR. MURRAY: No, not at all.

JUDGE COTTER: It is, in fact, a tape that was made on October 25 by Mr. Joukoff and Mr. Skov --

MR. MURRAY: Yes.

JUDGE COTTER: -- from your work at the site.

MR. MURRAY: And what was the woman's name?

WITNESS JOUKOFF: One other Federal employee was assisting us, Lynn Meara, Criminal Investigative Service.

MR. MURRAY: No. I have no objection.

JUDGE COTTER: I take it this is an exhibit, then?

MR. BACHMANN: Yes, sir. I would like to have it marked Staff Exhibit 5 for identification.

[Staff Exhibit No. 5 was marked for identification.]

MR. BACHMANN: I would note for the record that a copy of this tape has been sent -- one copy to Judges Cotter and Lam at East-West Towers in Bethesda, one copy to Judge Foster in Oregon, and a copy was mailed to Mr. Murray at the same time. I'm rather unfamiliar with the evidentiary rules on videotapes, but we will try to proceed.

MR. BACHMANN: Mr. Joukoff, would you plug in the tape? I would also like to ensure that the x-ray machine didn't do something to the tape on the way out.

JUDGE COTTER: We'll go off the record for a minute.

[Discussion off the record.]

JUDGE COTTER: On the record.

[Whereupon, a video presentation was made.]

MR. BACHMANN: I request that Mr. Joukoff or Mr. Skov provide comments to the Board.

WITNESS SKOV: The time recorded on the tape here

is 2:17 p.m.

JUDGE COTTER: Just a minute. Can you stop it a second?

REPORTER: Do you want this all on the record?

JUDGE COTTER: Yes.

MR. BACHMANN: I would ask that we don't need the narration on the tape on the transcript and only --

JUDGE COTTER: Right. Just their comments.

MR. BACHMANN: -- only their comments.

[Video presentation resumed.]

WITNESS SKOV: This was shortly after arrival of Mr. Murray at the job site.

[Video presentation continues.]

WITNESS SKOV: On the video, you can see at time 2:21:44, you can see on the black tool box is the Victoreen survey meter.

[Video presentation continues.]

WITNESS SKOV: At this point in time, on the video it says 2:23 p.m., you can see that Mr. Murray had taken the Tech Ops Model 660 camera and placed it on the ground.

JUDGE COTTER: The what camera?

WITNESS SKOV: The Tech Ops Model 660 camera.

[Video presentation continues.]

WITNESS SKOV: At 2:23:51 p.m., Mr. Murray placed a traffic cone on the ground and placed a radiation warning

sign on the cone.

JUDGE COTTER: That's all self-evident. What are we adding here?

MR. BACHMANN: Nothing. Your Honor, I'm aware that the Board has reviewed this. I know Mr. Murray has. I wanted at the very least to ensure that the item that was being placed into evidence contained a usable picture. The staff would not require that we play this through to the end unless the Board believes that it's necessary.

JUDGE COTTER: If all you're going to do is replay the tape, no. We can look at the tape. Are you going to add something to what we're seeing on the tape?

MR. BACHMANN: Excuse me just for a moment.

[Pause.]

MR. BACHMANN: We would waive any further showing of the tape if we could put it into evidence without -- if the Board allows us to put it into evidence without rolling the entire tape.

JUDGE COTTER: If you can you make a representation that this is identical to the tape that you've sent us, I see no reason for us to go through it all again.

MR. BACHMANN: Thank you, Your Honor. I do represent to the Board that this is an identical copy of the tape that was sent to the Board and Mr. Murray, that it

contains the events of October 25, 1990. It's been marked as Staff Exhibit 5. At this point, if Mr. Murray has no objection, I would move it into evidence as Staff Exhibit No. 5.

JUDGE COTTER: Any objection, Mr. Murray?

MR. MURRAY: No, sir.

JUDGE COTTER: It will be received as Staff Exhibit No. 5.

[Staff Exhibit No. 5 was received into evidence.]

MR. BACHMANN: Your Honor, we are going to be quicker than I anticipated because of not showing the entire tape. We are at a natural break in the staff's case. We're approximately three-quarters of the way through. I would suggest we might consider an early lunch and then we can wrap up our presentation inside of an hour.

JUDGE COTTER: Do you have any additional direct testimony from these two gentlemen?

MR. BACHMANN: Yes. I have one more piece, but, as I said, this would be a natural place to break or we can go for another hour.

JUDGE COTTER: We'll go off the record for a minute.

[Discussion off the record.]

JUDGE COTTER: Back on the record.

BY MR. BACHMANN:

Q Mr. Joukoff, Mr. Skov, I would like you to refer to Page 3 of the staff's order. I refer you to the last paragraph, wherein the order states "On October 25, 1990, Mr. Murray was asked by NRC personnel whether, during the NRC-observed operations of October 23 and 25, he had complied with the above referenced NRC requirements for the conduct of surveys to ensure that the source had been retracted to its fully shielded position, with a securing of the source in the shielded position after each exposure, and for preventing the entry of unauthorized personnel into the restricted area."

Then it goes on to say "He stated that he had complied and also demonstrated to the NRC personnel the survey procedures he stated that he had used on those occasions; that is, conducting a survey with a survey meter as he approached the radiographic exposure device and circumferentially surveying the device with a survey meter."

Let me ask you, starting with Mr. Joukoff, in turn, and then Mr. Skov. The NRC personnel referenced here, are they you?

A [Witness Joukoff.] Yes. The NRC personnel referenced here are Mr. Skov and I.

Q Now, it says here that on the 25th, Mr. Murray was asked whether he had complied with the three requirements

that I just read to you on October 23 and 25. Did Mr. Murray, on the 25th, tell you, Mr. Joukoff, and then I'll ask Mr. Skov, that he had complied with those requirements on those days?

A [Witness Joukoff.] Yes. On October the 25th, 1990, when I contacted Mr. Murray, Mr. Skov and I questioned him about these three points and Mr. Murray told us that he had complied with these requirements during the conduct of radiographic operations.

Q Mr. Joukoff, is there any question in your mind whether Mr. Murray, and I'm only asking for your opinion in this case, but is there any question that you asked Mr. Murray about what he did on those particular days and not just in general?

A [Witness Joukoff.] Yes. My questioning --

JUDGE COTTER: If you're not asking him for his opinion, you're asking for the fact.

MR. BACHMANN: Yes, sir. I got a little tangled up in that one.

WITNESS JOUKOFF: Yes. When I questioned Mr. Murray on October 25, 1990, as part of my questioning, I asked him very directed questions that included the date that I was referring to. In other words, I said on this date, did you survey the camera after each exposure, and I elicited an answer from Mr. Murray that, yes, he had, on

this date, surveyed the camera after each exposure.

The questioning continued also to the securing of the camera after each exposure and when I asked him about the entry of unauthorized personnel into the radiation area, Mr. Murray told me that this never happened at any time. It was an all-encompassing response.

BY MR. BACHMANN:

Q Mr. Skov, do you have anything to add to what Mr. Joukoff has just stated?

A [Witness Skov.] I have nothing to add, other than to verify that the responses that Murray made to the questioning was as Mr. Joukoff has stated.

Q Referring back to the November 2 order and going to Page 4, Section III. The second sentence, which begins on the sixth line down, states "In addition, Mr. Murray gave the NRC false information concerning his actions contrary to the observation of two NRC employees."

Mr. Joukoff, Mr. Skov, are you the two NRC employees referred to here?

A [Witness Joukoff.] Yes. Mr. Skov and I are the two NRC employees referred to here.

Q The false information referred to here refers to the statements that Mr. Murray made to you, Mr. Joukoff, on October 25, 1990?

A [Witness Joukoff.] That is correct.

Q Backing up just a little bit here, there's one more point I want to ensure we cover. On the order, at the bottom of Page 3, the very last fragmentary sentence where it starts out "He stated that he," and going on to Page 4, "He stated that he had complied and also demonstrated to the NRC personnel the survey procedures he stated that he had used on those occasions," and the sentence goes on.

Again, Mr. Joukoff, the NRC personnel were you and Mr. Skov, is that correct?

A [Witness Joukoff.] That is correct.

Q It says here that Mr. Murray demonstrated the survey procedures that he had used on those occasions. Would you explain what you mean by "he demonstrated?"

A [Witness Joukoff.] Yes. During the time that Mr. Skov and I were with Mr. Murray on October 25, 1990, Mr. Skov conducted an NRC inspection of Mr. Murray's field radiographic activities. I assisted Mr. Skov in this inspection and we also conversed with Mr. Murray about his activities on October 25 and his activities in general when conducting field radiography.

At one point during this inspection, Mr. Skov asked that Mr. Murray expose the radiographic source in a configuration on one of the pipes such that Mr. Skov could take a radiation survey meter and Mr. Skov could make radiation surveys of the restricted area boundary and other

radiation surveys in general to determine what the radiation intensities were at different locations around the trench in which Mr. Murray was conducting radiography.

Mr. Murray was asked to expose the source a number of times. I did not count the exact number. It would be approximately four or five times. I watched Mr. Murray during these exposures and I noted that every time that he retracted the source back into the camera, that he then picked up his survey meter in his hand and approached the camera with a survey meter in his hand while looking at the survey meter to see if there was a radiation reading on it and that he would then approach the camera, that he would bend over with his hand, reach down, turn the locking mechanism on the camera and then would utilize the survey meter to conduct a survey of the camera and the source guide tube.

Q Mr. Skov, do you agree with or have any comments on what Mr. Joukoff has stated?

A [Witness Skov.] I agree with all the statements that Mr. Joukoff has made. I don't have anything to add, other than the fact that upon questioning, Mr. Murray also demonstrated separately to us how he conducted a survey of the camera and also how he did lock the camera after conducting radiographic exposures.

Q Just so we are totally clear about the statements

you have just made, all of these demonstrations made by Mr. Murray occurred after your observations on the 23rd and 25th and essentially after the end of the videotape, which is Staff Exhibit 5, is that correct?

A [Witness Joukoff.] That is correct.

Q But during your observations, is it not true that Mr. Murray did none of these things?

A [Witness Joukoff.] That is correct.

MR. BACHMANN: I just wanted to set the record straight, Your Honor, as to when the demonstration occurred. Your Honor, the staff, as I indicated earlier, has attempted to break down its prime case into three parts. The first was the establishment of the facts. The second one was basically a general commentary and explanation of the Board, which we have now completed. The third part of the case would involve the appropriateness of the sanction.

For that, Mr. James Lieberman, the Director of the Office of Enforcement, will testify as to the reasons for the particular sanction chosen. At this stage, I believe it might be more efficient if we held Mr. Lieberman's direct and allowed the cross examination of Mr. Joukoff and Mr. Skov rather than proceed all the way through to Mr. Lieberman and then come back.

JUDGE COTTER: We would do that anyway, Mr. Bachmann. Are you finished with your direct?

MR. BACHMANN: I am finished with the direct examination of Mr. Joukoff and Mr. Skov for this portion of the case. I would, of course, reserve the right to have rebuttal testimony based on cross.

JUDGE COTTER: Mr. Murray, do you have any questions for these two gentlemen?

MR. MURRAY: Yes, just a few.

MR. BACHMANN: Excuse me, Your Honor. Just one small -- I would almost call it a housekeeping thing. It might make it easier. Mr. Murray is not a lawyer and, as such, there's probably a good case that some of his questions may become statements and vice versa.

If he were sworn --

JUDGE COTTER: He wouldn't be alone in that, Mr. Bachmann.

MR. BACHMANN: Were he sworn at this time, then we could consider his statements as part of his testimony and it might save some time later.

JUDGE COTTER: We'll wait until he makes a decision about whether he wants to put on a case or not.

MR. BACHMANN: Could I ask him if he understood what we -- I mean, I feel funny going up this way and back this way.

JUDGE COTTER: I think we'll just proceed the way we are. Go ahead with your questioning, Mr. Murray.

CROSS EXAMINATION

BY MR. MURRAY:

Q The 23rd in particular. Did you observe whether I had a survey meter?

JUDGE COTTER: One, speak into the mike and, two, be specific as to who you're addressing.

MR. MURRAY: Okay.

BY MR. MURRAY:

Q I guess, Dave, I'll address that to you. This is on the 23rd of October. This is because Phil said you weren't watching all the time and Dave was. But did you notice that I had a survey meter and can you explain where I had it, how I carried it?

A [Witness Skov.] On October 23, 1990, when we were observing your operations, I noticed that you had a piece of equipment on your belt. It was yellow in color. At that particular time, I did not realize until later, after we had interviewed you two days later on October 25, that you had apparently been wearing a Victoreen Model 400 radiation survey meter.

So at the time of our inspection of your activities on October 23, I did observe a piece of equipment being worn on your belt. I did not realize that was a survey meter. At the same time, I also noted that there was another radiation survey meter that was positioned on the

truck at the job site and had not been moved.

I did not observe any other radiation survey meters, for example, in the trench.

Q Okay.

A [Witness Skov.] I would also like to add that at no time did I observe you actually using your survey meter, which I later found out, as I said before, that was positioned on your belt. That is you did not actually remove the survey meter from your belt and conduct a survey with it, nor did I observe you actually looking down at the survey meter.

Q You never observed me looking down at it.

A [Witness Skov.] No.

Q Explain how you would ensure that the source -- I know you've done it once, but how would you ensure that the source was retracted into the fully shielded position on a camera, the 660 in particular, the camera I was using?

A [Witness Skov.] How I --

Q Yes. How do you know that it's fully retracted, other than -- I'm talking particularly about the survey meter. How would you know that it was retracted yourself?

A [Witness Skov.] If I were conducting the radiographic operations, is that what you're asking?

Q Yes.

A [Witness Skov.] If I were conducting the survey,

I would be using a survey meter, hand-held, in front of me and I would be conducting a circumferential survey around the camera and the source guide tube. And only with that step would I be able to confidently -- and this is assuming that the survey instrument was operable and was calibrated. Using a calibrated and operable survey instrument would be the only method that I would consider as confirming for sure that the source had been fully retracted in its shielded configuration.

Q Okay. Say you're at the crank, you're approaching, what would make you lead to believe that it was in the shielded position and, if not, would you know before you approached the camera that it wasn't in the shielded position? How would you know it wasn't?

A [Witness Skov.] The answer to that question would be I wouldn't know, not unless I had a survey meter and was using it as I approached the camera.

Q So you're saying if it's in the collimator or if it's in the hose and you're 25 feet away, you wouldn't know until you came up and you surveyed around the camera.

A [Witness Skov.] No, that is not correct. I would not know that until I was using my survey meter as I approached the camera and was at the same time conducting the survey as I was approaching the radiographic exposure device.

Q But you'll get a reading, you'll know that it's been retracted. I mean, you will suspect that it's been retracted at a distance of 25 feet or more because the intensities are high enough to be able to do that.

A [Witness Skov.] Well, that is a --

Q I say suspect. I don't say that you -- you can't ensure that it's in until go up there.

A [Witness Skov.] The only way that I would be -- let me back up. Let's suppose that the source had not been fully retracted and it was at some point, at some location in the source guide tube, including the collimator. I would expect that the radiation level would increase as I approached that location, as I was walking towards the camera.

However, that would not necessarily indicate that the source was fully shielded, because it's possible that the source, even if you had fully retracted the source, if you had retracted the source into the camera, that it was not fully retracted; that is, the source could be retracted only to a point where the source capsule, the iridium-192 source was just within the exit port of the exposure device.

Therefore, you would have a collimated beam of radiation. So, yes, a survey meter would be necessary in approaching the camera and would tell you if the source was out somewhere in the source guide tube. However, it the

source had been retracted even in a position where it were not fully retracted in the camera, the only way you would be able to tell that the source -- where the source was in that particular situation would be if you were to conduct a survey around the circumference of the exposure device.

Q You know about the meter that I had, the 400, the Victoreen. Explain why --

A [Witness Skov.] The one that you were using on your belt.

Q Yes, the yellow one. You've had enough of the literature, the nomenclature to understand how it operated.

A [Witness Skov.] Correct.

Q The way it does operate is when it pegs off-scale, the alarm activates. Now, explain to me why or, better yet -- well, why I would have to -- why I'd have to take it off and read it while I'm approaching as opposed to listening to it. In your opinion, why would you want to read it as opposed to listening to the alarm?

A [Witness Skov.] The answer to that is that the alarm is an output. It's reading off the output of the survey meter. Therefore, you've got two separate devices, basically. You've got an alarm device which gives an audio indication and you've got a survey meter which reads off the detector, basically.

I would not want to rely on a speaker only because

the speaker itself perhaps could even malfunction as opposed to actually looking at the meter itself, the survey meter.

Q This particular, it's not like an audible rate meter. This thing -- the 400, in fact, does peg out -- when it pegs off-scale -- if you put it on a two MR scale and it hits ten MR, it pegs out, it alarms, and it goes by what the meter reads. They aren't separate. The audible rate meter is part of the meter itself. So when the meter rises up and pegs out, that's when the meter goes off, whether it be ten or 100 MR.

In fact, the two are the same. So if the meter didn't work, if I looked down and the meter didn't work, then the alarm wouldn't work.

A [Witness Skov.] You're describing a situation that's true as designed. However, I'm certainly not convinced that the alarming mechanism would give an audio signal which is dependent only upon the signal output from the survey meter. It's possible that the alarm couldn't alarm by itself, not in response to radiation intensity.

Q Let me take it a step further. While you're cranking in and out, as you know, the intensities rise and fall from the collimation position to the shielded position. They will rise and fall and this meter will activate. Knowing that, wouldn't you -- I mean, what I'm getting at, you're accusing me of being unsafe.

I'm not refuting what you and Philip found, that I didn't survey. What I'm trying to do is bring this back down to a -- to moderate what you and Philip found. So I guess what I'm getting at is that the meter sounds off. If I crank out, the meter automatically sounds. I know -- and when it gets to the collimator, it goes off.

When I return it, it goes off. While it's being retracted and it returns to the camera, it goes off. When I approach, without having to look down, the meter, if it's (, even if -- the thing is that if it isn't out, it will keep going off.

You've brought up the situation where it could and it could very well be stuck. In most cases, if a source is stuck, it's stuck right there at the porthole. But whether you're looking at the meter or not or you have it in your hand, you're still there within that range of the front of the camera. You'll know it when you get there. Regardless of whether it's an alarm, whether it's a meter, you're still going to know it's exposed.

A [Witness Skov.] What you're describing is a situation similar to the way you would be wearing an alarming pocket dosimeter. First of all, in that light, an alarming pocket dosimeter is only meant -- and that's the way basically you're describing this situation, even though it is a survey meter.

An alarming pocket dosimeter is only meant to be a redundant device, to give additional indication of a possible radiation hazard; in a high radiation field, in other words. So what you're saying basically, the way I see it, is that you're using it as a substitute for conducting your radiation survey.

The fact that the survey meter was on your belt and you're only using it as an audible indicator indicates that you're using it as a pocket -- basically as an alarming pocket dosimeter.

Secondly, the survey meter was not placed properly. You would have to place it in front of you and not on your hip, because your body itself is going to provide some shielding effect from the radiation field, particularly if you're walking up to an exposure device and you're trying to determine whether or not the source is in a safe configuration, safe shielded configuration.

Having the survey meter on your belt completely opposite of a collimated beam of radiation is certainly an inadequate type of survey, at the very minimum.

Q When you say the opposite side of --

A [Witness Skov.] In order to determine where the source was located, let's say that the source was at the exit port and was only partially shielded by the camera and the only remaining radiation was being emitted out the exit

port. I don't believe that you would be able to actually determine if there was a high radiation field by having a survey meter on your belt.

First of all, you would have to actually reach -- I could demonstrate to you, but you would have to actually reach around where the exit port is and conduct a survey at that point to pick up or detect any radiation field at that location. But if you have a survey meter that's on your belt, first of all, you're several feet away. Secondly, your body is partially shielding whatever increased radiation field that may exist due to scatter.

So I am certainly not convinced that the way --

Q I'm not trying to convince you. What was the other thing? First of all, if a source, even with it fully retracted, it will get a high beam of radiation at the exit port because you don't have shipping plug in and there is no lead, like your cap here is lead-filled or filled. So you'll always have a high radiation field there if you put it in, if you put your meter in front of that hose. You're always going to get something.

Now, if you're talking about if it's sticking out a little bit, you'll know it. You'll know it whether -- well, like I say, I'm not going to defend the fact that it was on my belt or whether I had rate meters or on it and things like this.

This states that it's supposed to be a survey and it should be surveyed. What I'm getting at is -- let me go on with the next question. On this date, you stated that surveys weren't taken, that there were people inside the restricted boundaries. I was wondering why you and Phil didn't come out on that day, come down and shut down my operation and bring it to my attention then if you thought unsafe operations were going on.

A [Witness Skov.] Because, first of all, I could observe that you were using a collimator and that the radiation field was reduced considerably from what it would be if you had not been using a collimator. Secondly, I noticed that all of the personnel, even though they were within the restricted area, they were still some considerable distance away, at least 25 feet, I estimate, away from the source.

Thirdly, I would have stopped the operation if I had seen the individuals who had entered the restricted area actually walk towards the collimator with the exposed source.

Q You would have had to do that. Why was this particular job that I was on surveyed and no others during that week, because I was at several other jobs and you and Phil waited on top of this coral bank for me to arrive at this one. Why was it just this job that was isolated and

really had not that much public traffic? When I say public traffic, this isn't a place where pedestrians walk. It was in an isolated area off of a highway, 50 feet from the edge of the throughway or the thoroughfare. Why this job?

A [Witness Joukoff.] To answer your question, the Office of Investigations of the NRC has conducted numerous investigations in the Hawaiian Islands regarding the activities of NRC licensees that conduct radiography similar to your company. I know I've discussed these with you in the past and you're aware personally of the other investigations that have been done.

One of the problems that we have encountered in conducting these investigations, as I was the investigator that conducted two of them, was that the oil refineries where you were working at other times -- in particular, I remember you mentioned the Hawaiian Independent Refinery, the Chevron Refinery.

You were working inside the controlled gates and fences of the owner of the refinery. And at other times when we have attempted to make surveillances and find out exactly what our licensees are doing in the field with the radiographic sources that we license them to use, every time that we appear at the gate, our licensees are advised ins de that the NRC is at the gate.

Consequently, we're not able to get a true

indication of what our radiographers really do in the field. In this particular instance, it was occurring out at a public area, which made us able to observe, without going through any intermediaries, specifically what was transpiring by an NRC licensee while he conducted licensed activities.

Q I was wondering on that day, on the 23rd, I guess that was a Tuesday because you showed up on Thursday and that's when you talked to me. Did you figure the doses of the people that you witnessed coming into the restricted area? Do you have that? Do you know what the dose rates were and do you know what the doses that would have been acquired by these personnel?

A [Witness Skov.] I had a rough indication. When I was observing the operations on the 23rd, I had a rough indication of what the approximate radiation exposure levels would be or the exposures that the individuals would receive at the locations that they occupied.

Subsequent to that date, after the inspection, I did calculate the actual exposures that the individuals would have mostly likely received under very conservative conditions.

Q Tell me if these sound reasonable. The man on the dirt road [illegible] u said walked through my boundary, I've got six MR per [illegible] at that point; not six MR that he acquired,

but six MR per hour as a dose rate.

JUDGE COTTER: Is this October 23?

MR. MURRAY: Excuse me. This is October 23.

BY MR. MURRAY:

Q This is a man that was walking on what was considered by myself an inaccessible area of coral landfill. It was a worker. I take it you guys had a picture of him. Would six MR per hour be unreasonable? Do you recall that? He was approximately 60 feet from where I was shooting.

A [Witness Skov.] Those numbers don't correspond to what I believe the situation refers to. In my mind, the individual that had walked on the north side of the trench - -

Q Your side.

A [Witness Skov.] North side of the trench, which would be towards the berm, was approximately at a distance of 25 feet from the source at the closest point that the individual walked. On the 25th, I made a radiation survey - -

Q You're correct. Excuse me. That is correct. Fifteen to 20 feet I have and that's what this intensity is based on, is 15 to 20 feet, the six MR. So 25 feet would be -- you're right, Dave.

A [Witness Skov.] On October 25, I attempted to make a radiation survey to determine what approximate

radiation levels the individual was exposed to. One source configuration that I used was to have the source pointed towards the road so that the individual would be exposed to the radiation that had already passed through the collimator and was considerably attenuated, and I measured 15 MR per hour.

Q When did you do this?

A [Witness Skov.] On the 25th.

Q When I had my source pointing towards you, towards the road.

A [Witness Skov.] No. The source in that configuration was pointed towards the road. On the opposite side, I made a survey to indicate what the radiation level was at the location where the individual walked.

Q Near the coral --

A [Witness Skov.] To try to reconstruct the exposure levels.

Q And you came up with what on this thing?

A [Witness Skov.] I came up with approximately 15 MR per hour.

Q On the day that I pointed my source towards the bank and you stood on the bank, you came up with --

A [Witness Skov.] No. No. To use the clock face again as a description here, the source was located at 8:00.

Q Okay.

A [Witness Skov.] So it was pointed towards the road, Malakole Street.

Q Okay. It's pointed toward the --

A [Witness Skov.] The paved road. And I measured 15 MR per hour on the opposite side; in other words, the north side of the trench at a location where the individual had walked.

Q And you did this on the 25th when I exposed the source.

A [Witness Skov.] Yes. After -- you remember that we made a number of exposures and I was conducting surveys.

Q Yes. I recall.

A [Witness Skov.] One of those surveys was made at a location which I tried to reproduce as the position where the individual had walked on the north side of the trench on the 23rd of October, to try to get an indication of what kinds of radiation levels that individual would have been exposed to.

Q I recall two. I recall one I pointed towards the road. You came up with 6. --

A [Witness Skov.] 6.5. That was a separate radiation survey. Correct.

Q I turned it the opposite way. You came up with three. You told me you came up with three on the road on that day. You didn't tell me 15. And it was pointing at

you, it wasn't collimated the opposite way.

A [Witness Skov.] No. You're confusing the radiation level that I measured up on the berm. That was, in fact, three MR per hour.

Q Then I don't understand where the other -- because that's where the man would have been on that road. No, no, no. Okay. You were on the dirt road, further down from the 23rd naturally. We were on the other side of the loop, correct? There was a bank in front of me. My non-collimated end was pointing into the bank, if you recall. The pipe went over the bank and down back into the ditch.

You were up towards the coral, on the road. You told me to expose that side and I did so. I asked you what you got, you told me three MR as opposed to 6.5 towards the road, which would have been correct because that bank is higher by a couple of feet.

The bank that you were on -- not only that, the pipe is situated farther towards that bank, so you have an angle hitting earth that isn't quite the same as the side you were on, the road side, the roadway. I recall you coming up with three MR. I don't recall any 15 MR at that point.

A [Witness Skov.] Well, there were a number of different surveys that I made.

Q This one I don't remember.

A [Witness Skov.] It's really beside the point. I measured the 15 MR per hour, the individual was there for only a short period of time. So he would not have received anywhere near two millirem exposure.

Q Well, would this person -- naturally, I went back because of what had happened, reenacted the whole thing. By your pictures, I could tell where the forklift was and things of this nature. This man told me where he had walked. We reenacted that and this is how I came up with my figures. Like I say, where he walked would have been a six MR per hour. He would have been walking -- in fact, if I posted this, if this side was posted on that day, he would have still been walking beyond my posted area because I only had several -- a few exposures there and I based it on an isodose.

I did not base it on the intensity at that point. It was based on the number of exposures made within one hour at that point, during that point of my inspection.

JUDGE COTTER: Mr. Murray, you're going to have a chance to testify directly yourself.

MR. MURRAY: Okay. Sorry. I knew this would happen.

JUDGE COTTER: Maybe this would be an appropriate time to break and you can think about what specific questions you had for these two witnesses.

MR. MURRAY: Then I'll forget. Can I just ask him about the boundaries?

BY MR. MURRAY:

Q You indicated that you feel that the whole perimeter of the restricted area should be surveyed, and I want to know why you think that and why it should be, why there are not other methods of surveying the boundaries as opposed to walking the line, walking the entire controlled area.

A [Witness Skov.] If you're implying that the entire, every inch of the perimeter needs to be surveyed, that was not what I meant. What I had meant was that enough of the perimeter had to be surveyed to give you a very positive indication and you were satisfied that there were no areas that the radiation levels were different than from what you knew would exist at those locations.

Obviously, in a situation where you have an open field, it would not be necessary -- let's say you're using a non-collimated source. It would not be necessary to survey around the entire circumference of the boundary, because basically you've got a panoramic radiation field which is of uniform intensity around the entire perimeter.

But once you introduce the situation where you have obstacles, earth embankments, anything that could possibly reduce or even increase the radiation levels as a

result of radiation scatter, then you have to get into a mode where you're going to be conducting enough radiation surveys of the perimeter to positively establish that the boundary is set at the proper point.

In this particular case, it's two MR per hour. In the situation where you were conducting radiographic activities, you had a trench as one variable and you had a number of different locations where the source was being placed. So you had a multiple number of different types of exposure configurations which would lead to different radiation intensities at different locations.

Q I recall you bringing that up and that you said -- well, it would change. As opposed to the 23rd, I moved to another point on the 25th and that the conditions changed because of that movement.

A [Witness Skov.] Yes.

Q On this particular job, I'm dealing with four pipes. On each one of these days, I'm x-raying four pipes. I'm doing the one near the side of the bank, the one in the center. As opposed to the one in the center and the one against the bank, the shielding -- the only difference between the two is the bank.

If I'm shooting at 60 -- well, we'll use the clock like you were using. You're up at the bank. When I'm shooting up, there's a bank on this side, there's a bank on

this side. The pipes in between, like Phil said, don't make that much of a difference. It's the bank, it's the earth that offered me more shielding th[illegible] anything else.

So whether I moved to the outside or whether I moved to the center, the only difference was that the beam, the radiation was actually at a different angle. So if I moved to this side and over here it would be a little less. On this side, I would be shooting right into the bank and right into the soil.

All the readings I have taken, taken prior to these, are based on calculations -- were based on prior surveys. When there's people around, then naturally I'll go up and I'll survey these certain sections or where they are to make sure, in fact, that they're not in a high radiation area.

So when you say that -- when I came back on Thursday, and I was there on Tuesday, that I can't guarantee that the radiation levels are going to be -- what I based it on was an isodose and they're far less than two MR and I know this because of my calculations, because of the number of exposures I'm making.

You say that I can't guarantee this. I want to hear you say -- explain again how I can't guarantee this in a situation like that, because these situations are identical. They're exact. It doesn't vary that much. It

doesn't vary more than one MR.

JUDGE COTTER: I think I heard a question in there, Mr. Murray.

MR. MURRAY: I tried to fit one in. Maybe I should stop.

JUDGE COTTER: The question I heard was why, based on his prior experience and calculations, is he presenting a risk to the public health and safety.

WITNESS SKOV: I'm sorry. Would you repeat that, Your Honor?

JUDGE COTTER: If I understood his question correctly, he was saying that based on his prior experience with that site and his calculations and whatnot, why you think that he is presenting risk to the public health and safety?

WITNESS SKOV: Well, the basis for my reasoning is that there were enough differences in the location of the source, with the collimator being used, inside the trench and its location relative to any areas that may be occupied.

Now, I've stated that before. The radiation levels can change dramatically if you're in a trench and, yes, it does depend upon the angle at which the source is directed towards the wall of the trench.

So what you've got is one factor which takes into accour the position of the source inside the trench, the

depth the source is relative to the top of the ground, any pipes that are in the way which may serve as shielding or scattering. You've got the walls of the trench itself which are not all uniform along that entire trench.

MR. MURRAY: That's correct.

WITNESS SKOV: There are areas that the slope of the trench wall was very gradual and at other points they were very acute; in other words, they were almost at like a 90-degree angle, where the ground and the trench meet. The depth of the trench itself varied. So that means that the position of the source relative to ground level varied.

Also, you had the berm, the position of the berm where we were located on the 25th. We were certain far closer to the exposed source than we were on the 23rd. That's an entirely new variable. I think you admitted that there weren't any surveys conducted on the berm, for example.

BY MR. MURRAY:

Q No. You mean up where you two were.

A [Witness Skov.] That's correct.

Q No.

A [Witness Skov.] So I think I have described enough variables in this whole scenario where you conducted radiographic activities on the 23rd and 25th, there were enough variables which would lead to different or differing

radiation levels that could be measured at various points around that trench and above the trench to justify the need for conducting a radiation survey with an instrument at certain portions of the radiation restricted area.

Q Isn't it possible from a point which isn't exactly where the boundary is, I can estimate, I can calculate where that boundary should be just by taking a reading?

A [Witness Skov.] That is correct. However, I think you also know that it is an NRC requirement that radiographers conduct a confirmatory survey to verify that the position of that boundary is correct and can't be done only by calculation.

Q Can I tell you what it says? Would this be all right if I just read this?

JUDGE COTTER: What are you referring to?

MR. MURRAY: He said that the NRC --

JUDGE COTTER: What is it you're --

MR. MURRAY: -- requires you to make surveys, physical surveys of your boundaries. I'm going to read in the NRC 10 CFR exactly what it says on surveys. Survey means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials. I'll skip a little bit, and when appropriate, such evaluations indicate a physical survey of the location of the materials and measurements of the levels

of radiation or concentration of radioactive material present.

JUDGE COTTER: Are you talking about the definitions in Part --

MR. MURRAY: This is the definition of a survey.

MR. BACHMANN: Do you have the citation?

MR. MURRAY: This is 20.201.

JUDGE COTTER: I have a feeling this would be a good point to take a break. We'll recess for lunch. You can continue your questioning when we resume.

MR. MURRAY: Can I just say one thing?

JUDGE COTTER: You can say anything you want when it's your time to put direct testimony in, but saying something now doesn't mean anything.

MR. MURRAY: I mean just one question.

JUDGE COTTER: Sure.

MR. MURRAY: I don't want Phil and Dave here to feel like I'm --

JUDGE COTTER: Just give me the question.

BY MR. MURRAY:

Q I want to ask David and Phil, either can answer or both can answer, but -- and I'm asking you personally. Knowing this situation, do you feel that I'm unsafe as a radiographer, that you would not trust me out on the field, that I don't have enough knowledge --

JUDGE COTTER: You can't ask that question.

MR. MURRAY: I can't ask that?

JUDGE COTTER: That is the question we are supposed to answer.

MR. MURRAY: I'm sorry. Forget that. We'll take a break, I guess.

JUDGE COTTER: Good. We will recess until 1:30.

[Whereupon, at 12:20 p.m., the hearing was recessed for lunch, to reconvene this same day at 1:30 p.m.]

AFTERNOON SESSION

[1:37 p.m.]

JUDGE COTTER: Back on the record. The hearing will come to order. Mr. Murray, do you want to continue with your questioning?

Whereupon,

DAVID SKOV,

a witness, was called for examination by counsel on behalf of the Nuclear Regulatory Commission, and, having been previously duly sworn, was further examined and testified as follows:

Whereupon,

PHILIP Joukoff,

a witness, was called for examination by counsel on behalf of the Nuclear Regulatory Commission, and, having been previously duly sworn, was further examined and testified as follows:

CROSS EXAMINATION

BY MR. MURRAY [resuming]:

Q Just two things, Dave. The doses that were received by the people in the restricted area and the next thing was the dose levels in the restricted area. Again, the 2th when you showed up and you took the levels.

A [Witness Skov.] Yes.

Q I wanted to know what you came up with as far as

my boundaries. What I'm getting at, were my boundaries correct on where they were as far as my signs and things? I mean, I understand it wasn't rope, but I'm talking primarily about the posted restricted area.

A [Witness Skov.] On the south side of the trench, you had cones marked "radiation area" as a boundary, as a posted boundary.

Q That's the direction that you and Phil came from when you approached me.

A [Witness Skov.] Correct.

Q Okay.

A [Witness Skov.] During one of the simulated exposures with the source pointed towards Malakole Road, I measured 6.5 MR per hour at the position of the cone, which would represent your restricted area boundary. That compares with the two MR per hour boundary which is established by your operating and emergency procedures.

JUDGE COTTER: Did you take any other measurements, Mr. Skov?

WITNESS SKOV: I took other measurements on the north side of the trench; one at approximately 25 feet from the source and I measured 15 --

JUDGE COTTER: No. At the boundaries. Did you measure at any of the other boundaries and find --

WITNESS SKOV: No, not at the other boundaries,

other than at a position on the bluff overlooking the job site.

JUDGE COTTER: So there was only the one measurement at the one cone.

WITNESS SKOV: And the other measurement would e at the bluff position.

JUDGE COTTER: The result of that was?

WITNESS SKOV: It was three MR per hour at one point and two MR per hour at another point in time.

JUDGE COTTER: Thank you.

WITNESS SKOV: I would also like to mention that since this whole matter has come up concerning the two MR per hour significance, there's nothing really magical about the two MR per hour as a number. The real purpose of establishing a restricted area boundary, whether it's two MR per hour or two MR in any one hour, is to prevent the possibility that members of the public could enter the high radiation area.

So the purpose of setting that outer boundary, the outer restricted area boundary is to preclude individuals from not only crossing that boundary, but also entering the high radiation area boundary and seriously receiving high radiation exposures. So the actual number is immaterial.

MR. MURRAY: And I agree with that.

WITNESS JOUKOFF: If it please the Court, Your

Honor, also getting back to the surveys being made, that Mr. Skov made at the restricted area boundary, there was no posting of a restricted area boundary on the north side of the trench. There were no cones and no measurements were made there because it didn't exist. I just wanted to clarify that point.

BY MR. MURRAY:

Q The doses received by the people that were suspected of being -- or witnesses being inside the controlled area, the restricted area.

A [Witness Skov.] The doses that I calculated using fairly conservative assumptions probably were less than two millirem. So as was already stated in the inspection report, the maximum doses that any of the six individuals likely would have received, even though they were within the restricted area, were less than two millirem.

However, the potential did exist for those individuals to receive much higher doses.

MR. MURRAY: I think that's all I have, sir.

JUDGE COTTER: All right.

JUDGE FOSTER: I have a question or two for Mr. Skov. These go to the survey of the boundary, the two MR per hour boundary. From your earlier discussions, it seemed to me that it would almost be indicated that a separate survey be made each time the source was changed in some way;

located on a different pipe, aimed in a different direction.

Could you give us an idea of how often you think that a two MR per hour boundary ought to be established around a job site?

WITNESS SKOV: The way I visualize a radiographer conducting this type of survey would be where the radiographer would choose the most conservative exposure situation; that is, a situation in which the orientation of the source would be such that the radiation levels would be at a maximum; and to then position the source such that those levels would be measured at the boundary.

So the radiographer would position the source, would make the radiation survey at the start of radiographic operations, and once he knew that the radiation levels at any point around the perimeter of the restricted area boundary were such-and-such value, any additional orientations of the source would produce radiation levels that would be less than that.

So the initial radiation survey would be made in a conservative configuration and the boundaries set appropriately. To answer your question, it would not be necessary for the radiographer to, let's say during the day's operation, every time he changes the position of the source on a pipe, it would be necessary for him to conduct another restricted area boundary survey.

JUDGE FOSTER: Is there anything in the operating and emergency procedures that would go to that kind of an explanation?

WITNESS SKOV: No, sir, they do not. They only provide that a survey will be conducted during -- without reading the requirement -- would be conducted during each radiographic operation.

JUDGE FOSTER: Is the language which we read here in the operating procedures fairly typical of that of radiographic operations that you're familiar with? To say it another way, is this particular point about as well explained in the operating procedures for Fewell Company as it is in other radiographic companies' licenses?

WITNESS SKOV: My experience with reviewing other applicants' applications for radiography license makes me believe that the description of the circumstances of how the surveys are to be performed and when they're to be performed are less detailed in this particular license application than in some other license applications. However, they do provide enough detail to indicate that the surveys are to be performed corresponding to each radiographic operation.

JUDGE FOSTER: When the staff reviews these license applications when they come in, does the staff have any standard review plans or the equivalent of this for cross-checking the kinds of information and the depth to

which it goes?

WITNESS SKOV: Yes, we do, Your Honor. The particular standard review plan that is keyed to Regulatory Guide 10.6 does establish or provide guidance to the reviewer that radiographer licensee applicants should be conducting surveys at the restricted area boundary using the two MR per hour guideline. And if they do not wish to follow that particular guideline, they need to submit information, additional information, instructions to radiography personnel on how the radiographers are to calculate how much exposure -- what the exposure rate would be taking into account the concept of two MR in any one hour.

JUDGE FOSTER: But the license application with these operating procedures, emergency procedures, was able to pass the NRC's standard review plan for radiographic operations, is that correct?

WITNESS SKOV: That's correct, because it did contain the very conservative radiation level concept of using two MR per hour.

JUDGE FOSTER: But without specifying how frequently that needed to be --

WITNESS SKOV: Without specifying that the licensee would use the two MR in any one hour concept. That is the licensee in this particular case, Fewell, did not say

that they wished to set up the boundary, the restricted area boundary taking into account the two MR in any one hour and they did not provide information to take into account the number of exposures, the exposure duration, and the maximum radiation level that would be allowed using that concept.

JUDGE FOSTER: Thank you.

WITNESS SKOV: One of the primary reasons that the NMSS recommends that licensees submit their applications using the two MR per hour concept is that that is a number that is directly readable on a survey instrument. It's much easier for radiographer personnel to follow. And then try to come up with a very dynamic -- in a dynamic situation, they would have to determine the number of exposures that they're planning to make in any one hour.

They would have to determine the length of each exposure. They would have to use an equation to determine what the maximum radiation level was at a particular boundary. That's just for planned exposures. If the number of exposures or any other conditions were to change at any time during that one hour, there would have to be a continual adjustment made by the radiographer.

So that's a much more difficult thing for the radiographer to do than to simply use the survey instrument to indicate the maximum level that would be allowed and then set their boundary at that level.

JUDGE FOSTER: I understand.

JUDGE COTTER: Mr. Skov, have you ever worked as a radiographer yourself?

WITNESS SKOV: No, I have not.

JUDGE COTTER: How often have you observed radiographers as you have in the circumstances before?

WITNESS SKOV: I have probably observed radiographers conducting operations on two to three dozen times over the course of ten years.

JUDGE COTTER: How many of those were here in Hawaii?

WITNESS SKOV: I would estimate that the number would be on the order of perhaps five to ten.

JUDGE COTTER: Did I understand you to say that you first began this kind of observation within the last ten years?

WITNESS SKOV: No. I've been working for the NRC for ten years and soon after I was employed by the NRC, I started performing industrial radiography inspections.

JUDGE COTTER: So about two to three dozen and about ten of them here.

WITNESS SKOV: Yes. Now, that is actual performance of radiography. I have conducted roughly 80 inspections of radiographer licensees.

JUDGE COTTER: I'm not talking about the

paperwork. Is that what you meant? On how many occasions did you observe Mr. Murray?

WITNESS SKOV: I'm sorry, Your Honor. On how many occasions or over what period of time?

JUDGE COTTER: Before that, let me back up again. In the two to three dozen observations that you've mentioned over the last ten years, how many of those were done without the radiographer's knowledge that you were observing him or her, as the case may be?

WITNESS SKOV: None, Your Honor.

JUDGE COTTER: All of them were done when the radiographer knew you were observing them.

WITNESS SKOV: Well, many of the -- most of the radiographic inspections that I've made have been conducted where the radiographer knew at the outset that I was there. There have been some radiography field inspections that I've conducted where I was present at the site, but the radiographer didn't initially know who I was. So I would observe radiography personnel doing operations and at some point during that field inspection, I would announce to them who I was.

JUDGE COTTER: Let me go back to the question that interrupted both of us. That was how many times have you observed Mr. Murray perform his radiographic duties?

WITNESS SKOV: None previous to the October 23,

1990 i nction.

JUDGE COTTER: So you have observed him twice.

WITNESS SKOV: I've observed him on two different days only.

JUDGE COTTER: What prompted you to observe? Was that caused by the October 9 finding of nine violations in the paperwork of Fewell?

WITNESS SKOV: That was prompted by a finding by the previous inspection conducted approximately two to three weeks earlier that there needed to be a followup to that particular inspection since there was some doubt by the previous inspection personnel that the program was being operated in full compliance with NRC requirements.

There was an additional reason for conducting that particular inspection, and that was for the reason of following up on an allegation.

JUDGE COTTER: How many radiographic firms are there in Hawaii?

WITNESS SKOV: There are currently three.

JUDGE COTTER: How many radiographers are there?

WITNESS SKOV: I believe there are approximately six radiographer personnel that would be authorized to perform radiography.

JUDGE COTTER: How many of them have you observed?

WITNESS SKOV: Of the radiography personnel that are currently authorized to perform radiography, the only person that I've observed is Mr. Murray. There have been other radiographers working for firms in Hawaii in the past that I have observed doing field radiography.

JUDGE COTTER: Mr. Joukoff, let me direct the same kinds of questions to you. Have you been involved in any other observation, yourself, of Mr. Murray?

WITNESS JOUKOFF: No. The only operations of field RT of Mr. Murray, field radiography of Mr. Murray were made on October 23 and 25, 1990.

JUDGE COTTER: Have you been involved in observations of other radiographers here in Hawaii?

WITNESS JOUKOFF: Yes, on one other occasion.

JUDGE COTTER: Has your office or anyone from your office done any other observations of radiographers in the State of Hawaii?

WITNESS JOUKOFF: My office has conducted other investigations of radiography firms for violation of NRC rules and regulations in the Hawaiian Islands, but the only surveillances that have ever been done have been done by me.

JUDGE COTTER: Let me ask either one or both of you what you know about Mr. Murray's training. Particularly, has NRC ever conducted any examination or observation in connection with Mr. Murray's training?

WITNESS JOUKOFF: I'll answer first since my answer will probably be shorter. The knowledge that I have of Mr. Murray's training is through the review of his training records with Fewell Geotechnical, Limited and on other -- I wouldn't call it training, but there was another NRC inspection done by NRC inspectors that involved his demonstrating his ability to conduct radiography or explaining to our inspectors how he would go about doing field radiography, the results of which are contained in an NRC inspection report.

JUDGE COTTER: Do you know when that was done?

WITNESS JOUKOFF: The inspection was on October 4 or 5 of 1990. The report was issued at the end of October of 1990. Other than that, that's all the knowledge that I have of his training.

MR. BACHMANN: Your Honor, I have copies of that inspection report, if you would like to see it or have it introduced into the record.

JUDGE COTTER: I think we have to review the bidding on all these exhibits. You've got quite a package that has been spread around in the course of discovery and I think we're going to need to look at which ones of those things should be added to the record formally.

Mr. Skov, can you add anything to that?

WITNESS SKOV: There's very little to add to that.

The only experience that I have with Mr. Murray's qualifications would be those that were provided in the license application.

JUDGE COTTER: In the paper record back in Region V.

WITNESS SKOV: That's correct.

JUDGE COTTER: Is my memory correct that the discovery papers indicate that Mr. Murray should have been audited in at least two consecutive quarters and was not? That is that the performance of his duties should have been examined by his employer?

MR. BACHMANN: Your Honor, I believe I've found that particular reference.

JUDGE COTTER: You might just describe it.

MR. BACHMANN: This is an inspection report of an inspection that was conducted October 4, 1990. It was sent out under a cover letter dated October 25, 1990. On the first page of it, under the heading "Results," it says "non-apparent violations and no deviations were identified during the inspection. The apparent violations are summarized as follows," and then A reads "The radiographer was not audited between February 10, 1990 and June 1, 1990, a period in excess of four months. Radiography was conducted frequently during these dates."

That is a summary of the statement. It indicates

that there is a -- yes. Section III of the report has a more lengthy discussion of the internal audit program. What I read was the summary.

JUDGE COTTER: All right. Does comport with you gentlemen's understanding of when Mr. Murray was or was not audited?

WITNESS SKOV: Yes. The same inspection report that I'm looking at now indicates the same period of time, between May 10, 1990 and June 1, 1990.

JUDGE COTTER: The reference that Mr. Bachmann just made said February 10, 1990 to June 1, 1990.

WITNESS SKOV: I'm sorry. Correction. February 10, 1990 to June 1, 1990.

JUDGE COTTER: Do you know whether there was any audit of Mr. Murray after June 1, 1990 by Fewell?

WITNESS JOUKOFF: If it please the Court, I can look through some records. I believe there was, Your Honor.

JUDGE COTTER: If you would.

[Pause.]

JUDGE COTTER: As a matter of clarification, Mr. Bachmann, on that section from this October 25 cover letter, including the report. The inspection on October 4, the reference is to "the radiographer." Am I correct in assuming that that refers to Mr. Murray?

MR. BACHMANN: That is correct, sir.

JUDGE COTTER: At that time, did not Fewell have two radiographers?

MR. BACHMANN: I've been informed that at that time, that only Mr. Murray was actually performing radiography. I also would like to add that Mr. Gary Martin is listed as Radiation Safety Officer at that time.

JUDGE COTTER: I see. So while he could perform radiography, he was not listed as a radiographer.

MR. BACHMANN: That is my understanding, Your Honor.

WITNESS SKOV: Excuse me, Your Honor. Mr. Gary Martin is authorized also as a radiographer on the license.

JUDGE COTTER: Okay. His name is on the --

WITNESS SKOV: Yes. But he has not routinely been performing radiography.

JUDGE COTTER: So that there's no question in anybody's mind that when this refers to "the radiographer," it is referring to Mr. Murray, because, in fact, Mr. Martin was not doing radiographic work.

WITNESS SKOV: Yes. In the last inspection report, where the activities relate to the October 23 and 25 inspection, where the report refers to "the radiographer," it is referring to Mr. Murray only.

JUDGE COTTER: Thank you.

WITNESS JOUKOFF: Your Honor, during the course of

my investigation involving Fewell Geotechnical, Limited, I reviewed documents indicating that Mr. Murray had radiographer and assistant quarterly audits on December 27, 1989, February 10, June 1 and July 20, 1990.

JUDGE COTTER: Do you know what the nature of those audits were?

WITNESS JOUKOFF: The nature of the audits, to the best of my knowledge, is the Radiation Safety Officer, Mr. Martin, going out into the field with Mr. Murray and observing him during an actual radiographic operation, utilizing a checksheet which contains requirements, license requirements that Mr. Martin would observe Mr. Murray and check off that he was performing the license conditions correctly.

JUDGE COTTER: Do you of any other -- well, let me back up. I know you have problems with your investigations in terms of what is disclosable and not disclosable, but you indicated that there was an allegation. Was the allegation directed at Mr. Murray?

WITNESS JOUKOFF: I would have to confer with my counsel before I answered that, if I could.

JUDGE COTTER: Please do.

WITNESS JOUKOFF: Thank you, Your Honor.

JUDGE COTTER: We'll go off the record for a moment and let counsel confer.

[Witness and counsel for NRC conferring off the record.]

JUDGE COTTER: On the record.

WITNESS JOUKOFF: The NRC Region V staff received information from an alleger that Mr. Murray was not conducting radiography in compliance with the conditions of 10 CFR and NRC rules and regulations.

JUDGE COTTER: Had there been -- let me rephrase that. Was that the first occasion upon which any question of Mr. Murray's conduct of his duties was raised?

WITNESS JOUKOFF: I can recall that two NRC investigators assigned to the Region V office came to the Hawaiian Islands in approximately March of 1990, at which time I know they contacted Mr. Murray. Unfortunately, I'm not familiar with what the circumstances were surrounding that, Your Honor.

JUDGE COTTER: But so far as you know, there weren't any other questions raised as to his competence.

WITNESS JOUKOFF: I don't know the answer to your question. I'm sorry.

JUDGE COTTER: If I understand correctly, there were some other investigations going on at the same time and it might well have involved Mr. Murray's other employer.

WITNESS JOUKOFF: I beg your pardon? I didn't understand you, Your Honor.

JUDGE COTTER: I guess what I'm driving at is that so far as you or Mr. Skov know or the records disclose, there has been no other accusation or allegation of deficiency with respect to Mr. Murray's performance of his duties.

WITNESS JOUKOFF: To the best of my knowledge, there has not been.

JUDGE COTTER: Mr. Skov, in your professional opinion, how important is the licensee's direction to its employees in the quality of performance in their work?

WITNESS SKOV: I'm sorry. I didn't hear the first part of your question.

JUDGE COTTER: I said in your professional opinion, how important is the licensee's carrying out of its responsibilities under the license, how important is that to the quality of performance of its employees?

WITNESS SKOV: I would consider it to be very important

JUDGE COTTER: Obviously, one of the fundamental issues that we're looking at here is where does the blame lie if, in fact, there is a finding of a failure to follow NRC regulations in the performance of radiographic work. So I'm somewhat concerned that Mr. Murray may be taking a disproportionate share of the blame in the course of the conduct of this licensed work. That's what I'm driving at.

WITNESS SKOV: Well, during my inspection, there was no indication from the licensee management that they had ever instructed Mr. Murray not to follow the operating and emergency procedures and the NRC regulations.

JUDGE COTTER: I'm sure they didn't tell him to jump off the Pali either, but you've got to give me something a little better than that. Let me ask you this. In your judgment, did the licensee carry out its responsibilities with respect to Mr. Murray in terms of adequately, in terms of training and auditing and monitoring?

WITNESS SKOV: As far as I could tell, Your Honor, during the -- as a result of my inspection, I believe that Fewell had carried out their responsibilities with respect to the training of Mr. Murray in the proper conduct of radiographic operations. There was never any hint that Fewell was derelict in their duty as far as instructing Mr. Fewell in the proper way to conduct radiography.

JUDGE COTTER: I think you misspoke. You meant Mr. Murray. Instructed Mr. Murray.

WITNESS SKOV: Sorry.

JUDGE COTTER: Let me go back to some of your specific testimony earlier, Mr. Skov. I think there are a couple of questions on the number 12 in Item 3 of the November 2 letter, the 12 observations. Did you keep any

written notes or anything at the time that you were observing Mr. Murray on October 23?

WITNESS SKOV: I did not make any notes during the inspection. No, Your Honor.

JUDGE COTTER: Where did the number 12 come from?

WITNESS SKOV: The number came from an estimate of the number of exposures that he made, which I believed to have been at least 12, but I did not count, actually count the number of exposures that he had made on the 23rd.

JUDGE COTTER: I take it when he went out on a particular job that there were not a specific number of welds to be examined in a particular timeframe, is that correct, or is there some record that says on the morning of October 23, I'm going to do X number of welds?

WITNESS JOUKOFF: My experience in this, Your Honor, is that there is a report that is completed after radiographic operations are done. This is a report that is not completed for NRC requirements, but it is a report of -- an analysis of the radiographs made to the various piping codes. And that report shows the number of exposures that are made on a particular day on a particular job and then tracks to the reading of the radiograph for the acceptance or rejection of the quality of the welding.

Those reports we have reviewed in the past and I believe we have one for October 23, 1990, which shows more

than 12 exposures being made on that day.

JUDGE COTTER: Is that likely where the number 12 came from? Are you saying you have an independent recollection?

WITNESS SKOV: That's an independent confirmation of my recollection.

JUDGE COTTER: During the period that you observed Mr. Murray on October 23 at this site, how long a period was that? How long was he there and was it morning or evening? What time of day was it?

WITNESS SKOV: It was in the afternoon, Your Honor.

WITNESS JOUKOFF: If I could refer to the writeup that I did on that date, Your Honor, which I believe has been previously submitted to the Board by Mr. Bachmann. It was between approximately 2:45 p.m. and 3:36 p.m. on October 23, 1990.

JUDGE COTTER: Was Mr. Murray doing radiographic work in the morning?

WITNESS JOUKOFF: Of the 23rd?

JUDGE COTTER: Yes.

WITNESS JOUKOFF: I do not know.

JUDGE COTTER: Was he doing radiographic work on the 24th?

WITNESS JOUKOFF: I did not question him on what

he did on the 24th, Your Honor.

JUDGE COTTER: Do either of you know?

WITNESS SKOV: I do not know, Your Honor.

JUDGE COTTER: One of you responded earlier to a question from Mr. Murray that, if I understood you correctly, the sense of it was that this was the only radiographic work that he did on non-supervised plant grounds during this period, is that correct?

WITNESS JOUKOFF: No. My response was in reference to a question from Mr. Murray as to why we picked this location to do the surveillance. The answer was because in my experience out here, because we have attempted surveillances in the past, both myself and other investigators from my office, constitutes a situation where the NRC has direct control to make observations without having to go through company representatives of oil refineries, pipeline projects, or other such personnel, which we feel typically in the past have minimized our ability to observe a radiographer without his knowing that we're present.

JUDGE COTTER: With respect to Item 5 of the November order, November 2 order, it charges failure to prevent entry into the restricted area of individuals other than radiographers and radiographers' assistants. Mr. Skov, what do you expect a radiographer to do other than posting

the area?

WITNESS SKOV: I would expect the radiographer to restrict the access, keep out individuals other than radiographers and assistant radiographers.

JUDGE COTTER: I know, but how does he do it?

WITNESS SKOV: By warning the individuals not to enter the restricted area before the source is exposed.

JUDGE COTTER: Suppose he's in the middle of exposing the source.

WITNESS SKOV: If he's in the middle of exposing a source, he would -- the radiographer would have to warn away the individuals to immediately leave the area or, if necessary, retract the source if the individuals did not stop entering the area.

JUDGE COTTER: I guess I find this a very fuzzy responsibility to prevent entry into an area. You can put ropes up and you can post areas and that sort of thing. Then you're supposed to do your work.

WITNESS SKOV: The posting of the radiation boundary or the restricted area boundary is only meant to warn individuals of the presence of radiography and the presence of radiation. It is not intended to prevent individuals from actually crossing the boundary. The only way that can be done is to have surveillance of the job site and to actively prevent individuals from not only entering

the restricted area, but also the high radiation area.

JUDGE COTTER: I understand that, Mr. Skov, but my mother always taught me you couldn't do two things at once and do either one of them well. If, in fact, you're looking at a survey instrument, for example, and you're surveying the circumference of the device or the -- sorry, I've forgotten the terminology -- the guide tube or something like that, and somebody comes walking through the area. Then it seems to me that you're placing the kind of obligation on them that requires some sort of rule of reason.

So it would seem to me, if I understand correctly, we have something like six people, is it a total of six people who violated that boundary on October 23?

WITNESS SKOV: That's correct, Your Honor.

JUDGE COTTER: How many of these, in your judgment, did Mr. Murray have a reasonable opportunity to shoo away, if you will?

WITNESS SKOV: He had a reasonable opportunity to keep away all of the individuals because he was not doing any surveys. He was not performing any other activity while those individuals had entered the restricted area. So he had every opportunity to prevent those individuals from entering that area.

JUDGE COTTER: Of the six, how does it break down?

Who were they?

WITNESS SKOV: Two of the individuals were Finley Testing Laboratory employees who were working as helpers to Mr. Murray and the other four individuals were unidentified. They were construction workers.

JUDGE COTTER: Were they people who simply were passing through on their way to do something else?

WITNESS SKOV: Some of the individuals were simply passing through or walking up to the area and looking into the trench or, in the case of two forklift operators, they were actually performing a work activity in that area.

WITNESS JOUKOFF: Your Honor, if it pleases the Court, the citation on the six were only -- we only cited that the source was out at these particular times, not that these people walked through the restricted area boundary with the source in the retracted mode into the camera. And in these instances, the source was out and, in fact, Mr. Skov and I observed Mr. Murray looking directly at the forklift operators and waiting for them to finish loading palates.

And then when this went on for a period of ten to 15 seconds or 20 seconds, they weren't doing it fast and pulling back out of the restricted area, he actually reached down and cranked the source out knowing that they're there loading palates in the restricted area.

So the citation on the six is all for people that were in there with the source out. We're not citing for an area where people just walked through with the source in the camera.

JUDGE COTTER: How long were the two forklift operators actually within the boundary?

WITNESS JOUKOFF: I would estimate that they were there for approximately a minute total, a minute to a minute-and-a-half.

JUDGE COTTER: Each or total?

WITNESS JOUKOFF: There were two of them together. The two individuals were together. It was one instance with two individuals together on a forklift.

JUDGE COTTER: How about the one other worker?

WITNESS JOUKOFF: There was one worker who walked by the open trench on the north side on the dirt road area, and he just walked by with the source exposed. He was walking at a normal pace. I don't know how to quantify what that would be in seconds, but he wasn't running and he was not shuffling. He was walking at a normal pace.

One welding inspector came and stood at the edge of the trench for a period of approximately a minute, looking down into the trench while the source was out. And the two Finley employees were inside the restricted area both with the source exposed and the source unexposed during

the entire time that we had him under surveillance.

JUDGE COTTER: Do either of you -- in your two or three dozen observations, Mr. Skov, have you ever run across comparable situations or activities like that under examination here?

WITNESS SKOV: I have observed radiographic activities where radiographers were not performing various -- were not complying with the various requirements, such as locking cameras after each radiographic exposure or not performing a radiation survey, or they would do it improperly, would perform a survey improperly.

I believe this is the first instance that I can recall where a radiographer has failed to comply with many different requirements, 10 CFR 34 or license requirements.

JUDGE COTTER: Have any of those other radiographers who you've observed failing to meet regulatory requirements, have any of them ever been suspended?

WITNESS SKOV: No, sir.

WITNESS JOUKOFF: I might have an addition on that same line, Your Honor.

JUDGE COTTER: Please.

WITNESS JOUKOFF: Thank you. The other surveillance that I did in Hawaii led to a radiographer of another radiographic company here being removed from the NRC license.

JUDGE COTTER: Let me go to one other area that you addressed on direct. Again, on the November 2 order, at the bottom of Page 3 and the top of Page 4, I believe your testimony with respect to Mr. Murray's demonstrating to NRC personnel the survey procedures he stated that he had used. That demonstration was not, if I understand correctly, done in support of an affirmative statement. It was simply your observation of how he handled the equipment when you were conducting your own surveys, is that correct?

WITNESS JOUKOFF: That is correct, Your Honor. Mr. Murray was first questioned and he responded verbally to what his procedures were.

JUDGE COTTER: I understand that, but the handling of the equipment and the following of procedures during that period was not in itself done to deceive him, is that correct?

WITNESS JOUKOFF: Absolutely not. He was just asked to put the source out so we could make some radiation measurements.

JUDGE COTTER: On that same subject of false information, if I understand correctly, neither of you took notes at the time that you interviewed Mr. Murray on October 25 when you came down from taking the video, is that correct?

WITNESS JOUKOFF: Yes, Your Honor. I took notes.

I have handwritten notes on what he told me at that time. Mr. Skov did the questioning. I wrote it down.

JUDGE COTTER: Would you tell me do you have those notes available?

WITNESS JOUKOFF: I have them right here, Your Honor.

JUDGE COTTER: Would you look at them and tell me what you recorded that you thought was specifically deceitful?

[Pause.]

WITNESS JOUKOFF: Bear with me a minute. I have to find it amongst all my field notes.

[Pause.]

WITNESS JOUKOFF: Your Honor, I have before me two different documents. One is a series of handwritten field notes that I made on October 25, 1990 when Mr. Skov --

JUDGE COTTER: That's the only one I'm interested in.

WITNESS JOUKOFF: That one is very hard to read in scribble.

JUDGE COTTER: I'm not interesting in reading it. I'm interested in you telling me what it says.

WITNESS JOUKOFF: What it says is, at the top, it says 10/25/90 and then it says "did stop us from entering radiation area upon approach. Tom Murray showed us yellow

survey meter, working for FGE, Fewell Geotechnical Engineering, driving Finley's truck today."

JUDGE COTTER: I don't want to know all that stuff. All I want to know is what in there specifically refers to something that would support this grounds for the statement in the order that Mr. Murray gave NRC false information concerning his actions.

WITNESS JOUKOFF: Mr. Murray was questioned by Mr. Skov regarding the entry of unauthorized individuals into the restricted area, those being non-radiographer or assistant radiographer personnel. And Mr. Murray responded that that had never happened at any time. Mr. Murray was questioned by Mr. Skov regarding his conducting of surveys, of the survey camera between RT exposures, and Mr. Murray stated that he did perform such surveys between exposures.

Mr. Murray was asked by Mr. --

JUDGE COTTER: It's clear from your recollection that Mr. Murray wasn't talking generally, he was talking about specifically what had taken place within the last 45 minutes.

WITNESS JOUKOFF: Yes. We were asking him specifically about that day. Do you want me to continue, Your Honor? Murray was asked by Skov to describe how Murray conducts surveys, and Mr. Murray stated that the end of each radiographic exposure, he would crank in the RT source, take

a survey meter and look at the meter as he walked up to the RT camera. Murray stated that on this date, on October 25, 1990, he was obtaining survey results of three MR per hour near the camera with the RT source retracted into the camera.

JUDGE COTTER: Did you take that to be untrue?

WITNESS JOUKOFF: I had just watched him not conduct any surveys of the camera at all.

JUDGE COTTER: I mean that last part. You said something about him getting a three MR reading.

WITNESS JOUKOFF: I found it hard to believe he was getting a three MR reading when I just watched him through the video camera not taking any surveys. But at that point in time, you see, we were in transit for a period of time coming down from the bluff. So it was possible that while Special Agent Lynn Meara was running the camera that he might have made a survey.

So I didn't know until that night when I watched the video that no surveys had been made on that date.

JUDGE COTTER: How much time is missing from --in the total elapsed time from the time that you started taking the video until you shut the camera off, how much time is missing where -- the camera, I think, was shut off periodically or was not pointing at Mr. Murray at all.

WITNESS JOUKOFF: There was only one time that the

camera was shut off, and that was during the setup procedure, but before the first shot was cranked out, because it was getting tedious running the film with basically nothing going on.

When the first exposure was made, the camera was back on and the camera stayed on continuously until such time that Mr. Skov and I are observed walking on on the video. It was never turned off.

JUDGE COTTER: Okay. Is there anything else in your notes? I want you to be looking at your notes now, not at that report.

WITNESS JOUKOFF: Yes. In my notes it says that Mr. Murray confirmed for Mr. Skov that he did lock the camera after every radiographic exposure. And Mr. Skov asked Mr. Murray to show him how the radiographic camera is to be locked and Mr. Murray demonstrated for Mr. Skov the locking procedure on how to lock the radiographic camera.

JUDGE COTTER: You don't consider that to be a falsehood, do you?

WITNESS JOUKOFF: No. It's just an add-on to what I just said about locking the camera. It was demonstrated in the field on that day.

JUDGE COTTER: Okay.

WITNESS JOUKOFF: I believe that's it, Your Honor.

JUDGE COTTER: Thank you.

JUDGE LAM: I have questions for Mr. Skov. The Fewell license allows up to 100 curies for the source. During the job situation on October 25 and the subsequent occasion, how much activity was in that source?

WITNESS SKOV: The amount of activity, Your Honor, in the source would have been approximately 54 curies of iridium-192.

JUDGE LAM: With that amount of activity, what, in your expert opinion, would be the maximum credible dose to the radiographer and to the general public if there were an accident, by which I mean if the source was not fully retracted and the radiographers Victoreen 400 model failed to alarm, if he were to approach the source, exposed source that is, how much dose would he receive?

WITNESS SKOV: That's a difficult question to answer because it would depend upon the actions that would be taken by Murray in handling the camera and/or the source directly, unknowingly or not knowing that the source was still exposed.

JUDGE COTTER: Worst case scenario.

WITNESS SKOV: It's possible that he could -- a radiographer could have received on the order of tens of thousands of rads and received very serious skin burns to his hand if he had manipulated the source or let's say the guide tube, not knowing that the source was still positioned

in the guide tube.

JUDGE LAM: If you're talking about tens of thousands of rads, would that be life-threatening to the radiographer?

WITNESS SKOV: There would also be associated with that a whole body exposure of -- it's hard to say. It depends on how long the individual would be in the area, working in the area exposed to the source. If he were in the area, let's say, for two or three minutes, he could have received certainly tens of rads of whole body exposure.

JUDGE LAM: The aim of my question is really to try to assess what is a threat to the radiographer and to the public.

WITNESS SKOV: There is a very significant threat to the health of the radiation worker in such cases, and these have been documented in publications. One such publication would be NUREG-BR0024, titled "Working Safely in Gamma Radiography;" a training manual for industrial radiographers which is published by the NRC. It is also enumerated in another NRC publication, NUREG-BR0001 Volume 1. That is titled "Case Histories of Radiography Events," also published by the NRC.

Some very, very serious radiation exposures have resulted due to radiography events. Even though the population of radiographers constitutes only a small

proportion of radiation workers working with licensed material, they have accounted for over half of the overexposures that have occurred.

So there is a very significant threat to the health and safety of radiation workers, radiographers.

JUDGE LAM: Mr. Skov, based on your observation on these two occasions, would you categorize Mr. Murray's "deficiency" in his conduct to be more of a threat to himself than the general public?

WITNESS SKOV: Yes, Your Honor. I would classify it as more of a threat to -- from what I observed actually taking place on both October 23 and October 25, I would consider that the danger of radiation exposure to Mr. Murray himself to be by far the worst case, even though there were other individuals that had entered the restricted area and potentially could have received in excess of regulatory required exposures. Most definitely the greatest danger was to Mr. Murray himself.

JUDGE LAM: Then this leads to my final question. What does the NRC regulation -- the NRC regulation protects both the public and the radiographer. What is the emphasis of the agency's regulation in terms of protecting the radiographer or protecting the public?

WITNESS SKOV: The emphasis is in protecting both, Your Honor.

JUDGE LAM: Thank you.

JUDGE COTTER: We have nothing further. Is there anything further of these witnesses?

MR. BACHMANN: Your Honor, I have just one brief question to clarify the record and then I will have nothing further with these witnesses.

REDIRECT EXAMINATION

BY MR. BACHMANN:

Q Mr. Skov or Mr. Joukoff, earlier you were asked by Mr. Murray about his wearing of the survey meter with the alarm on his belt. Do you recall that question?

A [Witness Skov.] Yes, I do.

Q The discussion centered around October 23, did it not?

A [Witness Skov.] That's correct.

Q Did he use that meter on the 25th?

A [Witness Skov.] That meter was not used on the 25th. Mr. Murray had discovered, according to Mr. Murray, that the device was malfunctioning and was, therefore, not used.

Q So he had no alarm meter on his person on the 25th, is that correct?

A [Witness Skov.] Well, on the 25th, he had an alarm -- he had another alarming device which was a pocket dosimeter.

Q But it was not in any way a survey meter, was it?

A [Witness Skov.] No, it was not.

JUDGE COTTER: I'm sorry. It was not in any way what?

MR. BACHMANN: A survey meter on the 25th. If there are no further questions, I would ask that the Board excuse the witnesses.

JUDGE COTTER: You don't need to ask. We'll decide when we want to do that. Mr. Murray, do you have anything further?

MR. MURRAY: No, sir.

JUDGE COTTER: While we have these witnesses here, it might be advisable --

MR. MURRAY: Excuse me.

JUDGE COTTER: You came up with a question?

MR. MURRAY: Yes.

RECROSS EXAMINATION

BY MR. MURRAY:

Q I just want to verify that this was the alarming dosimeter that I was wearing on both those days. I know you came down on the 25th and you checked it and took the serial number, but do you recall this being worn also on the 23rd?

A [Witness Skov.] I cannot state categorically that that is what -- that particular dosimeter that you're referring to there was worn on the 23rd.

Q This is the audible rate meter, sir. I know we discussed this. The rate meter, you know about the audible rate meter, the new requirements and what this is supposed to --

A [Witness Skov.] Yes, I do.

Q And the intensity that this is supposed to alarm at.

A [Witness Skov.] Are you asking me what radiation level it's supposed to alarm at?

Q Yes.

A [Witness Skov.] The regulation states 500 MR per hour.

Q Then this device here can be tested so you know that it's working, it's operable. You're aware of that.

A [Witness Skov.] That's correct.

MR. MURRAY: That's all I wanted to ask. Thank you, sir.

JUDGE COTTER: Anything further?

[No response.]

JUDGE COTTER: All right. There were a number of documents that you made available, Mr. Bachmann. If you are not going to offer them, it seems to me that while we have these two witnesses here, it might be advisable to make them Board exhibits.

MR. BACHMANN: Do you require additional copies at

this time? I've got extra copies of the inspection reports.

JUDGE COTTER: I was thinking of the following documents; the October 25 letter, to which there have been some questions. Do you have any extra copies of that? Why don't we go off the record here for a minute.

[Discussion off the record.]

JUDGE COTTER: On the record. While we were off the record, the following documents were marked as Board's Exhibits 1 through 9.

[Board Exhibit Nos. 1 through 9, inclusive, were marked for identification.]

JUDGE COTTER: Exhibit 1 is the October 25, 1990 letter from R.H. Scarano, Director, Division of Radiation Safety and Safeguards to Fewell Geotechnical Engineering, Limited. It attaches an inspection on October 4, 1990 report consisting of six pages.

Board Exhibit No. 2 is a copy of the transcript of a November 1, 1990 interview of Mr. Murray by Mr. Joukoff and Mr. Skov. Exhibit No. 3 is 17 photographs of events taking place on October 23, 1990, while Mr. Murray was performing his radiographic duties.

Exhibit No. 4 is a November 16, 1990 letter to Mr. Fewell from Ross A. Scarano, Director, Division of Radiation Safety and Safeguards, subject NRC inspection report Nos.

030-30870/90-01 and 02. It's a two-page letter with a 13-page report of an inspection at Campbell Industrial Park and Fewell Geotechnical Engineering, a special inspection on October 23 and 25-26 and November 1 and 2 and 8, 1990.

Exhibit No. 5 is a transcript of an enforcement meeting between Alan D. Johnson, Thomas E. Murray and Philip J. Manly, totalling 63 pages, including the notary public certification. Exhibit No. 6 is a six-page document titled "Results of Field Work," Fewell Geotechnical Engineering, Limited. I'm sorry. It's a three-page document so titled, signed Philip J. Joukoff. It is the results of field work on October 23, 1990.

Exhibit No. 7 is a similar document for results of field work on October 25, 1990, totalling three pages and signed by Mr. Joukoff. Exhibit No. 8 is a December 17, 1990 letter from Fewell Geotechnical Engineering, Limited to the Regional Administrator for Region V, totalling seven pages, including attachments.

Exhibit No. 9 is a February 7, 1991 letter to Fewell Geotechnical Engineering, Limited, titled "Subject of Violation and Proposed Imposition of Civil Penalties-$20,000," NRC inspection report Nos. 90-01 and 90-02. That is a four-page letter with a seven-page attachment titled "Notice of Violation and Proposed Imposition of Civil Penalty."

Is there anything further of these two witnesses?

MR. BACHMANN: No, Your Honor.

JUDGE COTTER: Thank you very much, gentlemen. You are excused.

[Witnesses excused.]

JUDGE COTTER: Mr. Bachmann?

MR. BACHMANN: Yes, Your Honor. At this time, the staff would proceed on to the third and final part of its direct case. As I mentioned earlier, the first two parts were concerned with the facts, the significance of the facts, and the third part will be the appropriateness of the sanction. I now call as a witness Mr. James Lieberman. Whereupon,

JAMES LIEBERMAN,

a witness, was called for examination by counsel on behalf of the Nuclear Regulatory Commission, and, having been first duly sworn, was examined and testified as follows:

JUDGE COTTER: Please be seated.

MR. BACHMANN: I have here a document consisting of two pages. The title of it is James Lieberman. It is Mr. Lieberman's resume. At this time, it is not my intention to offer it into evidence. I would, however, like it to be marked as Staff Exhibit 6 for identification.

[Staff Exhibit No. 6 was marked for identification.]

JUDGE COTTER: I'm not sure that I completed the loop on the Board's exhibits. I should say that they shall be received in evidence.

[Board Exhibit Nos. 1 through 9, inclusive, were received into evidence.]

DIRECT EXAMINATION

BY MR. BACHMANN:

Q Mr. Lieberman, would you state for the record your name and your position at the Nuclear Regulatory Commission?

A My name is James Lieberman. I'm Director of the NRC Office of Enforcement.

Q Mr. Lieberman, in your position as Director of the Office of Enforcement, can you tell the Board generally, but briefly, what your duties entail?

A As a Director of Enforcement, I'm responsible for managing and implementing the Commission's enforcement program and primarily managing and implementing the escalated enforcement activities of the Commission. That's the civil penalties and orders that the Commission issues.

Q Mr. Lieberman, would it be correct to say that the sanction imposed in the Fewell case; that is, the suspension of Mr. Murray from the Fewell license for three years; was essentially your decision?

A That is correct. Well, Mr. Thompson, the Deputy

Executive Director for Nuclear Materials Safety, Safeguards and Operations Support, issued the order. It was my responsibility to develop the order in coordination with Region V, the Office of Nuclear Materials Safety and Safeguards, and the Office of General Counsel, to put this recommendation together, and I provided it to Mr. Thompson. He adopted it on my recommendation.

Q Mr. Lieberman, would you explain to the Board how you formed your recommendation to Mr. Thompson; that is, the three-year suspension of Mr. Murray?

A Let me first start by referring to Section 3 of the order. Section 3 of the order describes our views that the violations and the actions committed by Mr. Murray were willful. By willful, let me explain. Mr. Murray was clearly an experienced radiographer. He had been trained in order to become a radiographer. Under a license of the Commission, you have to be trained and tested, and he did that.

He has a full understanding of how to perform radiography. October 4, during inspection, he explained to the NRC inspectors how to perform radiography and what the procedures are in performing radiography, and he did that properly. Again, on October 25, following the observations by Mr. Skov and Mr. Joukoff, he again explained how to do radiography and demonstrated how to do radiography and

explained what he did on that particular day, and the explanation he provided was a proper explanation on how to do radiography.

Again, on November 1, when he was interviewed under oath by Mr. Joukoff and Mr. Skov, he again explained in detail on how to do radiography. Cleary, he understands how to do radiography. However, repeatedly on October 23 and October 25, he failed to perform a number of requirements in the performance of radiography, especially in the surveying of the guide tube and the camera, which is, in my point of view, the most significant violation of the ones we've discussed today, because the only way to assure that you know where the source is is by doing a survey.

The Commission recently, in promulgating new regulations for radiography that took effect January 10, 1991, indicated that in radiography, where only four percent of the radiation workers are radiographers, that they account for 18 percent of the exposures in both NRC jurisdiction and agreement states.

In fact, they indicated that in the time period between 19 -- I guess the decade ending in 1984, that more than one-half of the overexposures greater than five rems to the whole body or 75 rems to the extremities, and almost 60 percent of the overexposures greater than 25 rems to the whole body and 375 rems to the extremities are accounted for

from radiography.

In fact, they point out that more than 25 percent of all overexposures within NRC jurisdiction is accounted for through radiography. What I'm reading from is a statement of consideration for the rule, it changes the Part 34 that appeared in the Federal Register on January 10, 1990.

This Federal Register Notice also described a number of incidents involving radiography, and the Commission noted that all of these conditions, these are conditions of all the overexposures, could be recognized by performing a radiation survey after each radiographic exposure, to verify that the source is properly returned to its shielded position.

In my way of thinking, when you're performing radiography and you fail to do a survey of the guide tube and camera, I equate, and this may be over-simplification, but I equate to driving down a highway, a superhighway, going in the wrong direction on a moonless night going 60 miles an hour, you're flying blind. You can't smell it, you can't hear it, you can't feel it.

The only way to know for sure that you know where the source is is by doing a survey. In the past year, we had a situation where a radiographer failed to do a survey, didn't appreciate that the source was disconnected in the

guide tube. He carried the guide tube around his neck and as he was carrying it, the source fell out of the guide tube.

That person received approximately 6,000 rems to the back of his neck. That could have been prevented by doing an appropriate survey. And there are countless other cases where radiographers have been overexposed because they failed to make a survey.

So we consider this very significant. So going back to this order, the man understands what the requirements are, he repeatedly violated them. When you look at the tape, his actions were deliberate and careful. There doesn't appear to be any hurrying. He knew what he was doing and he didn't do it right.

We can only conclude that these weren't inadvertent actions, but these were willful actions. In addition, when he explained what he did on that day to Mr. Joukoff and Mr. Skov, he didn't describe what he actually do. He provided erroneous information. We can only conclude that he provided false information. He did that again on November 1 when he was under oath.

This leads, to us, to be a simple question of lack of integrity. Integrity is very important for radiography. Our inspection program is an audit type program. We inspect radiographers approximately once a year, absent allegations.

When we do inspect radiographers, it is often difficult to do an inspection of the actual radiography. Much of our inspections are records which really don't reflect how radiographers actually do the job.

We've tried recently to do more unobserved radiography because most radiographers are trained and knowledgeable and they know NRC is present, they're going to do it right. What we need to find out is how radiographers do it when they're not being observed. In this case, we observed Mr. Murray when he didn't appreciate he was being observed, and clearly he didn't follow the requirements.

Since we only do an audit type inspection program, we're depending on the training, on management oversight and integrity. Of those three factors, integrity is most important because most radiographers or all radiographers are well-trained. Management oversight is certainly important, as Mr. Skov pointed out this morning or earlier this afternoon, but management can't be there all the time. If the radiographer knows management is present, the radiographer tends to do it properly.

The question is how does the radiographer do the job when he's not present. In this case, he demonstrated that he doesn't do it properly and he lied about it. He gave us erroneous information. That caused us to lose our confidence in Mr. Murray doing radiography properly when

he's not being supervised.

That loss of confidence we call reasonable assurance that activities would properly be conducted. So in this case, we lost our reasonable assurance that Mr. Murray would properly do his job when he wasn't being supervised. As a result of that conclusion, the staff, in our view, had no other choice but to remove Mr. Murray from licensed activities.

The order that we issued has three basic parts to it. First, it provides for removal of Mr. Murray from licensed activities. Second, it provides that the Regional Administrator may relax that order for good cause shown. Third, it provides that the order expires in three years.

We picked three years because we wanted to have a clear sanction so that if Mr. Murray resumed operation as a radiographer, he will have a long enough period to clearly emphasize to him the importance of doing it right. So we'd appreciate that if he did resume radiography after three years and if he again violated Commission requirements, he would recognize that the sanction would be much longer.

Second, it would give clear notice to other licensees of the importance of doing radiography properly and being candid with the Commission. The third factor in the selection of the three-year period was that -- let me step back.

Prior to the last year or so, we did not provide a period of years when we suspended a person from licensed activities. It was basically open-ended and the order provided the ability to relax it by the Regional Administrator for good cause shown.

As a result of working on the wrongdoer rulemaking, which is a rulemaking to give the Commission the authority to implement, statutory authority to issue orders to non-licensees, it was thought appropriate to provide a term of years so that people wouldn't perceive these orders as lasting for life, because few things last forever. So say the last six months or so when we've been issuing orders, we've been putting, in many cases, a term of years.

In this case, when we considered the term of years to be applied, we recognized that Mr. Murray, as an employee of the Finley Testing Laboratories, and in that case we had revoked the license, Mr. Finley and the corporation requested a hearing. That case was settled with a three-year prohibition in that he wouldn't apply for a license for three years or be involved in licensed activities for three years.

We thought that if the employer had a three-year prohibition, it would be appropriate that Mr. Murray would not have a longer period than three years, and any time period less than three years we did not deem an appropriate

sanction given the significance of these violations.

To my knowledge, I've been involved in almost every enforcement action that the Commission has taken, escalated enforcement action the Commission has taken since 1977. We have never had a situation where a radiographer has repeatedly failed to do surveys as was demonstrated in this case. So we thought an extremely strong sanction was appropriate to get the message out. We think that nothing less would be appropriate by the public health and safety.

MR. BACHMANN: Your Honor, I believe Mr. Lieberman has covered all of the items that he wished to cover. At this point, I would have him available for cross examination.

JUDGE COTTER: Mr. Murray, do you have any questions for Mr. Lieberman?

CROSS EXAMINATION

BY MR. MURRAY:

Q Mr. Lieberman, along with myself, how many other radiographers have been given this punishment?

A In the past year, we've removed five radiographers from licensed activities.

Q For three years.

A In one case, it was one year. In the other three cases, it was an indefinite time period.

Q Indefinite time period. Okay. How long has the

NRC done unannounced auditing on radiographers?

A Not for that long. We decided that we needed to emphasize doing unannounced in inspections for the reasons I said earlier, because the only way to really determine how radiographers are doing the job is to be able to observe them when they don't recognize they're being observed.

Q How would I, you or the public benefit by suspending me for three years from radiography?

A I think the public would be -- when I use the term public, I include the worker as part of the public. Radiography is where real people get overexposed. The job of the Commission is to prevent overexposures to members of the public, including radiation workers. Giving this sanction, which we intend to distribute as part of the NMSS newsletter and letters to radiographers to emphasize the importance of doing radiography properly, that if people appreciate that they may lose their ability to perform their livelihood, that maybe that will give greater emphasis to doing the job right and doing the surveys to avoid unnecessary overexposures.

Q So suspending me for three years is -- you say I'm supposed to get a message from this, being taken away from the field for three years, I'm going to learn something from this as opposed to what I'm going through right now, I haven't learned anything. Is that what you're saying?

A No. I'm not saying you haven't learned anything to date, but I think after three years the message would be reenforced that much more.

Q So during three years, what am I supposed to do for three years that's going to improve my integrity or my performance of radiography, which is the only thing that I do know? There is no alternative. There is just this three-year suspension. There is no way that someone could come in and -- with the NRC, prove to them or try to -- what's the word I'm looking for -- try to get back into the good graces of the NRC. There is no other way.

A In our view, not without a significant time period. The order provides that the order may be relaxed for good cause shown and there may well be a proposal that could be made that might be less than three years, as we stated to Mr. Fewell in response to his request that we would consider additional proposals.

But we thought any proposal required a significant sanction because we feel we need to get the message out. In your own case, we believe you clearly knew what you had to do, you knew why you had to do it, you chose not to do it. I'm sure you believe and you're going to tell us that you intend to do it right now.

In almost every case when we've had an overexposure, the person has told us this is the first time

I've ever had a failure to survey. We've had no way to disprove that. In your case, we see the situation where on a number of occasions you failed to do a survey. I would like to believe you and I'm sure you're very sincere.

But as I said earlier, radiography is where people get overexposed and they only get overexposed for one reason, not doing a survey. So we believe it's appropriate that a substantial time period will provide the emphasis to you that should you resume radiography, and you might not, but if you do, you will certainly appreciate how important it is to do it right, and hopefully other licensees and radiographers will obtain the same message from this action.

Q Now, opposed to this order, if I was to offer, my employer was to offer -- and I'll give you a hypothetical situation. Let's say I was to continue to do radiography from this day forward. If I was to notify the Region Director or the NRC of this region every day by phone or by fax where I was to be on each and every day and answer to them each and every day, don't you believe that that's better than taking me out of the field?

What I'm trying to get at is wouldn't it be better to take me, and I do know -- you're right, I do know what I'm doing and I know a lot about the NRC and I've done radiography for ten years, not in the field, but in the military. But I don't see the advantage of taking somewhat

out for three years as opposed to trying to help this person to better himself and to acquire the responsibility, and understand that I am responsible to you, that you don't have the people to look over me.

Now, wouldn't it be better if I could do that, that you could come out and audit me at any time and that I would let you know where I am each and every day?

A From a safety point of view, one could say the cleanest way to protect the public health and safety is not to have you perform radiography, because clearly then you're not creating a potential hazard to either yourself or to others. As to your proposal about giving us notice, frankly, we don't have the resources to inspect you every day.

However, that proposal, together with some sanction, together with greater management oversight could well be a framework to relax this order. But that is a decision that the Regional Administrator has to make initially and then in consultation with the Program Office, NMSS, and my office, and my supervisor, Mr. Thompson, will consider whether that's appropriate.

We haven't yet received the proposal that's adequate. The previous proposal, we concluded, was not adequate.

Q I get the impression that when you say it's better

for the public that I'm not doing it all and yet the order kind of falls in between. Either I'm not trust -- and in your eyes, I shouldn't be doing this at all, or I should be taken and put in a probationary situation where I can be either trained or made into a better radiographer, a more responsible radiographer.

The order, to me, is in between. It doesn't -- do you see what I'm saying? It falls short of that. You're saying I'm unsafe, but in three years I can go back to it. In three years, I'll forget everything I learned up to this point.

A I presume before you resume operation in three years, you'd be retested to assure that you are still competent and knowledgeable of requirements.

Q I think the important thing here is that I understand what my responsibility is to the NRC and to the public safety. That's what I see. And I don't see how a three-year --

JUDGE COTTER: Mr. Murray, don't testify now. You'll get a chance later.

MR. MURRAY: Thanks, again.

BY MR. MURRAY:

Q There was one more question. The order itself. I think I asked Mr. Bachmann over the phone during the conference, does this pertain to just Dick Fewell -- if I'm

to go somewhere else, what is the situation going to be if I apply to another license, what is going to be the response of the NRC when I apply to someone else's license.

A The order itself is directed at only to the Fewell license 030-30870. The Commission this time has not implemented statutory authority to be able to issue orders to the individual. So you are not under any prohibition from being involved in any other licensee's activities and you're not obligated to tell us if you are involved in any other licensed activities, except for those radiography licenses that require named radiographers on the license.

For those other licenses, should we determine that you are involved in licensed activities, we'd have to make a decision at that time, considering the length of time that has passed, the oversight provided, the quality of the company, and whatever other changed circumstances might be, and decide whether we need to take some action.

If we did, then we would have to issue another order at that time.

Q So I see there's only really two I can work on this island. If I was to go to, let's say, Walashek, they name their radiographers, and it's going to come to the Regional Director, the office at Walnut Creek. Again, what is going to be your position and am I going to be able to do radiography for them?

A We haven't considered that question, but I would presume that if it's in the near term, the answer would probably be no.

JUDGE COTTER: I'm sorry. The answer would probably be what?

THE WITNESS: It would probably be no if it's in the near term.

MR. MURRAY: That's all, Mr. Lieberman. Thank you.

JUDGE FOSTER: Mr. Lieberman, your order goes directly to a determination of loss of assurance in Mr. Murray's performance. It doesn't provide any information on what level of severity you considered his actions to be, as normally included in Appendix C. I wonder if you could elaborate on the thoughts and evaluations that went into the classification of degree of severity of Mr. Murray's actions here.

THE WITNESS: If I could see the proposed civil penalty.

[Witness reviewing document.]

THE WITNESS: When we issue an order, we don't normally provide severity levels for the violations. This order was issued because of a safety reason, because we didn't have confidence that the Fewell Corporation would comply with requirements with Mr. Murray present.

In the proposed civil penalty that we issued February 7, we go over the individual violations which are chargeable to the corporation because they're responsible for the activities of their employees. And as to the false information provided to Mr. Joukoff and Mr. Skov on October 25 and November 1, we provided that as a Severity Level 2. We considered making that Severity Level 1, but recognizing that Mr. Murray is not a supervisor or manager, we concluded that Severity Level 2 would be the more appropriate sanction.

In the case of the surveys and the other matters, we also combined those into a composite Severity Level 2 for the same reason.

JUDGE FOSTER: So you did go through a consideration of the Appendix C levels in considering what kind of sanctions should be directed against Mr. Murray, is that correct?

THE WITNESS: No. Against Fewell we did that. We did not consider the severity levels at the time we issued the order to Mr. Murray, because the order, again, was based on lack of reasonable assurance. And whenever we have a situation where we don't have reasonable assurance that licensed activities will be properly conducted in accordance with Commission requirements, our response is issuing an order.

If it's a management problem, under those circumstances, we suspend the license. If it's an individual problem, as in this case, we view this as an individual problem, we would issue an order to remove the individual.

JUDGE FOSTER: But I'm sure this wasn't an arbitrary decision on your part relative to a finding of lack of assurance. You must have gone through some sort of a process to come up with that conclusion. Is that entirely a mental consideration as contrasted with reference to the Appendix C sanctions?

THE WITNESS: Well, it was certainly a very serious decision that we gave careful thought. We certainly don't take a matter like this very lightly. Under the enforcement policy, willfulness is a basis for issuing an order. There's a section in the enforcement policy on when we issue orders. There's a section about issuing orders to licensees involving individuals.

If I could refer to the enforcement policy?

[Witness reviewing document.]

JUDGE COTTER: Page 167.

THE WITNESS: I'm looking at Section E there. It talks about willful violations, serious violations and compares inadvertant situations with willful violations. Clearly, we think this is a willful violation. It refers to

issues of integrity. It says, "In addition, NRC may take enforcement action where the conduct of an individual places in question the NRC's reasonable assurance that licensed activities will be properly conducted." The section on when we issue orders, that's Section C.

One provision when we issue orders is to remove a threat to the public health and safety, and that's what we viewed of Mr. Murray's actions, once we lost confidence that he would be doing surveys routinely. We clearly think that under Section 186, we would not have issued a license to this corporation if we knew its employees or an employee of the licensee would willfully violate Commission requirements and provide us erroneous information.

If we have the authority to revoke a license, we think we have the authority to do less, and that is to modify a license to remove the individual; no different than if we were to remove a -- require a licensee to remove a piece of equipment which we thought would not give us reasonable assurance, because licensees, in the end analysis, work through people.

And the people, the person, the human factor, in the end analysis, was important to make sure licensees complied with Commission requirements. Unfortunately, Mr. Murray did not demonstrate that he was prepared to do this.

JUDGE FOSTER: If I look at Part 2, Appendix C,

under Supplement 4, this is in the 1990 version on Page 175, under Severity Level 3, a number of items. One of those items is No. 12. It says breakdown in the radiation safety program involving a number of violations that are related or, if isolated, that are reoccurring, that collectively represent a potential significant lack of attention or carelessness toward the license responsibilities.

Do you think that characterizes Mr. Murray's actions in this case?

THE WITNESS: Certainly it does, but when I read the enforcement policy, I read from the top down. What I mean by that is I consider the higher severity levels and then I reach down to the lower severity levels. That example is primarily used when we have a bunch of Severity Level 4 and 5 violations that individually may not be that significant, but together they become more significant.

If you take a look, for example, C-4, substantial potential for a overexposure, whether or not such exposure or release occurs. They talk about in the vicinity of exposed radiographic sources without having performed an adequate survey. When it says an exposed radiographic source, you never really know until it happens.

And we don't think that you need to have an overexposure before you have a significant problem. In the recent additions to the enforcement policy that was

published on January 10, 1990, the Commission clarified the enforcement policy and modified it in the area of surveys.

The Commission said -- the Commission is modifying its general statement of policy and procedure to reflect the Commission's amendment of 10 CFR Part 34. The modification of the enforcement policy is being made at this time to Supplement 6, fuel cycle and materials operations, to put licensees on notice that the failure to implement the requirements for dosimetry and equipment by the acquire date, and the equipment has to do with survey instruments, may be considered a violation of significant regulatory concern.

The example for Severity Level 3 is significant because it represents failures associated with the use of equipment and dosimetry designed to minimize overexposures from radioactive materials. When you look at Section, I believe, 3, on Page 162 of the CFR referring to severity of violations, there's a description of how to deal with violations involving a willfulness.

You consider the position of the individual. You consider the potential hazards, the significant violations. And since these violations, we conclude, are willful, the severity level would be greater than just if there was one case of a failure to survey. If it was a case of just a failure to do a survey, that would be a civil penalty

situation.

If there was a failure to do a survey and the radiographer admitted that he failed to do that survey, again, that would probably be a civil penalty case. But in this case, we don't have that. In this case, we have repeated failures to do a survey on different days, and then we have the statements that ask particularly how did you do the job, and false information was provided.

Mr. Murray was deceitful to us and we have to depend on licensees doing the job properly. Just a month or so ago, we had a case of a licensee, I believe the name is Westress, where the radiographer failed to wear a film badge and he called us up to tell us that he was in a situation where he had a source disconnect and, as I say, he told us he wasn't wearing a film badge.

We inquired why he wasn't wearing a film badge and he said I don't know, I just don't understand why I wasn't wearing the film badge. We did an investigation of this case and finally, after the investigation, he stated to the investigator when he was under oath that he took the film badge off only for one reason, to avoid an overexposure.

In that case, we removed the radiographer only for one year. The difference between that case and here is that he admitted to us that he didn't wear a film badge. The only thing he didn't tell us was the reason. The reason, to

some degree, was pretty obvious. The significant information he gave us.

So essentially while he wasn't completely candid, he told us the important stuff. So one year we thought was an appropriate sanction. But we have to have integrity in licensees' employees. Because we have this audit type program, we're depending on licensees to do the job right. When we're not there, that's the -- it's only the integrity and training of the employees that we can depend upon.

Mr. Murray has the training, but, unfortunately, we concluded he doesn't have the integrity based on his own actions.

JUDGE FOSTER: That's all I have.

JUDGE LAM: Mr. Lieberman, I understand there was an enforcement meeting between the Region V Regional Administrator, Mr. Scarano, and Mr. Murray on December 5. There's a copy of the transcript the Board has. In that meeting, I understand Mr. Murray proposed a relaxation of the order, together with a letter from Fewell Engineering, proposing putting Mr. Murray under supervision.

I gather that that proposal was not accepted. Would you clarify on what basis that proposal wasn't accepted?

THE WITNESS: Yes, I will. In fact, that meeting was performed at my request. We responded to the Fewell

Corporation in a letter -- do you have that, Mr. Bachmann?

MR. BACHMANN: This is --

THE WITNESS: Mr. Scarano's letter, I believe.

MR. BACHMANN: It's a Board exhibit.

THE WITNESS: But in any event, the proposal of the Fewell Corporation was to increase the supervision of Mr. Murray beginning almost constant supervision and then, over time, a more relaxed supervision, did not provide for a continuation of the suspension.

[Telephone interruption.]

JUDGE COTTER: We'll go off the record for a moment.

[Discussion off the record.]

THE WITNESS: Our concern was that while additional supervision may clearly be appropriate, the question is when they don't have the supervision, how will Mr. Murray perform. Again, this question of Mr. Murray not knowing how to do it, he clearly knows how to do it. The question is can we depend on him doing it when someone is not around.

So we really think that more than just additional supervision is required, especially if he knows he's being supervised. We really think some period of time is appropriate to reenforce the sanction.

JUDGE LAM: This leads to my next question. In

your earlier testimony, you mentioned that perhaps a combination of different elements would constitute an acceptable basis for relaxation of the order. What are these elements, in your mind?

THE WITNESS: Of my mind, a period of suspension or probably at least a year. After that point in time, I would think Mr. Murray should work as an assistant radiographer under constant supervision for some period of time, and, thereafter, assuming he's properly performing activities and being supervised by a qualified radiographer, then some audits, some time period in a probationary period.

I do have to indicate that it's not my decision alone as to what the sanction should be and how it should be relaxed. There's a number of individuals that would have to be involved in that decision from the staff point of view in relaxing the order.

JUDGE COTTER: Mr. Lieberman, you say that the Commission did not authorize you to issue orders to individuals. Why is that?

THE WITNESS: The Commission's regulations in Part 2, 2.202 to 2.204, refer to issuing orders to licensees and not to individuals. So we have a proposed rulemaking. We've published the proposed rule --

JUDGE COTTER: That wasn't my question. I know what it says, but why?

THE WITNESS: Because in the past the Commission hasn't done that.

JUDGE COTTER: Why?

THE WITNESS: Well, in all honesty, Your Honor, I can't tell you why in Section 1952 we adopted the regulations, because 2.202 and 2.204 essentially go back to that time period, on why the Commission has always in the past focused on the licensees.

I believe 1978 was the first case where we issued an order. It was to Nine Mile Point where we issued an order to remove the plant manager because of providing false information to NRC. That was the first time the staff had issued an order to a licensee to remove an individual person. Since that time, we've issued numerous orders, such as the order here, to licensees to remove individuals.

JUDGE COTTER: Let's take the plant manager situation that you indicate was the first one. Would you call that a Severity Level 1 or Severity Level 2?

THE WITNESS: Severity Levels 1 and 2 both have the same definition, very significant violations. The plant manager probably, I concluded, would be a Severity Level 1.

JUDGE COTTER: Pardon me?

THE WITNESS: I would conclude a Severity Level 1, the plant manager. The severity level is a concept developed in the enforcement policy to really assist us in

applying the Commission's civil penalty process, because we do have the authority to issue civil penalties up to $100,000 per day.

We have thousands of requirements. We try to break them up into those matters which the regions can handle, Severity Levels 4 and 5, and those matters which require approval of Headquarters, Severity Levels 1, 2 and 3, Severity Level 1 the Commission needs to approve.

In giving a severity level, it helps us to determine the civil penalties in the enforcement process.

JUDGE COTTER: I'm having real conceptual difficulty with equating the specific violations mentioned here on two days with a nuclear power plant manager furnishing false information to the Commission. It seems to me that you're not talking about the same level of either threat to the public health and safety or the same level of severity.

THE WITNESS: I referred to the plant manager only because that was the first time that we had issued an order.

JUDGE COTTER: I'm just using it as an example, Mr. Lieberman. The point is that I can't find anything in these severity levels and, as you point out, they were the severity levels and the concept of the appendix was directed towards nuclear power plants, I believe.

THE WITNESS: Well, except --

JUDGE COTTER: There is only passing reference to other areas. But to conclude that the work of a radiographer, and particularly the deficiencies involved here are Severity Level 1, 2 or 3, in comparison to the threat to the public health and safety presented by a nuclear power plant misadministration or willful breaking of the regulations, I find conceptually very difficult.

THE WITNESS: Let me respond. Some of the supplement -- only Supplements 1 and 2 directly pertain to power reactors. Supplement 4 is health physics, Page 174. Supplement 6 is fuel cycle operations. Supplement 7, called Miscellaneous Matters, involves inaccurate information.

Clearly, the Commission considers willful violations to be significant matters, erroneous information to be significant matters, overexposures committed by any licensee is a significant matter, as I've tried to demonstrate and Mr. Skov also demonstrated.

JUDGE COTTER: There are no overexposures here, though, is that correct?

THE WITNESS: That's right, but the problem with radiography, one could say, is once the equipment fails --

JUDGE COTTER: I understand risk.

THE WITNESS: And in each of the cases where we've had an overexposure, it's because of failure to do a survey. Clearly, if a failure to do a survey is a Severity Level 3,

a willful failure to do a survey is a Severity Level 2 by the enforcement policy, and in Table 2 on Page 167 of the policy, it gives some examples as to what actions might be taken.

JUDGE COTTER: Let's go back. You said that failure to do a survey is a Severity Level 3. What is the basis for that?

THE WITNESS: Well, the Commission's changes in the enforcement policy dated January 31, 1990 --

JUDGE COTTER: Which says what?

THE WITNESS: Says that the example -- the statement of consideration provides that we are making changes to examples. An example of Severity Level 3 is significant, and what that example is is failure to use a radiographic survey device, failure to do a survey in performing radiography, because it presents failures associated with the use of equipment designed to minimize overexposures. That's one milestone to consider.

Another milestone to consider is Item C-4, the substantial potential for exposure, failure to do surveys there. That's another potential consideration. In Item C-12, the breakdown in the program involving repetitive violations could be another basis to make it a three.

Then the erroneous information, a willful failure to provide information.

JUDGE COTTER: Let's take that one for a while. You've said in your testimony that Mr. Murray willfully failed or provided false information during a November 1 interview. I don't find that in there. I find a considerable -- a very muddy exchange of information between the people involved. Where do you find that?

THE WITNESS: Well, my reading of the November 1 interview was he was questioned as to how he performed radiography on the 23rd and 25th. He described how he did it and what he described, how he did it on those days was not what he did. He described how he surveyed the guide tube, how he locked it at the end of each exposure.

JUDGE COTTER: I don't think that's what it said, but I guess we'll have to read it. You're reading it and getting one interpretation; I'm reading it and getting another.

THE WITNESS: I would say the document speaks for itself. Can I attempt to show you --

JUDGE COTTER: Sure.

THE WITNESS: It'll take a minute. Can we go off the record for a minute?

JUDGE COTTER: Yes. We'll go off the record.

[Discussion off the record.]

JUDGE COTTER: Back on the record.

THE WITNESS: Before we broke, I was looking to

find where in the November 1 transcript there are references to where he might have provided false information. On Page 52, Mr. Murray was asked by Mr. Skov, on Thursday, which is October 25, then what we're looking at here is a description of what he did on that day.

And then when you went up to the exposure device, you surveyed the camera. Did you also survey between exposures the guide tube. Answer, yes. So here's a statement that he said how he did it and, in fact, he did not survey the guide tube.

Page 87 is referring to a discussion of locking the camera. The question, and you did that between exposures. Yes; well, except when you guys showed up. I cranked it in and came over. And then I ran down and locked it up. So again he's saying that he locked up the camera, which he didn't do. So those are two examples --

JUDGE COTTEN: I find this transcript full of sort of backtracking and misunderstanding and that sort of stuff. You picked those two out and I'll bet you there are at least four or five other instances in here where he says no, I didn't lock it and you caught me and, no, I didn't do this and you caught me. So you're being very selective about that, Mr. Lieberman.

THE WITNESS: I guess I should add that when I make my decisions on these enforcement actions, I rely to a

large part on information I get from inspectors and investigators. They were there on October 25. We've heard testimony earlier today on what they asked and that Mr. Murray demonstrated and explained what he was doing and their explanations --

JUDGE COTTER: I understand, Mr. Lieberman. Number one, this is judgmental and I certainly don't for a second question that you have exercised your best judgment as you best see it. But because it is judgmental, that makes it a subjective area.

THE WITNESS: No question about it.

JUDGE COTTER: I guess I'm a little troubled in that in your direct testimony you recited a number of major horror stories and I could see why the NRC would become considerably upset and why they would indefinitely suspend people for things like that.

I have difficulty here because what we've got is two days' observation. We've got a fellow who, if you look at it one way, lied out-and-out to the inspectors and then didn't want to get caught. If you look at it another way, he was panicking in the circumstances. I'm a little concerned because it seems to me that we've got a situation where you've got somebody performing radiographic functions in a rural or at least a reasonably isolated set of circumstances, who otherwise has no record of misfeasance,

no prior record that appears anywhere here.

So I'm concerned that if you interpret this set of facts one way, you've got somebody who is out there killing people or, if you interpret them another way, you're taking an elephant gun to an ant. I need some help from you, I think, in this regard.

THE WITNESS: As I said earlier, we have an audit type inspection program. We're not there all the time. In almost every case when there is an overexposure, it's the first time he ever failed to make a survey. I think this Commission should be concerned about the potential. I don't think we have to wait until we have an overexposure, a serious overexposure before we take strong action.

In this case, on two days we observed these activities occurring. This was not a day where -- certainly on October 25, when you look at the film, it doesn't appear to be pressure. There's no rush. I think even Mr. Murray noted on November 1 when he viewed the tape that it doesn't show him being in a hurry.

We can only act on what we see and I think it's a proper presumption to make that if on these two days he was doing it wrong, probably on other days he probably was also doing it wrong, but he's lucky that he hasn't had a source disconnect and, thus --

JUDGE COTTER: We can't make decisions on what

might be, what might have been.

THE WITNESS: That's true.

JUDGE COTTER: We don't have --

THE WITNESS: We can only take what we have, and what we have --

JUDGE COTTER: You have two days which appear to be in essentially a continuing incident, really.

THE WITNESS: Separated by a day. We don't have a prior record here, but, again, we only look at radiography once a year and even then we don't inspect every radiographer.

JUDGE COTTER: I take it, though, that when you do, when you find someone, that there's really no -- I find no provision in any of these regulations for mitigating circumstances. For example, there is no provision for, as was mentioned by someone earlier, I think Judge Lam, supervision for a period of time. There's no provision for whether or not there's some degree of sincerity in the individual's having committed -- since he'll regret for having committed these kinds of transgressions.

It's almost like a penalty kind of a reg rather than something that improves the climate, if you will. Would you agree with that?

THE WITNESS: I think it's remedial in the sense that it's used to provide a clear notice to others and

hopefully improve others' performance. As I did say, the orders provide a mechanism for relaxation and there may well be steps that could be taken --

JUDGE COTTER: It says that it shall be, but it doesn't say how, when, where or why.

THE WITNESS: That's right, and those, again, judgments --

JUDGE COTTER: In a sense, that makes it almost meaningless or the subject of someone's whim at some particular point in time. It's a difficult issue, I think, we're looking at here. What we're looking at ultimately is almost a policy type issue.

THE WITNESS: There's no question about it And when I look at these cases, I look at all the radiography cases, and they come in different sizes and different shapes and people have different attitudes. I think I said earlier whenever we have one of these situations, the individual says in very sincere way I'm going to do it right next time.

JUDGE COTTER: You're unable to respond to that under this regulation.

THE WITNESS: Well, we can measure the sanction, the time period. Certainly the enforcement policy doesn't dictate a result. I think other than if you lose reasonable assurance, you have to address that. I don't think that we

can let licensees perform activities where you've lost reasonable assurance.

JUDGE COTTER: Well, let's talk about that a little bit. Assuming that's a reasonable conclusion for purposes of this line of inquiry, how do you regain reasonable assurance? Do you just get that simply through passage of time?

THE WITNESS: That is a very difficult question and answer, Judge Cotter.

JUDGE COTTER: I don't see it addressed anywhere in all this.

THE WITNESS: We spend a lot of time among the staff discussing that question. Time cures a lot of things.

JUDGE COTTER: Well, sometimes they just go away and that's the cure. But I don't see that as a cure.

THE WITNESS: That's why as part of the rulemaking on wrongdoing we decided to have a term of years rather than being indefinite. But all I can offer at this point, absent some proposal, the three-year time, we think, would be sufficient to give the message to provide the cure.

JUDGE COTTER: That's another problem I find with your testimony. It looks to me like there's an element of using Mr. Murray in here to address other people, other radiographers. It seems to me that that's not what we do in the United States of America, use some people to get to

other people.

THE WITNESS: Well, the fundamental reason for issuing the order is to remove the safety hazard. At the same time, I think enforcement actions, by their nature, provide notice to other individuals, because if you see what's happened to one person, you might not desire that happening to you, so you try to do it right to avoid a similar situation.

JUDGE COTTER: But doesn't that lead you down the road of temptation of making the sanction particularly severe to discourage others? It pushes you in the direction of severity rather than in the direction of appropriateness.

THE WITNESS: A combination thereof. I think it pushes us in the direction of a combination of severity appropriate to the circumstances and judgment as to what the right thing to do is. There's a balance of a lot of f s. Clearly, these violations are not insignificant. These are significant violations, you have the integrity question that adds to it.

A strong sanction is clearly appropriate. And I think more than just a civil penalty, more than just increased oversight because increased oversight will give you assurance that when you're there and the person knows you're there, it's very hard to observe radiography without the radiographer knowing. We've discussed the importance of

monitoring the area.

And the question is how you have that assurance that when someone is not watching, when you have a skilled and experienced radiographer, he's going to be doing it right. I don't think there's a simple answer to that. That's why we thought the suspension was appropriate. I guess I'd be the first to admit that three years is not perfect and -- I mean, three years is perfect and two years and three weeks, for example, is not perfect, a range there.

In the case of CNR Laboratories, Mr. Joukoff referred to when he mentioned another surveillance where we issued an order, there the sanction was five years. But, again, that was a slightly different situation because there the company fired the individual and there the order was give us notice if you rehire the person for the next five years, and then we would have to decide, once we had that notice, whether we need to issue an order at that time.

Each case is on its own merits. We exercise judgment. I've given you the rationale for our decision. The facts speak for themselves and there's nothing specific in the enforcement policy that speaks to what the particular sanction should be, because these things, I think, require judgment. I think that's about all I can say.

JUDGE COTTER: I certainly appreciate your frankness and the chance to discuss it with you. Anything

further of this Witness?

[No response.]

JUDGE COTTER: Thank you, Mr. Lieberman.

[Witness excused.]

MR. BACHMANN: Your Honor, that concludes the staff's direct case.

JUDGE COTTER: Your turn, Mr. Murray. What would you like to do?

MR. MURRAY: What I've done, Your Honor, is I've outlined things that I want to ask myself and if it's all right with Mr. Bachmann and the Judges, if he could, while I'm up here, also address these things in case I do not. It would be easier for me.

JUDGE COTTER: If you would like Mr. Manly to ask the questions, that would be fine, or you can just make a statement, whichever way you want to do it.

MR. MURRAY: I guess I'll take the stand, then.

MR. BACHMANN: Your Honor, can we have a brief recess before we start on this next phase, maybe about five minutes?

JUDGE COTTER: All right. Five minutes.

[Brief recess.]

JUDGE COTTER: On the record. Are we ready to proceed?

MR. MURRAY: Yes, sir.

Whereupon,

THOMAS MURRAY,

Petitioner, was called for examination on behalf of Petitioner, and, having been first duly sworn, was examined and testified as follows:

JUDGE COTTER: Have a seat, Mr. Murray.

MR. MANLY: Should I identify myself?

JUDGE COTTER: If you would, please, for the record.

MR. MANLY: My name is Philip Manly. I'm a certified health physicist.

JUDGE COTTER: You have to speak up a little, too.

MR. MANLY: My name is Philip Manly. I'm a certified health physicist. I have been working with Mr. Murray over the last two months on this issue and basically what I will be doing is to give him some questions to help direct his thoughts on his own testimony. I think he wants to talk about the order, the Docket No. 030-30870 and the reasons or the actions behind the order to remove him from the Fewell Geotechnical Engineering license.

I think we'll start by talking about some of the items that were brought up in that order, and he will be giving his testimony, his explanation of his actions in each of those instances. The first item that was identified in the order was performing of radiographic operations without

performing surveys to establish the radiation boundaries. Would you want to talk about what your actions were and what the thoughts were behind those actions, what your feelings were or what your understandings were as you did those things?

DIRECT TESTIMONY

THE WITNESS: This is the survey of the boundaries.

MR. MANLY: Yes.

THE WITNESS: On the 23rd and 25th of October.

MR. MANLY: Yes.

THE WITNESS: I had been here -- in fact, it's written down here. I've been on this job site like 12 times prior to this and I've done a lot of surveys. Now, the way I posted this area was I posted the road all along the roadway and I would put my 100 MR per hour posting at about 15 feet from the ditch.

And as far as the coral hillside, it was -- I considered it inaccessible. It was inaccessible to the public, although there were instances when construction vehicles and construction people would come back and forth.

JUDGE COTTER: Could you orient us, Mr. Murray? The road is south and the coral hillside or berm is north, is that correct?

THE WITNESS: I believe so. Based on this, this

is how I set up my boundaries each day on this job site. After that, my primary -- well, the areas I was primarily concerned with were the -- down from -- well, the way my hoses -- they just demonstrated this camera up here.

There's a collimated section and where the hose, the guide tube connects to the collimator, it's at that end that you have a high intensity of radiation. So I would always have to be concerned with the opposite direction that I am in with the crank. That is to say if people are on the opposite side of where I'm shooting, those were the people I had to be more concerned with than anyone else.

I would take the people from the job site and several times I would tell them that they had to stay 15 feet away from the ditch and if they had to come through my boundaries, to signal me and come around, and if they were in the ditch, that they should be at least 80 feet or at least two pipe-lengths, is how they viewed it, down from where I was.

As far as surveying, I based it on prior surveys. I had done several surveys and --

JUDGE COTTER: At that specific site?

THE WITNESS: Yes. On that specific site. Naturally, I moved down into the ditch, but it changed very little. The ditch was still the same depth, although, like Dave said, that there were generally on the coral side, on

the inaccessible side, it would slope a little bit.

Also, along with this I would use, in a lot of cases, sandbags when I was in a congested area with a lot of people and construction. I would put a sandbag behind my hose so they would be more shielded and that they didn't have to --

JUDGE COTTER: Did you do that here?

THE WITNESS: Excuse me?

JUDGE COTTER: Did you do that on October 23 and 25?

THE WITNESS: I don't know if I did or not, and I don't know if they witnesses me doing that, but I had sandbags in the back of my truck for two reasons; that, and in case the source ever got stuck, I could shield it with -- I had six -- I had about half-a-dozen sandbags, where, if something ever did happen, all I'd have to do was cover it with these sandbags and shield the source until I could get the RSO or the health people to come out and help me retrieve the source.

JUDGE COTTER: Before you go on, you said that you had surveyed the site at some time during your prior 12 visits to it. Did you survey the entire perimeter?

THE WITNESS: Well, I surveyed -- at one time or another, yes. The entire area, at least all sides were surveyed at one time or another. Primarily, when I first

started this job, when I first -- there was more congestion. On the days that Dave and Phil came out, in particular the 25th, there was no one even around me.

On the 23rd, people happened to be coming around for one reason or another, but they weren't really working in that area. But in the beginning of that job, a lot of times I had welders that weren't that far away. So I had to survey almost every time I was out there, and generally I would go out and survey where they are.

On the roadside, I pretty much had established my boundaries and I knew what they were. Fifteen feet from the ditch, I recall there was one time there were people moving piping. I took one -- and it was five MR in an hour, at 15 feet and one pipe-length down. I did do surveys prior to these days and after that I pretty much based it on where I was.

If I was above the ground, then naturally I have to do different surveys and take into consideration people in the area and my exposure times. In all these cases, I might add that they were all based on what I define as an isodose, that I would be doing three or four pipes in this area and I would move down generally 80 feet because they were doing splices.

So I would do every other weld length. So I would generally move down 80 feet from where I was the time before

and have to move everything down. So considering that and the number of exposures, which are written here and none were over half a -- well, I take that back. There was one large pipe in there that was closer to a minute and three exposures were done on that, but the rest were around 25 seconds.

So I used that and based that on my establishing my boundaries. So in no case -- I would just push my boundaries out here near the road and my high radiation signs, but as the way I understood it that this could be done and that, secondly, I was always well under the limits and protecting the people and that no one would acquire a dose of in excess of two MR an hour.

MR. MANLY: At that time, then, you felt that you could establish radiation boundaries on the basis of your general experience, plus past physical surveys that were done at the area.

THE WITNESS: Yes.

MR. MANLY: Do you feel that way now?

THE WITNESS: Well, no. No. See, after all this -- well, after these gentlemen came out and after my second deposition -- well, actually before my second deposition, I talked to Phil Manly and what I got from Phil Manly was he was asking me what had happened, my opinions on the things that did happen, and he brought to my attention that I was -

- my attitude was subjective and that -- and he made me see things in a different light.

I didn't see things in the NRC point of view. I saw things in my own point of view, and being on the job and just doing what I could to protect the safety of people around me and really not adhering to the rules and regulations as I should have been.

Actually, in this case, it was my procedure that instructed me to do surveys, physical surveys. When I say that, I mean physical surveys.

MR. MANLY: Another item talked about roping off of the boundary or failing to rope off the boundary and failing to post signs for most of the boundary on one of these sites. Can you talk a bit about what your basis was for your actions on the posting that you did?

THE WITNESS: Yes. As I said and as it is documented in here, on the 4th we had the inspection with Mrs. Rathlinger and Mr. Payne, and during their audit of our facilities, I had brought up the problems I was having on this job, about roping off because it's a difficult area to rope off and control in that manner.

And two things I asked were can I use the isodose, is it -- actually, I asked them to define two MR in an hour as my boundary because if I come over to -- the way I saw it up until this time was it says you rope off at two MR an

hour. And so I said, now, in my mind, does that mean two MR in any one hour or is that based on a dose rate on your meter at two MR in an hour.

Then when I come to the permissible levels of radiation in a restricted area, it says radiation levels which an individual continuous present in that area and could result in receiving two MR or more. So that told me that this must be based on a two MR dose. And at the time, she -- well, I don't want to speak for Beth, but the way I understood it, she said, oh, yes, you can do that.

And I also brought up the rope. I always understood that all areas had to be roped off, but when I looked through the NRC 10 CFR, I never saw where you had to rope off boundaries. All is they had to do was be posted. And I asked her about that and she said, no, they don't have to be, but if your procedure says it -- I'm assuming she said this. I'm sure she did.

That if your procedure says it, then you have to do it later. Now, whether or not she said that, I don't know. But from that day on, I was going out on this job because it was so difficult to rope and I wasn't using rope. Up to that point, I always used rope. When the two gentlemen came out a year prior to this in March, and I think we brought this up earlier, they came out and someone had called them, I don't know who called them, but this

referred to -- I had boundaries up.

I had ropes up and someone witnesses concrete people coming inside my boundaries and performing some concrete work. Well, in fact, what I did is shut down and allow this engineer to bring the concrete in and do his job and then I roped it back off and resumed the radiography.

Well, even at that time I was using ropes and, again, that was all cleared up and they had asked everyone and it was really never a problem. As far as when I stopped -- it was after I met with them and whether I understood it that I could do it or I couldn't do it or whether she said you couldn't do it unless your procedure says, I don't know. All I know is I know it wasn't in violation of the license, that I went ahead and did it, and really didn't think too much about the procedure being as serious as the 10 CFR.

It's hard to look back at it and say how I justified that in my mind and performed radiography that way.

MR. MANLY: What about posting on the side of the trench where the berm was?

THE WITNESS: On the 23rd, I can't -- I always consider the road -- and there were times when I posted this area. Now, on the 25th I knew this was inaccessible because they had taken out the access road to this side of the ditch. On the 23rd, I don't know if it was in those

conditions -- those conditions were still in effect at that time, but I knew they were out on the 25th because the engineer told me.

JUDGE COTTER: When you say they took out the access road you mean the road between the ditch and the coral berm?

THE WITNESS: What it was was an access road that actually --

JUDGE COTTER: A dirt road.

THE WITNESS: It actually -- the ditch was filled and the trucks and cars -- well, the equipment went right over the ditch and then on this particular day they had to continue on with it, so they took the access road out.

JUDGE COTTER: Just to make sure it's clear in the record as to where the access road was, it was on the coral berm side of the ditch rather than the road side, the paved road side.

THE WITNESS: Okay. The dirt road was right along the coral hill and access to that road was a little road that they can't -- they didn't -- the ditch discontinued, there was fill, and then it continued on where they hadn't put the pipe, and they could access the back road from that point.

JUDGE COTTER: Okay.

THE WITNESS: I don't know whether it was there on

the 23rd or not, though. I don't recall. But I know it wasn't there on the 25th.

MR. BACHMANN: Your Honor, I believe that picture No. 6, I believe it was Board Exhibit 2 or 3, might be more helpful.

JUDGE COTTER: Why don't you deal with that on cross.

MR. BACHMANN: I believe Mr. Murray has got his set there.

JUDGE COTTER: Those pictures appear to show a road on the coral side of the ditch.

THE WITNESS: Right. What happened was the access road was actually -- it came right across the ditch. It was just fill and they took that out, but it was much farther down. It was probably 100 to 150 yards down from this point where I was working. From this point, it wasn't but -- in fact, it was just over outside this picture where the 25th --

JUDGE COTTER: What's the number of the picture you're referring to?

THE WITNESS: This is No. 6. Like I say, down there where you can see the portable john here, it was probably only 15 yards forward of that that I was conducting radiography on the 25th of October. Well, we're talking about the -- I didn't post it because I didn't find it an

accessible area to the public. I basically just posted the area I found accessible to the public.

JUDGE COTTER: When you say the public, I take it you include the workers working on these pipes.

THE WITNESS: Good question, sir. Actually, the workers, they all know what my requirements of them were. They know that they could not -- they weren't supposed to come -- in fact, they weren't supposed to come within two welds of me without stopping and letting me know and letting them through or signaling them.

Now, on picture No. 9, with the gentleman walking by, this man had come from behind and if you notice, you can see my source guide tube. You can see the high radiation side. Below that, you see the weld that I'm shooting. And it's apparent that I'm shooting what would be considered -- I'm shooting at 12:00 down.

So when I turned around -- well, I turned around and I saw this gentleman. I saw how far away he was. So I really didn't bother him because of the shot I was making and I knew he wasn't -- as far as the radiation levels there, that they were low enough where he wasn't acquiring two MR in any one hour at that point.

If I had set signs -- if you go back to picture No. 6, if I had posted this area, which I have done, I would have posted it -- it's hard for me to describe. You can see

the tread marks from the road, the wear marks. I would have posted it on the first lighted area.

The man was actually a few feet south of that, but I would have posted it probably about ten or 15 feet from there. He's actually more like 20 or 25. So he still would have been outside my radiation boundaries in the way that I post them, because I never really post it off the road. I put signs on the road, but I never made it inaccessible for the trucks to come back and forth. I just put them up so they'd be aware of where the boundaries were.

I didn't -- in fact, I didn't -- they're always allowed access through that -- especially the trucks that come by and thought they were supposed to come through me first.

JUDGE COTTER: It sounds pretty sloppy, Mr. Murray.

THE WITNESS: It was very sloppy, sir. It was.

MR. MANLY: The next area, I guess, is one of the important ones, which is the surveys on the exposure device. Can you explain the different types of either survey instruments or survey meters or alarming dosimeters or pocket dosimeters or any type or all types of radiation metering equipment that you normally carried with you.

THE WITNESS: I carried the audible alarm 400 meter, which has a capability of one MR to 1,000 MR. I

carry my film badge. I carry generally two dosimeters. One is a zero to 200 MR scale and the other is usually, but not in all cases, zero to 1,000 MR. Then I carry the audible, this audible rate meter which alarms, also.

Aside from the 400 meter, I would generally incorporate the 492 which is an older model, non-audible alarm, but I would use that -- I would keep that because I had one on my side and I would generally keep the other meter up near the camera for surveys and things like that.

On October 23, that same rate meter, the 492, you can see it on picture No. 6. You can see it on the box here, because he was up here and taking measurements of radiation areas. And I had the audible one. But generally I have this one in the ditch with me, along with the yellow 400. So I usually carry two meters with me, along with the rate meter and my dosimetry and an extra dosimeter and my film badge.

MR. MANLY: The Victoreen 400 survey meter, at what point does that alarm?

THE WITNESS: It alarms at -- you can set it to alarm at whatever you want, 10 MR, 100 MR, or 1,000 MR.

MR. MANLY: How did you have it set?

THE WITNESS: What I would do is I would set -- because the reason I didn't have this particular meter on the 25th is because it got saturated. Lo and behold, I find

out that it's -- it's ultra-sensitive, so I can't leave it in the two MR position or the low scale, the one MR to ten MR scale for the whole period of time. Otherwise, it will saturate if I go up there and I'm in a high radiation area. So what I'll do is once I get back and I crank out, it's in two MR and it will go up. And then I'll step up the ten MR scale, which will carry me up to 100 MR.

What I'll do is I'll walk back and I walk back far enough where I am at two MR or less. Sometimes situations arise where I can't get that far back and I'll be at five MR. But I at least mark the five MR radiation area or I stand back where the two MR is. That's why my helper, if you notice, is always behind me.

So when I would come and crank, I would still be in the ten MR zone. When I crank in, the alarm goes off. When I approach, I step back down. I'll just click the thing down to the low scale. It's either that or it's in the -- in these situations, it was always in the low scale. It wasn't till after this I found out why it was saturating, why the meter wasn't operating.

This is the second meter that went out on me and that's how I got stuck using the 492 primarily on the 25th.

MR. MANLY: So you say the 400 was normally set so that it would alarm at ten MR per hour.

THE WITNESS: Yes.

MR. MANLY: In addition, as you said, you also had the alarming dosimeter. Why did you wear that?

THE WITNESS: My rate meter, yes.

MR. MANLY: No. The alarming dosimeter.

THE WITNESS: Yes. That's the rate meter.

MR. MANLY: At what rate does that alarm?

THE WITNESS: This alarms at -- actually, it's supposed to alarm at 500 MR, but this one alarms a little bit lower because I have a new rate meter now that clips on my belt. And I've taken this and I've tested it as far as exposing the source on this and it alarms a little bit before, it's not quite calibrated at 500 MR. It's actually a little bit less, more like 425 or 450. But primarily 500, they're set for 500.

MR. MANLY: Why were you wearing that one?

THE WITNESS: This one?

MR. MANLY: Yes.

THE WITNESS: On that day?

MR. MANLY: Yes.

THE WITNESS: Right. Since I got it, I've always worn it.

MR. MANLY: On the 25th, you said that the 400 meter was not working.

THE WITNESS: Correct.

MR. MANLY: So you relied primarily on the 492.

THE WITNESS: Right.

MR. MANLY: You said on some of the surveys that you did not use the 492.

THE WITNESS: On some --

MR. MANLY: On the surveys, on the video tape.

THE WITNESS: That I didn't use it.

MR. MANLY: Yes.

THE WITNESS: No. I failed to survey my boundaries with a survey meter.

MR. MANLY: If the source had been exposed, would there be any other backup means or other means that you would know or have found out that, in fact, the source was not in its shielded position?

THE WITNESS: Well, I had the meter and the film right there near the crank. That was one way, while I was cranking, and this. If I walked up and it had been exposed, this would have alarmed.

MR. MANLY: So that would have alarmed if the source were exposed.

THE WITNESS: Yes. Besides, when I crank in, I --

JUDGE COTTER: For the record, you're referring to the orange alarming dosimeter.

THE WITNESS: Yes. You can refer to this as the rate meter.

JUDGE COTTER: Okay.

THE WITNESS: But when I'm retracting the source, just by the number of turns -- I mean, I've used it so often, I can tell if there's any deviation in the number of retractions I make, the number of turns. I mean, there's been times when I was -- to give you an example, there's been times when I retract it out and my collimator and the end of my tube would be bent in such a situation where it didn't get quite all the way into the collimator to make a shot. And I could tell. So I'll retract it, go and I'll correct the radius on the bend.

So it's easy to tell if your crank -- even if it's just as much as an inch, it's easy to tell if your crank is not all the way back in or all the way out, because you've done it so many times and you know how many number of times it's gone out. It's hard to explain, but you know immediately, if you've done radiography before.

MR. MANLY: What do you feel now is the proper procedures to be used on doing the surveys?

THE WITNESS: Like I said before, I had the 492 and I would pick it up and survey like this, look down at it. It was between the front -- the shipping plug, the hose connection, it would be between that and the back of the collimator. So if it was anywhere in there, it would indicate, and the other meter was here on my belt. But, no. I should take the meter, this meter off and survey the

entire circumference and the hose and the collimator.

I'll say this. With the 400, that's the reason I brought the 492. I was getting too used to listening to that alarm. You'd crank out, it would beep-beep-beep-beep, and then it stops when it's collimated. I would look at it to move back and know where I was, but I would go back and crank the source out and it would alarm and go off as I would retract or expose the exposure device.

Now, walking up -- the minute it goes off, you're walking up, you know that it's -- I would get it in my mind that it's in, and now I would approach the source, it was on my belt. There were sounds, I would look at it. But in that ditch, I depended too much on the 492 and this thing on my belt and wasn't doing the proper surveys.

To answer the question, yes, I should be surveying the entire circumference of the camera and the guide tube and the collimator as opposed to relying on that meter, the audible alarm, and just picking up the 492 on the ground and surveying with that.

MR. MANLY: I think the next area deals with the entry of people into the restricted area. I believe you have a series of pictures that were entered into exhibit previously. Why don't you go through those and identify them and talk about the individuals who are shown in those pictures.

THE WITNESS: Okay. We've already discussed the gentleman walking by. Now, the two Finley people had showed up and primarily they were helping Gary Wood had --

JUDGE COTTER: Which picture should we be looking at?

THE WITNESS: In particular, there's No. 10 here, No. 11, and the gentleman on the bank had the other meter and he had it near the truck. He was monitoring the boundaries for me out there and the other gentleman in the ditch was -- what he was doing was changing IDs. I used lead numbers and he was changing the IDs for me and taping up the --

JUDGE COTTER: This is the film strip IDs?

THE WITNESS: Yes. The lead letters I would tape to the film to identify each exposure, and that's what he's doing. The gentleman in No. 12 is -- he's an engineer, some sort of weld inspector. You can see me in the ditch. At this point right here, I'm standing at the two MR intensity with my meter and he is behind me. And you can see where my -- as Dave pointed out, you can my restricted area cone here, and he's inside it, which brings up another --

JUDGE COTTER: You say he's an engineer. Who is he?

THE WITNESS: He works for American Pipe and Boiler and I don't recall his name. He was new on the job.

Seems like a lot of people showed up this day for some reason. This was one of them that really doesn't have any business out there and just came up to look in the ditch and see what was --

JUDGE COTTER: Did you tell him to go away?

THE WITNESS: Excuse me?

JUDGE COTTER: Did you tell him to go away?

THE WITNESS: I don't think so because I knew he was all right where he was, which, again, is poor judgment because here you see my restricted area sign. As Phil has pointed out, it sends the wrong message to these people that if they can come in here, regardless of whether it's safe or not, that if they can come in here every once in a while that it really doesn't put any restrictions on them, that they take it for granted after a while.

I'm looking for the picture of the forklift, which is picture No. 17. This is the picture -- and if you take that picture with picture No. 6, you can see where we are as opposed to the palates. The gentleman, the second gentleman is behind the forklift. You can barely make him out. Now, what had happened on here was these two pulled up, I was ready to make an exposure.

Gary Wood, up on the bank with the other meter, had told them to get back. In fact, he told this guy to just get behind the forklift here. Now, after he had gotten

back there, for some reason, when I -- he came back out again while I was exposing and looked over into the ditch. Again, if I remember correctly, Gary told him to stand back and back off the ditch and in back of the forklift.

But, again, these guys, they -- you can see my cone. This is the outside of my boundary. They had just come inside that cone to pick up those palates. Again, I'm basing my two MR restricted area on an invisible radiation area instead of actually my cones where I just put them out on the road.

JUDGE COTTER: You're saying the forklift was outside the two MR area?

THE WITNESS: Yes. They were outside the two MR area.

JUDGE COTTER: In picture 17, how far is the forklift from your source?

THE WITNESS: About 40 feet from the source, approximately. I think 40 feet, 40 or 50, I'm not sure. I don't recall what the lengths were, but I think they were 40 foot lengths of pipe. And they're exactly one pipe-length away. As you can see, the next pipe weld down. So they were about 40 feet away from there, 40-50 feet, and I was making my first exposure, in fact, because I can see the film and I was shooting towards the coral reef.

I think that explains about all the people that

entered in or around the area that I was radiographing.

MR. MANLY: These pictures were taken on the 23rd of October.

THE WITNESS: Yes.

MR. MANLY: On the 25th of October, were there any people who tried to enter the area?

THE WITNESS: No. There was no one, other than Phil and Dave.

MR. MANLY: What did you do with them?

THE WITNESS: When I turned around -- in fact, I had just exposed the device. I turned around and I saw these two actually coming towards the source. So I yelled to them and I think they acted as if they didn't hear me. But they kept on coming and I yelled again to stand back and I started to walk towards them. And that's when Phil pulled out his badge and showed me his badge and told me to retract the source and that they were NRC representatives.

They were the only ones, other than after they were talking to me the engineer -- in fact, the project engineer came up, but the radiographic operations were shut down at that time. But other than that, there was no other people in the area that I recall at all that day.

MR. MANLY: I guess we can move on to the issue of willfulness of misrepresentation to the NRC. Can you give a little bit of background or an environment from which you

were working that might have set your frame of mind at the time that these inspections occurred?

THE WITNESS: That they showed up on the job site.

MR. MANLY: Around then or prior to then? As you had told me before when we talked about this, your feeling of what people -- your coworkers of said of what your response to the NRC was, of what you felt that your relationship should be to them.

THE WITNESS: He's referring to people that -- as these guys all well know, people that work for Finley Laboratories and just a consensus after working there for a year-and-a-half or so, talking about the NRC and what they had gone through with it; oh, yeah, they try to be your buddy and that, in fact, they're not; they get information.

I described this to Phil when we had our deposition. I got this -- I acquired this attitude where -- you know that I never really looked at it as myself being responsible to them as opposed to being responsible to myself and protecting my job and my employer and things like this. It was almost looking at them as the enemy and I'm out here doing radiography and they're out here to try to find something to prevent me from doing radiography.

On the particular day when they showed up, first of all -- okay. This is the week when Jiogi was due to have our baby and that's the only reason I had that phone with

me, that modular phone and my beeper. So when you guys look at this, when you gentlemen look at this film, it looks like I'm walking around and I'm doing things kind of slow, but just the fact that the way I was setting up things, I could look at myself and I knew exactly what was going to -- I'm just thinking of something else.

I wasn't thinking about everything I was doing. I did my dosimeter. I went through the routine of making sure certain things were done. My things were posted. At the same time, I'm thinking of a phone call that I'm going to get at any minute now from her. And then after this I'm out there and I'm shooting and I've got a radiac, I'm used to having one here in that audible alarm, and now I'm using a radiac that I'm not accustomed to using, but it's usually up near the camera.

JUDGE COTTER: What is a radiac?

THE WITNESS: I'm sorry. The meter, survey meter. That was left always at the crank, as you can see in that film. I would just run up and change the film and come back. I can see in here the only times I locked it is when I moved the camera. Now, when these two arrived, I must have done five or six exposures, then they arrived, and I saw the badge, and immediately I just panicked.

I was trying to think of anything I did wrong or everything that I had done right. I was real confused and

real wired and then they came over and they started asking me questions, looking at equipment. I don't want to refute what Phil said or what Dave said. I'm sure what they say is what I said or what I -- the answers that they got from me were probably what I said.

But at the time, and even when I look back at it, they even asked me -- they asked me questions that had just happened moments ago and I had trouble remembering what I did just minutes prior to them showing up. So when they asked me in particular, I was answering routinely. I was answering as if -- they would ask a particular thing; well, how do you perform this and how do you do that, and I said, well, I do it like this and, did you, well, yeah.

And before I had a chance to think about -- I was just answering yes, yes, yes, without even thinking. At the deposition later, I know it got started and I recall one period of time when I stood up and walked out. I stood up and I said, yes, I know I didn't do these things every time. I couldn't say for sure what I did and didn't do, but I knew I didn't do it every time.

In fact, I was positive because I had a different meter, for one reason. But I stood up and I told them that I was going to leave and I know they recall this, and I was pretty upset. She was in labor at home. We just came from the hospital and, in fact, when I got done with the

deposition, I went back to the hospital and she had our child several hours later.

So it's hard to -- and I don't want to water all this down by bringing these up and using them as excuses. But my frame of mind at that time, and in particular at the time of the deposition, was -- I wished I'd never been there. I had every intention of going up and talking to Dave and Phil and telling them anything they wanted to know. I think I was only half listening. It's difficult for me to explain it, the frame of mind I was in, but I was extremely stressed out.

I know I got off the beaten path. What was your question, again?

MR. MANLY: You were talking about the willfulness issue and about the environment that existed at the time of the inspections.

THE WITNESS: The willfulness. Well, I'll say this. This job is isolated. Now, especially on the 25th -- the 23rd was a bad day, these people that showed up, and it was an extremely bad day. People seemed to be coming from everywhere. Up till this time, I never had anything like that. So many people coming up and pulling away palates and all of a sudden I look over here and there's a guy going down the road.

All these people know, they've been told a million

times. I've been out there several times. They all know that they're not supposed to come within a certain distance of me or the source. They know where I am. They've been told several times. They know what the signs mean, and, yet, even this engineer, and he knew, he came in, walking over the ditch.

Why I didn't push away and yell at th ~ime, they were there and they were in safe areas and they weren't walking towards the source. I don't know whether it would have been wise to run up and crank in the source and expose it instead of leaving it in the collimated position for only 20 seconds or -- I don't know. I really can't answer as to why I didn't yell at these people or push them back immediately when they were so close or inside my boundaries, my posted boundaries.

But I knew in all cases that these people, where they were, because I had been in all these areas. I knew what the radiation levels were. I know these people were safe. I know what my exposure time is. I know which direction it's going. I know it's down here. It's against the dirt and, in this case, you can see the 20-inch is almost against the bank, yet my source is down at what would be considered the 4:00 or 5:00 position, and it's shooting up this way.

Looking back, in retrospect, I look at this and I

saw the film and I was really embarrassed and I'm still embarrassed. I really pride myself in my work and in radiation safety. And, again, this is an isolated job. This is not the way I routinely do radiography.

I've been downtown, I did a job for HECO where I came down Vineyard Boulevard. You people are not familiar with it, but it went straight through downtown. This is a situation where everything is taken into consideration. There are no -- it's not like this. I'm thinking all the time about people being around. I'm really aware. Ropes are all over the place. Meters, I'm scanning all the area.

It's just a different frame of mind. Here, I got too complacent. I really did. It's primarily because of the area I was in. I'm down in a ditch. I took things for granted and I shouldn't have and I understand that I shouldn't have. I should treat it as I did downtown, that there are people all over.

MR. MANLY: You actually had been talking about what you thought your relationship was with the NRC and the environment that existed that led to the statements that you gave to them on the 25th. What's changed since then?

THE WITNESS: I'm here, I'm talking -- I see Jim. I see -- I know Phil, I know Dave now. I've talked to you. More importantly, I've talked to you and you've brought to my attention things that I never thought of. I think I

talked to Mr. Johnson about that, which would be in the second deposition.

So my attitude was a whole lot different. I wasn't so defensive. When I was at the first deposition, I was walking in and I was there and I was on the defensive, I was nervous, worried about Jiogi. There was so many different -- well, my job, in fact. My job I was worried about, the pipelines that I was on, these people were calling me, hounding me because now I was using an x-ray tube to do it, which isn't quite as fast.

They're calling me up that the job's not getting done. In fact, we lost the job a few weeks later. So I couldn't keep up with the x-ray tube. I was taking my job too seriously, actually taking responsibilities; not that I shouldn't have been taking -- it's just a radiographer and an employee. I was taking on responsibilities that weren't mine. It was the manager's.

After talking with Phil, Mr. Johnson and after all was said and done, my attitude towards the NRC was and is now entirely different. Now they say that we don't have -- they bring up things that I never thought of before. We don't have the people to watch you. We expect you to be a responsible radiographer. We expect you to consider the public safety. It's you we depend on.

When you put it in that light, it makes everything

totally different, as opposed to someone that's chasing me down and looking over my shoulder, that I feel is trying to burn me. Totally different.

Knowing that the responsibility lies on my shoulders and that these people are dependent on my integrity is totally different. If I'd know this, if I had the attitude I do now when this had happened and Phil and Dave came up to me, I wouldn't have been nervous. I wouldn't have acted like I did. It would have been entirely different. I wouldn't have felt like the enemy has come inside my territory and I have to put up all these defenses and charades and not offer any information.

I never thought for a minute that I was really lying. I was just trying to not offer any information. Stupid rationale.

MR. MANLY: How do you feel this order will affect your livelihood?

THE WITNESS: I know they asked me if I'm still working for Finley and I am, but you know the circumstances over there. I may not be working especially after today or tomorrow, next week. I may not still be there. I've already been laid off at Dick Fewell's. My income already is almost -- it's only -- well, it's approximately two-thirds of what it was when I was with Dick. But I worked a lot of hours, but there was a lot of radiography to do.

Some of the problems -- well, I don't want to get too far off the subject, but when I was doing radiography, one of the biggest problems I had was not having an assistant. I think if I had an assistant, a lot of these things would have been alleviated. It was hard to do the work that I did, ten and 12 hours a day, by myself every day. And I was doing this every day. But I never -- I was never exposed to the source. I never exposed anybody to the source.

I never felt that I was compromising safety. I always kept that in mind. I would never approach the source without something on my body to tell me that the source was not, in fact, retracted. I want to get back on track. What was it? Oh, how will it affect me.

Well, not only -- going to other businesses and things like this and trying to get a job. I really don't think they're going to let me get onto another person's license, first of all. Secondly, I don't want to be a radiographer all my life. I want to do something like these guys are doing. I want to get into being an RSO and get into radiation safety and things like that.

I know what you see here doesn't really put me in the best light as opposed to what I'm saying here right now, but my whole life right now is radiography. I know it inside and out and that's all I've been doing. I don't want

to be a radiographer for the rest of my life, but I do want to stay in this field and acquire positions that these gentlemen have and write licenses, be a -- something of this nature.

So I'm really worried about my reputation more than anything. Like I said, in the monetary aspect, it has already affected the money that I bring in. Jiogi can attest to that. I'm just worried about my future, that's all, and I don't know what else I would do, particularly here in Hawaii, except for radiography.

MR. MANLY: Are there other radiographers you could work for in Hawaii?

THE WITNESS: Walashek. I could. I was offered a job there before I got out of the military, but I don't know. Even the job I have could be better. I mean, I could be back at the mainland and have a much better job. From the frying pan to the fire is how I feel about going to Walashek and they're really the only other company, other than going out on my own. But to go out on my own means having to write up a license and submit it to these gentlemen and set up a radiation safety program and write a license and apply for being an RSO and things like this.

These are things I wanted to do. These were things in the future. So I'm really concerned about those things.

MR. MANLY: Do you think if you were to submit a license for yourself that it would be approved?

THE WITNESS: I don't think so. No. I really don't think so.

MR. MANLY: Do you think you could get yourself listed on Walashek's license?

THE WITNESS: I don't think so. If I was to take a license I wrote up and submit it to someone else with their name on it, it would be approved. In fact, as opposed to this license that I worked under, which is a terrible operating and emergency procedure because they don't address a lot of situations you come across as a radiographer.

If I was to write up a license, it would address these things and it would be addressed in such a way as these people would -- I know would find it more than acceptable. In fact, I have a radiation safety program wrote up and incorporated into a license and things like this. So I don't know.

MR. MANLY: This completes the list of things that we had talked about. Is there anything else that you want to talk about to complete your testimony?

THE WITNESS: I can't think of anything.

JUDGE COTTER: Do you want to cross examine, Mr. Bachmann?

MR. BACHMANN: The staff has no cross examination.

JUDGE FOSTER: I have a few. Mr. Murray, you spent a lot of time with the Navy.

THE WITNESS: Yes, sir.

JUDGE FOSTER: Part of that as a radiographer.

THE WITNESS: Yes, sir.

JUDGE FOSTER: What kind of operating procedures did they have? Did they rely almost exclusively on Part 20 or 10 CFR Part 20 and Part 30 or did they have their own rules and regulations? What were the groundrules that you were working under when you were with them?

THE WITNESS: Well, yes. They come under the 10 CFR Parts 19, 20, 21, 30 and 31 -- 34, excuse me. The difference is while the -- you might want to correct me in this. The military has an all-encompassing type license where they control themselves and answer to you through RASO, is that it? I think it's RASO.

MR. LIEBERMAN: I don't know the name of the organization, but there is a Radiation Safety Overview Committee within the Navy that runs the Navy program.

THE WITNESS: Okay. The difference -- they're real specific. They're step-by-step, how you crank out, count the number of turns, they're real specific, much more specific than this or any other license you'll see. They're very specific and very, very detailed.

JUDGE FOSTER: Do you recall what they had as far

as the designation and posting of the radiation zones? Did they require roping and things of this sort?

THE WITNESS: Because you're working on ships, they didn't -- there's a lot of situations where -- well, in particular, sub-bases was my last duty station. So on a nuclear submarine, it's easy to secure doors and things like this. So you tape up, secure doors, and tape your signs on these doors and plus they have an intercom system where they warn the crew and they secure that area for you. So roping is not necessarily required in the military. They have it. Yes, they have it, but in a lot of situations, they don't -- it's impractical.

JUDGE FOSTER: When you left the Navy, was this job with Fewell the first time that you had been a civilian type radiographer?

THE WITNESS: Yes. While I was in a sub-base, I never -- well, I was only -- we rarely used a source, which is -- I mean, we get trained and trained on NRC rules and regulations, but your hands-on experience is almost none. I recall only two times in the three years that I was there that we took the source out on a ship at all.

So when I came out, I was a bartender for a little while. I was going to go to school for radiology in the medical field. So it was about a year-and-a-half or two years after I got out that I got on Dick Fewell's license

and then started performing radiography again.

JUDGE FOSTER: So with Fewell's license, was that the first time that you had really been working under a license that had this type of operating procedures?

THE WITNESS: Yes.

JUDGE FOSTER: And emergency procedures.

THE WITNESS: Absolutely.

JUDGE FOSTER: All right. You mentioned working for Finley. Was that as a radiographer or what were your duties there?

THE WITNESS: Radiographer, primarily. I did some ultrasonics and other, but pretty much most of it's radiography. With Gordon, you know, naturally he has to use an x-ray tube because he's not allowed to use the source.

JUDGE FOSTER: And you still are a radiographer on Finley's license?

THE WITNESS: He doesn't have a -- with the x-ray, you don't have to have a license.

JUDGE FOSTER: All right. He's not using a byproduct source, then.

THE WITNESS: No, he's not.

JUDGE FOSTER: My other question was that you did continue to use x-ray.

THE WITNESS: Yes. Yes.

JUDGE FOSTER: -- source, which does not come

under the NRC's purview.

THE WITNESS: I would wear the same film badge, in fact, if I was doing x-ray with Finley or whether I was doing gamma radiography with Fewell. I would still keep the same film badge to keep my exposures on one record.

JUDGE FOSTER: All right. Thank you.

JUDGE LAM: Mr. Murray, in your earlier testimony, you indicated you're anxious to regain the confidence of the NRC staff. What action are you willing to take to provide additional assurances to the staff that you will not commit the violations that you admit to in the future?

THE WITNESS: Other than what I had said earlier about offering to let them know where I am each and every day, naturally they can't be out here every day, but they'll know where I am in case they want to come and show up. They don't have to tell me they're coming. They can at any time come and spot me or I can employ Phil here, who is a radiation physicist, to come out and every so often come out on his own and inspect me and make reports to the NRC.

I can get someone else to do it. I've thought about this a lot, how I could, in fact, regain the confidence of these people and there's not very many things I can come up with other than Phil and letting them know where I am and just giving them my word that my attitude isn't what it was prior to them coming out on this job site

and inspecting me.

JUDGE LAM: So far, what would the estimate be of your monetary losses that you've suffered so far?

THE WITNESS: About -- let's see. The monetary losses right now are, I'll say, at a minimum, $800 to $1,600 a month. I know that sounds like a lot, but a lot of this gamma radiography goes on at night at overtime type hours. So without being on the license, without being able to do this type of radiography, I'm getting just full-time hours with Finley and he's already brought in a new radiographer. So right now I'm just -- as opposed to before, I'm just -- I'm not the radiographer of his anymore. I'm just a radiographer.

And since he pays me, and he does pay me about $18 an hour, it's easy for him to bring in other people now and do it for less money. You call in to California and say, hey, I have a job here in Hawaii, especially under the conditions with this war going on. My job right now is in jeopardy. I really think I'm going to lose my job at Finley Laboratories. I truly do.

To put it in a nutshell, I'm not as marketable as an NDT, an all-around NDT inspector as I was before this had happened. Philip said, oh, you can go out and do NDTs, but that is just -- the bulk of NDT is everyone wants engineers -- they want radiography. They want to see the inside of a

plane, the inside of a pipe, the ship, what have you. They don't want some subjective tests, like an ultrasound. They want to see results. They want to see that film.

So a lot of people call for it and a lot of it calls for gamma radiography. X-ray is restricted. You have a bit electronic component that you've got to haul around and it's real restrictive. People are not going to call you for very long when they know someone on the island has a source and they can do it faster and for less money.

JUDGE COTTER: Any other questions for Mr. Murray?

MR. BACHMANN: The staff has no further questions.

JUDGE COTTER: Thank you, Mr. Murray. Is there anything further that you wanted to present?

THE WITNESS: No. I think all that needs to be said has been said, sir.

JUDGE COTTER: All right.

[Witness excused.]

JUDGE COTTER: Do you have anything further to present, Mr. Bachmann?

MR. BACHMANN: Let me confer for a moment.

JUDGE COTTER: We'll go off the record.

[Counsel for NRC conferring off the record.]

JUDGE COTTER: Back on the record.

MR. BACHMANN: The staff will not be presenting any additional rebuttal testimony.

JUDGE COTTER: I'm sorry?

MR. BACHMANN: We will not be presenting rebuttal testimony.

JUDGE COTTER: Then that concludes the presentation of the respective cases, then.

MR. BACHMANN: Yes, sir.

JUDGE COTTER: I think we have dealt with all the exhibits, have we not? Let's go off the record for a moment.

[Discussion off the record.]

JUDGE COTTER: In the discussion off the record, the parties and the Board have agreed on the following briefing schedule. The staff's brief will be due March 8. Mr. Murray will respond by March 22 and the staff will have a work week after its receipt of Mr. Murray's answer to respond to his answer, if they decide they want to. If not, they will notify the Board that they will not respond.

Of course, Mr. Murray, you have an obligation of sending your answer to their brief, when you send it to the Board, you send a copy to the staff.

MR. MURRAY: And you gentlemen, also.

JUDGE COTTER: That's right. I want to thank everyone, the witnesses and the parties, for doing a good job and presenting a clear case. I don't see it as an easy case. I think it's a difficult one. It's obviously an

important one in more ways than one.

With that, we will close the hearing.

[Whereupon, at 6:16 p.m., the hearing was concluded.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Fewell Geotechnical Engineering

DOCKET NUMBER: 030-30870-)M

PLACE OF PROCEEDING: Honolulu, Hawaii

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Diane Brayton

Official Reporter
Ann Riley & Associates, Ltd.

Staff Exh # 1
2/14/91

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 02 1990

Docket No. 030-30870
License No. 53-23288-01
EA 90-190

Fewell Geotechnical Engineering, Ltd.
ATTN: Mr. Richard B. Fewell
President
96-1416 Waihona Place
Pearl City, Hawaii 96782

Dear Sir:

SUBJECT: ORDER MODIFYING LICENSE (EFFECTIVE IMMEDIATELY)

The enclosed Order is being issued based on observation[s] [of] personnel of one of your radiographers willfully violating NRC requirements during radiographic operations on October 23 and 25, 1990. The Order prohibits further utilization of this individual in NRC licensed activities for a period of three years from the date of the Order.

The NRC investigation into this matter is continuing. Any further enforcement action will be the subject of separate correspondence.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosure will be placed in the NRC's Public Document Room.

Sincerely,

Hugh L. Thompson, Jr.
Deputy Executive Director for
Nuclear Materials Safety, Safeguards,
and Operations Support

Enclosure: As stated

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 02 1990

Docket No. 030-30870
License No. 53-23288-01
EA 90-190

Thomas E. Murray
802 Prospect St., # 601
Honolulu, Hawaii 96813

Dear Sir:

SUBJECT: ORDER MODIFYING LICENSE (EFFECTIVE IMMEDIATELY)

The enclosed Order is being issued based on observations by NRC personnel of your conduct of radiographic operations in willful violation of NRC requirements on October 23 and 25, 1990. The Order prohibits Fewell Geotechnical Engineering, Ltd, from utilizing you in NRC licensed activities for a period of three years from the date of the Order.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosure will be placed in the NRC's Public Document Room.

Sincerely,

Hugh L. Thompson, Jr.
Deputy Executive Director for
Nuclear Materials Safety, Safeguards,
and Operations Support

Enclosure: As stated

UNITED STATES
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	Docket No. 030-30870
Fewell Geotechnical Engineering, Ltd.	)	License No. 53-23288-01
Pearl City, Hawaii	)	EA 90-190

ORDER MODIFYING LICENSE
(EFFECTIVE IMMEDIATELY)

I

Fewell Geotechnical Engineering, Ltd. (FGE or Licensee) is the holder of Byproduct Material License No. 53-23288-01 issued by the Nuclear Regulatory Commission (NRC or Commission) pursuant to 10 CFR Part 34. The license authorizes the Licensee to receive, possess, and utilize sealed sources of Iridium 192 in industrial radiographic exposure devices. The license was issued on January 26, 1989, was most recently amended on September 29, 1989, and is due to expire on January 31, 1994.

II

Under 10 CFR 20.105 and 20.201 and under FGE License Condition 15 on page 3 of the license and FGE Operating and Emergency Procedures ("OEP"), personnel performing licensed activities under FGE's license are required to conduct radiation surveys to establish the boundaries of restricted areas (OEP Section IV, Paragraph 2.5). In addition, during radiographic operations, personnel are required to determine that the sealed source is returned to the fully shielded position after each source exposure (10 CFR 34.43(b); OEP Section IV, Paragraph 2.6), to secure the sealed source assembly in the shielded position after each source exposure (10 CFR 34.22(a); OEP Section IV,

Paragraph 2.6), to post and rope off the 2mR/hr boundary (OEP Section IV, Paragraphs 2.2 and 2.5), and to prevent entry into the restricted area of individuals other than radiographers and radiographers' assistants (OEP Section I, Paragraph 5; OEP Section IV, Paragraph 2.5). Finally, information provided to the NRC by licensee personnel must be complete and accurate in all material respects (10 CFR 30.9).

Thomas E. Murray, a radiographer for the Licensee, has been a radiographer since December 1987, having satisfied the experience, training, and examination requirements of at least two NRC licensees (the U.S. Navy and FGE). In accord with 10 CFR 34.31, examinations by NRC licensees must include demonstrations by radiographer candidates evidencing their understanding of NRC requirements, including licensee operating and emergency procedures. During an NRC inspection conducted on October 4, 1990, Mr. Murray demonstrated a thorough understanding of proper procedures for surveys, source securing, and control of access into restricted areas.

An NRC investigator and an NRC inspector observed Mr. Murray, conduct radiographic operations on October 23 and 25, 1990 at Campbell Industrial Park, Oahu, Hawaii, contrary to the above-referenced NRC requirements as follows:

(1) on October 25, 1990, Mr. Murray conducted radiographic operations without performing surveys to establish the radiation boundary;

(2) on October 23 and 25, 1990 Mr. Murray failed to rope off any portion of the radiation boundary, and failed to post signs for most of that boundary;

(3) on October 23, 1990, on at least 12 occasions and on October 25, 1990, on at least 5 occasions, Mr. Murray failed to perform surveys of the exposure device to determine that the sealed source had been returned to its shielded position after radiographic exposures;

(4) on October 25, 1990, Mr. Murray failed to secure the radiographic source in the fully shielded position after each of several source exposures;

(5) on October 23, 1990, Mr. Murray failed to prevent entry into the restricted area of individuals other than radiographers and radiographers' assistants.

On October 25, 1990, Mr. Murray was asked by NRC personnel whether, during the NRC-observed operations of October 23 and 25, he had complied with the above-referenced NRC requirements for the conduct of surveys to assure that the source had been retracted to its fully shielded position, for the securing of the source in the shielded position after each exposure, and for preventing the entry of unauthorized personnel into the restricted area. He stated that he

had complied and also demonstrated to the NRC personnel the surv rocedures he stated that he had used on those occasions, i.e., conducting a survey with a survey meter as he approached the radiographic exposure device, and circumferentially surveying the device with a survey meter. This demonstration again showed that he had a thorough understanding of Commission requirements.

III

It appears that Mr. Murray's actions were willful because he was experienced, trained, and knowledgeable concerning NRC and Licensee requirements pertaining to surveys, to securing the source in the fully shielded position after each source exposure, and to preventing unauthorized entry into a restricted area, and because he repeatedly failed to comply with these requirements on at least two days in one week. In addition, Mr. Murray gave the NRC false information concerning his actions, contrary to the observations of two NRC employees. Therefore, the NRC has concluded that this false information was also provided willfully. As a result of these willful violations, the NRC does not have reasonable assurance that Mr. Murray will comply with regulatory requirements. Moreover, Mr. Murray's willful violations of Commission requirements cannot be tolerated.

Consequently, I lack the requisite reasonable assurance that, with Mr. Murray's involvement, the Licensee's current operations under License No. 53-23288-01 can be conducted in compliance with the Commission's requirements and that the

health and safety of the public, including the Licensee's employees, will be protected. Therefore, the public health, safety, and interest require that License No. 53-23288-01 be modified to prohibit the utilization of Mr. Thomas E. Murray in licensed activities. Furthermore, pursuant to 10 CFR 2.204, I find that the public health, safety, and interest require that this Order be immediately effective.

IV

Accordingly, pursuant to Sections 81, 161b, 161c, 161i, 161o, 182 and 186 of the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR 2.204 and 10 CFR Part 34, IT IS HEREBY ORDERED, EFFECTIVE IMMEDIATELY, THAT LICENSE NO. 53-23288-01 IS MODIFIED AS FOLLOWS:

Fewell Geotechnical Engineering, Ltd., shall not utilize Mr. Thomas E. Murray in any licensed activities, including, but not limited to, activities performed by radiographers, radiographers' assistants, and helpers, for a period of three years.

The Regional Administrator, Region V, may relax or rescind, in writing, any of the above conditions upon a showing of good cause by the Licensee.

V

The Licensee, Mr. Thomas E. Murray, or any other person adversely affected by this Order may submit an answer to this Order or request a hearing on this Order within twenty days of the date of this Order. The answer shall set forth the matters of fact and law on which the Licensee, Mr. Thomas E. Murray, or other person adversely affected relies and the reasons as to why the Order should not have been issued. Any answer filed within twenty days of the date of this order may include a request for a hearing. Any answer or request for a hearing shall be submitted to the Secretary, U.S. Nuclear Regulatory Commission, ATTN: Chief, Docketing and Service Section, Washington, D.C. 20555. Copies also shall be sent to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, to the Assistant General Counsel for Hearings and Enforcement at the same address, to the Regional Administrator, NRC Region V, 1450 Maria Lane, Suite 210, Walnut Creek, California 94596, and to the Licensee if the answer or hearing request is by a person other than the Licensee. If a person other than the Licensee or Mr. Thomas E. Murray requests a hearing, that person shall set forth with particularity the manner in which his or her interest is adversely affected by this Order and shall address the criteria set forth in 10 CFR 2.714(d).

If a hearing is requested by the licensee, Mr. Thomas E. Murray, or any other person whose interest is adversely affected, the Commission will issue an

Order designating the time and place of any hearing. If a hearing is held, the issue to be considered at the hearing shall be whether this Order should be sustained.

Upon the Licensee's and Mr. Murray's consent to the provisions set forth in Section IV of this Order, or upon failure of the Licensee and Mr. Murray to file an answer within the specified time, and in the absence of any request for hearing, the provisions specified in Section IV above shall be final without further Order or proceedings. AN ANSWER OR A REQUEST FOR HEARING SHALL NOT STAY THE IMMEDIATE EFFECTIVENESS OF THIS ORDER.

FOR THE NUCLEAR REGULATORY COMMISSION

Hugh L. Thompson, Jr.
Deputy Executive Director for
Nuclear Materials Safety, Safeguards,
and Operations Support

Dated at Rockville, Maryland
this 2nd day of November 1990

Fewell Geotechnical Engineering, Ltd.

PDR
SECY
CA
HThompson, DEDS
JMartin, RV
JLieberman, OE
JGoldberg, OGC
Enforcement Coordinators
  RI, RII, RIII, RIV, RV
BHayes, OI
EJordan, AEOD
DWilliams, OIG
RBernero, NMSS
RCunningham, NMSS
FIngram, GPA/PA
VMiller, GPA/SP
EA File
Day File
DCS

OE	OGC	RV	NMSS	DEDS
JLieberman	JGoldberg	JMartin	RBernero	HThompson
11/2/90	11/1/90	11/1/90	11/2/90	11/2/90

NRC Form 374 (3-83)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 1

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Fewell Geotechnical Engineering, LTD	In accordance with letter dated September 12, 1989 3. License number 53-23288-01 is amended in its entirety to read as follows:
2. 96-1416 Waihona Place Pearl City, Hawaii 96782	4. Expiration date January 31, 1994
	5. Docket or Reference No. 030-30870

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Iridium 192	A. Amersham Model 68309 sealed sources	A. Not to exceed 100 curies per source
B. Iridium 192	B. Gamma Industries Model A-1-A sealed sources	B. Not to exceed 100 curies per source
C. Iridium 192	C. Amersham Model A424-9 sealed sources	C. Not to exceed 100 curies per source
D. Cesium 137	D. Amersham Model 77032 sealed sources	D. Not to exceed 165 millicuries per source

9. Authorized use

A. For use in Amersham Model 683 exposure devices for industrial radiography and in Amersham Model 750 source changers for storage and replacement of sources.

B. For use in Gamma Industries Model Century exposure devices for industrial radiography and in Gamma Industries Model C-10 source changers for storage and replacement of sources.

C. For use in Amersham Model 660 exposure devices for industrial radiography and in Amersham Model 650 source changers for storage and replacement of sources.

D. For use in Amersham Model 773 calibrators for c   ration of instruments.

Staff Ex. #2
DB 2/12/91

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
53-23288-01
Docket or Reference number
030-30870
Amendment No. 1

CONDITIONS

10. Licensed material may be stored at 96-1416 Waihona Place; Pearl City, Hawaii and may be used at temporary job sites of the licensee anywhere in the United States where the U. S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.

11. The individuals listed below are the only persons authorized by this license to act as radiographers or radiographers' assistants as defined in 10 CFR 34.2:

Radiographers	Radiographers' Assistants
Gary Martin	None
Thomas E. Murray	

12. The Radiation Safety Officer for activities conducted under this license is Gary Martin.

13. A. Notwithstanding the periodic leak test required by 10 CFR 34.25(b), such requirement does not apply to radiography sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before use or transfer to another person.

B. Sealed sources authorized for a use other than radiography shall be tested as radiography sources in accordance with 10 CFR 34.25.

14. The licensee is authorized to receive, possess, and use sealed sources of iridium 192 or cobalt 60 where the radioactivity exceeds the maximum amount of radioactivity specified in this license provided:

A. Such possession does not exceed the quantity per source specified in Item 8 by more than 20% for iridium 192 or 10% for cobalt 60;

B. Records of the licensee show that no more than the maximum amount of radioactivity per source specified in this license was ordered from the supplier or transferor of the byproduct material; and

C. The levels of radiation for radiographic exposure devices and storage containers do not exceed those specified in 10 CFR 34.21.

15. Pursuant to 10 CFR Part 40, "Domestic Licensing of Source Material", the licensee is authorized to possess, use, transfer, and import up to 999 kilograms of uranium contained as shielding material in the radiography exposure devices and source changers authorized by this license.

16. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License No. 53-23288-01
Docket or Reference number 030-30870
Amendment No. 1

CONDITIONS

(continued)

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. NRC Form 313 dated October 24, 1988
B. Letter dated January 13, 1989
C. Letter dated September 12, 1989

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date SEP 29 1989

By Beth A. Riedlinger
Beth A. Riedlinger
Health Physicist (Licensing)
Nuclear Materials Safety Section
Region V

NRC FORM 313 (1-84) 10 CFR 30, 32, 33, 34, 35 and 40

rec'd 10/26/88

U.S. NUCLEAR REGULATORY COMMISSION APPROVED BY OMB 3150-0120 Expires: 5-31-87

APPLICATION FOR MATERIAL LICENSE

L+L 23288

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN: 030-30870

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

[X] A. NEW LICENSE
[ ] B. AMENDMENT TO LICENSE NUMBER ____________
[ ] C. RENEWAL OF LICENSE NUMBER ____________

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip Code)

FEWELL GEOTECHNICAL ENGINEERING, LTD.
96-1416 WAIHONA PLACE
PEARL CITY, HAWAII 96782

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

96-1416 WAIHONA PLACE
PEARL CITY, HAWAII

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION: RICHARD B. FEWELL

TELEPHONE NUMBER: 808-455-6569

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)
FEE CATEGORY 3-0 AMOUNT ENCLOSED $ 700.00

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE—CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
Richard B. Fewell	RICHARD B. FEWELL	PRESIDENT	10/24/88

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS: [ ] <$250K [ ] $250K–500K [ ] $500K–750K [ ] $750K–1M [ ] $1M–3.5M [ ] $3.5M–7M [ ] $7M–10M [ ] >$10M

b. NUMBER OF EMPLOYEES (Total for entire facility excluding outside contractors)

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION (Dollar and/or staff hours) ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? (NRC regulations permit it to protect confidential commercial or financial—proprietary—information furnished to the agency in confidence) [ ] YES [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
App	Oct-1-V	30	Staff Rev. 2 RB 2/17/91	M. Hussin
AMOUNT RECEIVED: $700	CHECK NUMBER: 013173			DATE: 11/1/88

PRIVACY ACT STATEMENT ON THE REVERSE

70854

FEWELL
GEOTECHNICAL
ENGINEERING, LTD.

January 13, 1989

United States Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, California 94596-5368

Attention: Ms. Beth A. Riedlinger
Health Physicist

RE: Docket No. 030-30870
Control No. 70854

Gentlemen:

Enclosed for your review is a resubmittal of the items referenced in Docket No. 030-30870.

We will be contacting Mr. Leonard Gordon in Washington, D.C. regarding the Quality Assurance Program.

If you need any additional information, please do not hesitate to contact us.

Respectfully submitted,

FEWELL GEOTECHNICAL ENGINEERING, LTD.

By Richard B. Fewell

RBF/lse

Enclosures

70854

96-1416 Waihona Place • Pearl City, Hawaii 96782 • (808) 455-6569 • FAX 456-7062

NPC License Application

ITEM 5

Sealed Sources

	Element	Manufacturer	Model No	Max Activity Per Source
A	IR-192	Tech-Ops	68309	100 Ci
B	IR-192	Gamma Industries	A-1-A	100 Ci
C	IR-192	Tech-Ops	A 424-9	100 Ci
D.	CS-137	Tech-Ops	773	0.140 Ci

Exposure Devices

	Model No	Manufacturer
A	683	Tech-Ops
B.	Century	Gamma Industries
C	660	Tech-Ops
D.	773	Tech-Ops

Source Changers

	Model No	Manufacturer
A	750	Tech-Ops
B	C-10	Gamma Industries
	U1-10	Gamma Industries
C	65[illegible]	Tech-Ops

ITEM 6

The licensed material will be used for industrial radiography and source changes and survey meter calibration. Survey meter calibration will be for in-house meters only.

ITEM 7

Gary Martin will be the designated Radiation Safety Officer and will be responsible for the radiation safety program and training of radiographers and radiographer assistants.

Initial radiographer certification - 1963 at X-Ray Engineering Company, 2825 Koapaka Street, Honolulu, Hawaii.

Employed as radiographer and Radiation Safety Officer for the following:

X-Ray Engineering Co., 2825 Koapaka Street, Honolulu, Hawaii - 10-63 to 12-64

Industrial Testing and Inspection Co., 2825 Koapaka Street, Honolulu, Hawaii - 12-64 to 9-69

Aerojet Nuclear, Idaho Falls, Idaho - 9-69 to 12-72

Pittsburgh Testing Labs., Pittsburgh, Pennsylvania - 4-73 to 11-74

Pittsburgh Testing Labs., Honolulu, Hawaii - 10-76 to 12-78

Construction Engineering Consultants, Laughlintown, Pennsylvania - 12-78 to 1985

Barbara Fair will be certified as a radiographer, initial radiographer certification - December 1982 at U.S. Navy Service School Command, San Diego, California.

Employed as radioghrapher - U.S. Navy - 12-82 to 2-85

Walashek Enterprises, Pier 1, Honolulu, Hawaii - 4-85 to 4-86

Finlay Testing Labs., 99-940 Iwaena Street, Aiea, Hawaii - 7-86 to 9-87
C & R Testing, 2248 Aumakua Street, Pearl City, Hawaii - 4-88 to present

ITEM 8

Training shall be conducted by Gary Martin, R.S.O, in accordance with the attached training program.

ITEM 9

All radiography will be performed at temporary job sites.

ITEM 10

See attached "Safety Program" and "Operating and Emergency Procedures".

ITEM 11

All radioactive material will be disposed of by returning to the original supplier or other specific licensee authorized to possess the licenced material.

SECTION I
General Safety Rules

1.0 Prior to performing any operations with radioactive material, each radiographer and radiographers assistant must be wearing a personnel dosimeter and film badge.

2.0 Dosimeters shall be charged prior to use.

3.0 A calibrated and operational survey meter shall be in use during all operatons involving radioactive material.

4.0 Radiographers assistants shall be under the direct supervision of a radiographer when performing tasks associated with radiographic material.

5.0 Only radiographers and radiographersassistants shall be permitted inside the 2 Mr/Hr boundry.

6.0 The radioactive material shall always be under the direct surviellance and control of the radiographer unless it has been positively secured to prevent unauthorized use.

SECTION IV
Radiographic Operations

1.0 Preparation for Travel to Job Site

1.1 Observe the requirement of Section II and Section III.

1.2 Inspect radiographic equipment and complete applicable parts of daily utilization log.

1.3 Assure that all safety equipment is available

a. Personnel dosimeter and film badge

b. Survey meter

c. Ropes and signs

2.0 Job Site Operations

2.1 Advise job supervisory personnel that radiography is to take place.

2.2 Establish the radiation boundry with ropes and radiation area signs.

2.3 Bring exposure device inside the radiation area and connect guide tube and control cable.

2.4 Assure that no one is in the radiation area.

2.5 Expose the source and conduct a survey of the radiation boundry. Move the boundry as required to establish the 2mR/hr boundry. After the 2mR/hr boundry has been established and verified, post the high radiation area. Use the inverse square law to determine the high radiation area. Maintain surviellance to prevent unauthorized entry into the radiation area.

2.6 Immediately following each exposure, the following steps are to be taken:

a. Check dosimeter

b. Survey all sides of the exposure devises and the guide tube

c. Lock the exposure device

2.7 When radiography has been completed, disconnect the guide tube and control cables. Remove all ropes and signs and advise job site personnel that radiography is finished.

2.8 On returning to the storage site, perform a survey of the exposure devise on all sides and return to storage vault. After storing, perform a survey on the sides and top of the storage vault.

2.9 Complete the daily utilization log.

FEWELL
GEOTECHNICAL
ENGINEERING, LTD.

September 12, 1989

United States Nuclear Regulatory Commission
Region V
450 Maria Lane, Suite 210
Walnut Creek, California 94596-5368

Attention: Mr. Beth A. Riedlinger
Health Physicist

Re: Docket No. 030-30870
License No. 53-23288-01

Gentlemen:

Enclosed for your review is the radiographic training and experience background of Mr. Thomas E. Murray, Social Security No. 109-50-2373. We hereby request that he be added to our material license as a radiographer. We have enclosed a $230.00 check to cover the amendment fee per 10CFR 170 Part 170.31(30).

If you need any additional information, please do not hesitate to contact us.

Respectfully submitted,

FEWELL GEOTECHNICAL ENGINEERING, LTD.

By Richard B. Fewell
President

RBF/fse

Enclosure

Aug-2-E
01421
$230
30
Hand
9/5/89
9/5/89

71047

96-1416 Waihona Place • Pearl City, Hawaii 96782 • (808) 455-6569 • FAX 456-7062

THOMAS E. MURRAY

802 Prospect Street #601
Honolulu, Hawaii 96813

June 1978 - December 1980

Navy, U.S.S. Fulton AS-11 New London Ct.

Duties: Fireparty Team Member, Sheetmetal Journeyman. Fabricated sheetmetal ducting, cabinets and various renevations on Nuclear Submarines.

January 1981 - June 1981

Attended Non-Destructive Testing School. San Diego Naval Base Service School Command. 360 hrs. of Visual Penetrant and Magnetic Particle Test Methods.

80 hrs. of Radiation Safety, NRC Rules and Regulations and proper handling of Radioactive Isotopes.

320 additional hrs. of Radiography Training, Film Developing and Safe Handling of Radioactive Isotobes and X-Ray Units.

Graduated #2 in a class of sixteen.

June 1981 - December 1984

U.S.S. Hector AR-7 San Francisco, California.

Duties: Qualified after approximately 160 hrs. of Radiographer Assistant traning as a Radiographer. Also qualified VT, MT, PT and attended five weeks of Radiographer Inspector Training at Naval Station School Command San Diego during October 1982.

Performed NDT Services on Surface Ships home ported in the San Francisco Bay area. Supervised NDT Lab from November 1983 to November 1984. Acted as Senior Radiographer and maintained NRC records and training.

February 1985 - November 1985

Pittsburgh Testing Laboratories, Emeryville, California

Duties: Spent approximated 360 hrs. as a Radiographer Assistant in the field of utilizing 1R192. Qualified Radiographer and performed field Radiography regularly.

Worked on PG&E Oil Pipelines, Nitrogen Pipel e in Sunnyvale area, aircraft, structural steel, concrete, military explosives and welder qualifications. Other duties were soil inspections, concrete inspections and weld inspections. Qualified as VT, MT, PT Inspector and RT operator/inspector.

April 1986 - February 1989

Navy - Sub-base NDT Lab Pearl Harbor Hawaii

Duties: Nuclear and Non-Nuclear Radiographer VT, MT, PT Inspector, Ultrasonic Thickness and Silverbraze. Selected in October 1986 for Divisional and Work Center Training Petty Officer in charge of Training Lectures, Documentation and Scheduling. Train Personnel in Radiation Safety with Sub-base RSO (approximately 4 hrs. per week classroom and 8 hrs. of Practical Training). Acquired more than 400 hrs. of sub-base Radiation Safety Training before being certified as RT Operator. Other responsibilities were Radiation Worker for sub-base, Quality Assurance Inspector for NDT Lab.

FROM: HT1 R. LOPEZ
COMMAND NDT EXAMINER
SUBASE PEARL HARBOR

TO: WHOM IT MAY CONCERN

SUBJ.: RADIOGRAPHIC ASSISTANT QUALIFICATIONS OF T.E. MURRAY

Thomas E. Murray, completed 400 hours of radiographic assistant training at SERVICE SCHOOL COMMAND, NAVAL STATION, BOX 6, SAN DIEGO, CALIFORNIA 92136-5006.

Upon completion of said training, Mr. Murray completed 100 hours of train under the supervision of a qualified radiographer before qualifing as radiographer operator. On 4 Dec. 1987 Mr. Murray qualified as a radiographic inspector.

NDT EXAMINER

COMMAND EXAMINER
QA DIV/REPAIR DEPT
NAVAL SUBMARINE BASE
PEARL HARBOR, HI 96850

3827
NUMBER