

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

1 In the Matter of:

2 IE TMI INVESTIGATION INTERVIEW

3 of Frazier L. Bronson, Vice President, Mid-West Division
4 of the Radiation Management Corporation

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9 Trailer #203
NRC Investigation Site
10 TMI Nuclear Power Plant
Middletown, Pennsylvania

11
12 May 15, 1979
(Date of Interview)

13 July 1, 1979
14 (Date Transcript Typed)

15 195
16 (Tape Number(s))

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21 NRC PERSONNEL:
22 Robert Marsh
23 Thomas H. Essig

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1 MARSH: The date is May 15, 1979. The time is 9:14 AM. We are located
2 in the offices of the U. S. Nuclear Regulatory Commission in Glen Ellyn,
3 Illinois. I am Robert Marsh, that's MARSH, Investigator with the USNRC
4 and we are here this morning to conduct a interview of Mr. Frazier L.
5 Bronson, BRONSON, Vice President, Mid-West Division of the Radiation
6 Management Corporation, that's located at 356 Commercial Avenue, North
7 Brook, Illinois, 60062. Before starting, I'd like each individual in
8 the room to identify themselves, spell their last name, and identify
9 their position. Tom, if you would.

10
11 ESSIG: My name is Thomas H. as in Harold Essig, last name spelled
12 ESSIG. My title is Chief, Environmental and Special Projects Section,
13 USNRC, Region III.

14
15 MARSH: Okay, Mr. Bronson if you'd identify yourself.

16
17 BRONSON: My name is Frazier Bronson and I am Vice President of the
18 Mid-West Division, Radiation Management Corporation.

19
20 MARSH: Okay. I will ask that we pull that microphone a little bit
21 closer. We'll try it like that and see how we do. Mr. Bronson we
22 talked, or Mr. Bronson we talked for a few minutes before I turned the
23 tape on, regarding what we want to cover. I would like you to go into
24 your background, before we begin that I'd like to get a few things just
25

1 on the record. The NRC is conducting an investigation of the Three Mile
2 Island accident and as such we're going through quite a few interviews.
3 In the course of these interviews, we are using a tape recorder and if
4 this does present any problem to you, we can take written notes as
5 opposed to a tape recorder. If this is satisfactory to you, I'd like
6 your permission at this time to continue to tape the interview.
7

8 BRONSON: That's satisfactory.
9

10 MARSH: Fine. If you so desire, at the conclusion of this interview I
11 will get you a copy of the tape and as the transcript is available I
12 will provide you also a copy of that transcript.
13

14 BRONSON: I'd appreciate that.
15

16 MARSH: Okay. Then at that point then, Mr. Bronson if you would, give
17 us some of your background with Radiation Management Corporation and
18 your association with Metropolitan Edison and Three Mile Island.
19

20 BRONSON: Okay. I have a Bachelor's Degree in Nuclear Engineering from
21 the University of Missouri in 1964, and in 1965 a Master's Degree in
22 Radiological Health from the University of Oklahoma. I worked for 4
23 years with the Armed Forces Radiobiology Research Institute in Bethesda,
24 Maryland as the head of their Radiological Measurements Laboratory and
25

1 have then worked for 10 years with Radiation Management Corporation in
2 various positions but always involving aspects of radiation measurement
3 both in samples and in environmental areas and in personnel such as
4 whole body counting. We as, or one of many consultants involved with
5 Metropolitan Edison and have performed various projects for them over
6 the past 5 or 10 years, including environmental monitoring at the Three
7 Mile Island site.

8
9 MARSH: Okay. Tom you have some questions I believe.

10
11 ESSIG: I'll be giving my name before this, before I ask the questions,
12 so the gal transcribing can keep us straight. This is Essig speaking.
13 Frazier, you indicated that you were a contractor, that Radiation Manage-
14 ment Corporation was a contractor with Metropolitan Edison, was that
15 true on the date in question here, March 28th through the 30th?

16
17 BRONSON: We, at that time were on the site with a contract for whole
18 body counting and have a portion of the environmental monitoring program.
19 That portion, I believe is the QA type portion of the program but not
20 the major portion of the environmental monitoring program at the moment.

21
22 ESSIG: You were under a contracts for the Analytical Services that you
23 were providing on the dates in question, what are the other contracts
24 extended to cover that?

1 BRONSON: That is true.

2
3 ESSIG: Okay. What time did you, time and date did you arrive onsite,
4 approximately could you recall?
5

6 BRONSON: I received a phone call on the, get my calendar here, on the
7 Thursday. Okay, on the morning of the 29th which was about 5:30 in the
8 morning, that's Chicago time and that was from our people in Philadelphia
9 and requesting that I go out there immediately and provide some assistance
10 in sample measurement to several of our other people and with some of
11 our other equipment that was on the way out there. I called back to the
12 station about a half an hour later and confirmed this and made reservations
13 on the next plane going out which left roughly at 9 and got there roughly
14 at 1, so I think I was physically on the site about 2 in the afternoon
15 on the 29th.
16

17 ESSIG: About 2 in the afternoon on the 29th.
18

19 BRONSON: I'm not exactly sure of the times.
20

21 ESSIG: Approximately.
22
23
24
25

1 BRONSON: But you can check that by looking at the plane schedule.
2

3 ESSIG: Right. To whom were you reporting in Met Ed? Who was calling
4 or, giving you most of your direction during your stay onsite?
5

6 BRONSON: Well, ultimately we had 3 or 4 different projects and each one
7 had more or less a different person in charge of them. The various
8 people that were giving us direction were initially Sid Porter for
9 sample analysis and then people from the station in that same capacity,
10 Tom Mulleavy and Dick Dubiel when they were available, but primarily
11 through Sid Porter on sample analysis. Whole body counting was typically
12 done through existing station procedures and that contact ended up being
13 Dave Limroth or under other certain circumstances Sid when he was around
14 for that or involved in that part of it, and also in that category was
15 Mike Buring on Bioassay Result Whole Body Counting.
16

17 ESSIG: Now, you indicated there were several areas and I just want to
18 make sure that I have these all straightened out. We're talking about
19 actual sample counting that was one area, whole body counting was another.
20

21 BRONSON: A third area which I didn't mention was respirator testing
22 which was, I believe, after the, I believe that was into April and then
23 we were doing offsite environmental analysis which was not coordinated
24 through me on the site. That was done through the laboratories in
25 Philadelphia.

1 ESSIG: Okay. This would be the normal offsite, the QA portion of the
2 environmental monitoring program?
3

4 BRONSON: Yes, and some portions of it I suspect which were augmented
5 because of the incident there.
6

7 ESSIG: Okay. When did the whole body counting portion of your work
8 begin?
9

10 BRONSON: Well, it was, the counter was there covering the outage from
11 Unit 1.
12

13 ESSIG: Oh okay.
14

15 BRONSON: And so when the incident occurred, the site was evacuated
16 including our operator and he got, he was there but we finally got
17 clearance to get the truck off the site. About the same time I got
18 there so, I think the truck was just leaving the gate about 2 o'clock in
19 the afternoon on the 29th, when I got there. We pulled it over to the
20 Electrical Substation, I forget the name of it, it's behind the hill
21 behind the Observation Center.
22
23
24
25

1 ESSIG: It would be the 500 Kv Substation?

2
3 BRONSON: Yes, I think so.

4
5 ESSIG: I think it's commonly referred to as that.

6
7 BRONSON: Yeh. It's the one over the hill behind the Observation Center.
8 And, so we had the counters electrically connected on within a couple of
9 hours and we washed it down because there was surface contamination on
10 it, the zenons read some of the dust particles so just a light washing
11 with a damp cloth knocked most of that down. We were up counting 5 or 6
12 o'clock in the evening.

13
14 ESSIG: Now when you say zenons were observed on the dust particles, do
15 you actually, did you see zenon in your background then and the?

16
17 BRONSON: Yes.

18
19 ESSIG: In the whole body counter?

20
21 BRONSON: Very much so.

1 ESSIG: A very significant peak?
2

3 BRONSON: Yes, a very significant peak and significant amounts at that
4 time.
5

6 ESSIG: And the wash down then, essentially that pretty much get rid of
7 it or?
8

9 BRONSON: Reduced it quite a bit and then what we were left with was
10 things which were of an atmospheric nature, you could see. Changes in
11 the background going periodically, as I presumed the wind changed direc-
12 tions.
13

14 ESSIG: Okay. I think that pretty much coincides with the experience of
15 others onsite, that as the wind shifted, I know our own laboratory there
16 was seeing the xenon peak in the background. Okay.
17

18 BRONSON: Yeh and we were seeing it up in the other mobile lab too.
19

20 ESSIG: The whole body counting activities, were they under your direct
21 supervision or were you mostly in, on the, associated with the sample
22 analysis?
23
24
25

1 BRONSON: I was, at the time I was there in charge of all of RMC's
2 personnel onsite, however, I did spend more of my time in the sample
3 analysis because I had another guy there, Herman Daniel who was quite
4 capable of the whole body counting and I could let him be in charge of
5 most of that operation plus we had a good Whole Body Counting Tech there
6 too. So, that was one area I could let them handle more of a direct ...
7

8 ESSIG: That part of it pretty much ran itself then, as far as?
9

10 BRONSON: Well, there were some initial problems in getting set up to
11 conveniently analyze, to conveniently let the computer analyze the bulk
12 of the data due to the high xenon contributions and we could, we have
13 techniques to where we can operate under a predictable but varying
14 background. One technique is you, you only look at things greater than
15 300 Kev which includes, which means you can still see the iodines, but
16 it does tend to reduce the xenon contribution from the background signifi-
17 cantly. The second thing we can do is, if you have a predictable amount
18 of, a predictable background spectra as we did there, which was due to
19 one peak, or due to one particular combination of nuclides, the xenons
20 and then was due to only two different circumstances, one where the
21 xenon clouds were in the vehicle itself and the second was when they
22 were way up in the sky. We could treat those two background spectra as
23 a standard and therefore, analyze or eliminate them from the background
24 so then after a day or so we were, I think after the second day, we were
25 able to count people with very little interference from the xenon background.

1 ESSIG: Is this something that you, did you program into your mini-computer
2 to handle or was this a hand correction that you had to make?
3

4 BRONSON: No, after we got it in the computer, it was, the computer
5 handled it all and then we could just visually observe to make sure that
6 there weren't any surprises in the data, visually observe the spectra.
7

8 ESSIG: Did you during your, the whole body counts performed on the 29th
9 and the 30th encounter any positive iodine results?
10

11 BRONSON: Yeh. There were positive iodine results on or in people. The
12 bulk of them, as I recall, I made a summary about 5 or 7 days into the
13 incident, where we had counted by that time about a 150 different people
14 and of the 150 there was only 1 confirmed and 1 suspected case where the
15 body content was greater than the investigation level for Iodine-131,
16 the investigation level being 300 nanocuries. And, although I don't
17 know, don't remember the exact numbers, it was approximately 10 to 15 of
18 them were between 20 and 30 of them were between 50 and 100 nanocuries
19 and the rest of them were all less than 50 nanocuries of iodine, half
20 being detectable, meaning between roughly 10 and 50 and the other half
21 of the remainder of it being less than detectable. So there were,
22 essentially negligible amounts of iodine in people. There were a couple
23 of cases where it was definitely on people, like on their hands or
24 something like that which is not surprising. But even those were rather
25 small amounts.

1 ESSIG: What techniques do you employ (excuse me) to determine whether
2 the contamination is external or internal and how do you correct for
3 that?
4

5 BRONSON: Okay. There's two things that the computer ends up with, one
6 is a fifth parameter which is a quantitative estimate of the difference
7 in spectral shape between the source when it's in the manner which it
8 was calibrated, say in the manner we expect it to be in the body, either
9 uniformly distributed or contained within the body versus the difference
10 between the source, the spectra of that source on the individual. If
11 the activity is in a different position on the man, say on his hands or
12 on the outside of his body, then the spectral shape is different and
13 then therefore, the fifth parameter is larger than we normally expect,
14 so that's our first clue. And the second clue is in this particular
15 kind of a counter, it's a scanning bed counter and we do look at gross
16 activity versus time, which means gross activity versus position. So
17 then we have a positionally spectra which tells us where the activity is
18 on the person, so the most common things or where you have it on his
19 hands and his hands are layed on his sides so you see large peak of
20 activity down below the waist area as opposed to in the upper thorax
21 area which you would expect a fresh iodine inhalation to be.
22
23
24
25

1 ESSIG: Then do you get ...

2
3 BRONSON: Well then the third way, you have for confirming it is not
4 legimate internal as by doing a recount and looking at how fast or how
5 slowly the item goes away, I mean if you suspect it's on his hands, tell
6 him to go back and wash his hands.

7
8 ESSIG: Is that a procedure that you ordinarily follow when you see,
9 from this profile, that it appears to be external contamination? Do you
10 ordinarily request the individual to go wash and come back for a recount?
11

12 BRONSON: The standing procedure at, well each plant has its own levels
13 which we as contractors adhere to and as I recall the particular level
14 at (excuse me) Three Mile Island was, that existed before the incident
15 was notify station people when something is greater than an investigation
16 level and at that point then they will decide what action to take, such
17 as showering and recounting. If it's less than a investigation level,
18 it's reported at the routine frequency.
19

20 ESSIG: Okay. Do you, when counting for I-131 in the thyroid, I guess
21 this is, we haven't established here, but it's my understanding, then
22 confirm me, confirm this that you don't have a small detector that's
23 actually placed next to the thyroid, you do this by your bed?
24
25

1 BRONSON: Yeh. Yeh. First of all we are counting for Iodine-131 in the
2 total body not in the thyroid.

3
4 ESSIG: Okay.

5
6 BRONSON: It's a total body counter.

7
8 ESSIG: Okay. And how do you then go ...

9
10 BRONSON: It uses a single 8 x 4 sodium iodine detector, that's for
11 stationary, and the man moves underneath the detector.

12
13 ESSIG: Okay. And then how is the thyroid burden actually assessed?

14
15 BRONSON: The body burden is the limiting factor which assumes that the
16 nuclide is in the thyroid in the according distribution, so you don't
17 directly assess a thyroid, burden ever, it's a total, it's a whole body
18 counter and the body burden is 700 microcuries assuming that it is
19 distributed in a manner which makes the thyroid as the critical organ.

20
21 ESSIG: Okay. So the burdens you mentioned earlier, the investigation
22 level at 300 nanocuries was a total body burden.

1 BRONSON: Yes.

2
3 ESSIG: Okay.

4
5 BRONSON: Indirectly we, and that's another method we have of confirming
6 that it is not an internal, of a, differentiating between external and
7 internal contribution. There is a small shield, small in physical size
8 but of adequate thickness to stop the iodine, the 364 Kev gammas and
9 under certain cases, we can count the guy twice, once with the shield
10 over his thyroid and once without the shield over his thyroid and can by
11 the difference in those two counts determine how much iodine is in the
12 thyroid.

13
14 ESSIG: Did you have to employ that particular technique during the
15 initial period following the incident?

16
17 BRONSON: Yeh, it was used on a couple of cases. I'm not sure, not
18 sure of the exact days of those cases whether they were within the first
19 three or four days or the first two weeks that I was down there. But
20 during that two week period, it was used several times.

21
22 ESSIG: Would that have been detailed in this report that you had mentioned
23 that which covered the whole body counts, five to seven days post incident?
24 Would that, the individual, for example, the one you mentioned that was
25

1 over the investigation level of 300 nanocuries, would that have been
2 used on him for example ...
3

4 BRONSON: I'm certain that it would of for those high guys. Generally,
5 we use that if we're trying to differentiate between a relatively large
6 external contamination versus the fairly small body burden level of
7 Iodine-131 and, although I can't, I didn't bring those records on whole
8 body counting with me, so I haven't reviewed them in a while, that's the
9 normal technique we generally do on the higher ones anyway.
10

11 ESSIG: Okay.
12

13 BRONSON: I'm sure it was done on some that were less than the 300
14 nanocurie level to just because they were the technologically important
15 ones at the time.
16

17 ESSIG: And the report that you mentioned...the summary?
18

19 BRONSON: It wasn't a report, it was a summary that I gathered for
20 information at a internal meeting. I just went through all the records
21 and categorized.
22
23
24
25

1 ESSIG: It was not something that was given to Met Ed then?
2

3 BRONSON: It was not a formal report that I gave to Met Ed. Somebody,
4 can't think of the name, somebody within the health physics support
5 group and I, Bob Labamonye, can't, that's why I can't remember his name.
6

7 ESSIG: No, it doesn't ring a bell.
8

9 BRONSON: He and I sat down and went through, in preparation for a
10 internal meeting that was held, went through all of the results that had
11 been held and categorized them into several different levels. Just went
12 through the results that I had already looked at and approved and just
13 got summaries of numbers of people within certain different ranges of
14 iodine activity.
15

16 ESSIG: Okay. When you say internal meeting, was this yourself and this
17 fellow that you, whose name ...
18

19 BRONSON: In the meeting that he went to, that I didn't go to.
20

21 ESSIG: Oh, I see. But was the meeting presumable within, between Met
22 Ed and their contractors? Is that the you said health physics support,
23 I assume that meant ...
24
25

1 BRONSON: I'm not certain. It's the contract health physics support
2 group that was over there and it was a meeting they were having. I'm
3 not certain what the substance of the meeting was, it may have been an
4 internal meeting there, it may have been one of the daily meetings that
5 were held with, between them and Met Ed and the NRC. I'm just not
6 certain of what meeting it was.

7
8 ESSIG: Do you have a copy either in your Chicago office or in your
9 Philadelphia office of that summary that you'd put together? Would that
10 be available, should we request it through Met Ed?

11
12 BRONSON: I know in preparation for that I wrote in a log book that
13 didn't start, okay so this meeting must of been well after the first
14 week. It's when we had counted about 150 people, which I think was into
15 the second week there.

16
17 ESSIG: Okay. I think you'd indicated it summarized the first five to
18 seven days.

19
20 BRONSON: It summarized the first 150 people and I'm not certain when
21 that occurred.

1 ESSIG: Okay.

2
3 BRONSON: It was after I started keeping a second record book, which
4 must of been about six or seven days later and in that record book I
5 summarized the data, priliminarily on my own. Then I think when the next
6 day, and there were probably a few more people counted in that interim,
7 Bob and I sat down and went through and did a formal summary on a form,
8 or information that he had and I don't think I kept a copy, at least I'm
9 not certain where a copy is of that summary. The original data is
10 there, so the summary could always go back and be reconstructed.

11
12 ESSIG: Okay. And the original data had been provided to Met Ed then?

13
14 BRONSON: I presume they have, although I have no direct knowledge of
15 it, I presume they have by now.

16
17 ESSIG: Okay.

18
19 BRONSON: I didn't physically carry over, what I was there and give a
20 stack of data to Met Ed on all the whole body counts. We notified them
21 when there were high results. Typical

1 ESSIG: Okay. Greater than the investigation results?
2

3 BRONSON: Greater than the investigation. Typically, then we go back of
4 the order of a month later, provide them the official data and various
5 kinds of summaries.
6

7 ESSIG: Is this an arrangement which they had previously set up with
8 you, in other words, don't, only inform me orally of the counts greater
9 than the investigation level?
10

11 BRONSON: Yes. As I understand it, that was a standard standing arrange-
12 ment with Met Ed.
13

14 ESSIG: Okay. How we doing on the tape there?
15

16 MARSH: We're okay. Fine, you may continue.
17

18 ESSIG: I'd like to switch the emphasis at the moment to the gamma
19 spectroscopy that was performed on samples that had been collected and
20 maybe there might be a question or two with respect to the whole body
21 counter that we could come back to and one of the reasons that I'm
22 focusing on the whole body counter is because it, I think it became
23 apparent to me at the beginning of the interviews that since I was gonna
24 be the only one for the investigation team to speak to you that I better
25

1 ask you some questions on the whole body counting too. So, with respect
2 to the sample counting that you had to do onsite, I think you've established
3 that you were set up approximately at about 2 o'clock in the afternoon
4 on the 29th to begin the counting.
5

6 BRONSON: That was with respect to whole body counting.
7

8 ESSIG: That was with respect to whole body counting.
9

10 BRONSON: Whole body counting I, 4ish or so in the afternoon or 5 in the
11 afternoon. The sample analysis lab was set up, oh roughly 7 or 8 or 9
12 in the evening, we could of begun counting then but we were in, we were
13 calibrating really up until roughly midnight, according to my records,
14 roughly midnight was about the first time a real sample was analyzed.
15 We could have counted it earlier had one been presented that was important
16 enough.
17

18 ESSIG: Were the samples that you were asked to count in, were they
19 presented to you in a configuration which was, geometry that you are
20 normally calibrated for?
21

22 BRONSON: Let's see. We counted a variety of samples, many of them were
23 in geometries, we were easily configured, most of them were in geometries
24 that were not different from geometries in which we were configured, you
25

1 know, we could easily use an alternate geometry. A few of them were in
2 some strange weird geometries that we could only give estimates on, but
3 those were by far the exception and they were.
4

5 ESSIC: Were these strange ones, were they liquid samples or?
6

7 BRONSON: Well initially we started receiving liquid samples in an
8 unusual geometry but we also had some liquid standards there which later
9 in that afternoon or later following these unusual sample geometries, we
10 then we recalibrated for that unusual geometry. Like some one liter
11 beakers we ended up placing on the side and then we calibrated in the
12 field for 3 1/2 liter Marinelli beaker geometry by also diluting a
13 master standard down to that geometry. Both of those geometries we did
14 not have prepared when we, or we did not have calibrated for when we
15 went there. The detector was already calibrated, it was one we've been
16 using very routinely in the Philadelphia labs so it came with a set of
17 calibration curves and then we, first thing we did which is why it was
18 about 4 hours before we were counting was to calibrate for some much
19 higher activity samples because this is what we were told to expect
20 would be the case. And there were some quite hot samples so we were
21 calibrating at 2, 3, 4, 5 feet, or 2, 3 and 4 feet away from the detector.
22 And we were spending quite a bit of time getting set up for that. But
23 the bulk of the content type geometries were done ahead of time and
24 simply verified out there.
25

1 MARSH: Okay. We're at a break point, I'm going to stop this tape for a
2 moment. The time being 9:44 and turn it over.
3

4 MARSH: The time is 9:45. We're picking up again, the meter reads 478
5 and Tom you were just asking some questions.
6

7 ESSIG: Okay. Frazier did you experience any problems with the background?
8 I think you had already established that you were on the whole body
9 counter, I presume that extended to your other detector as well, the one
10 used for sample counting.
11

12 BRONSON: Well, we were experiencing very definite background fluctuations
13 and background changes with a GeLi detector, however, they are not
14 nearly as significant of a problem per say because, first of all the
15 nuclide of concern was not the zenons there and a GeLi detector has a
16 nice advantage of it being pretty selective, so even though you do have
17 a high count rate of one nuclide, it still doesn't make it impossible to
18 see other nuclides, especially if they're higher energy, which was the
19 case with the Iodine-131. Those cases when the background was very very
20 high, and we could not tell whether the zenon was on the sample or on
21 the, in the background, we so indicated on the report that, couldn't
22 report it. Fortunately, the kinds of samples that we were dealing with
23 were air samples and it's not certain what one does with the zenon
24 number on an air filter anyway.
25

1 ESSIG: Was there any attempt to your knowledge with either at that, at
2 the suggestion of Metropolitan Edison or at your own suggestion to
3 remove the xenon from the charcoal by purging, just to reduce the back-
4 ground, to better be able to be in a position to more easily quantify
5 the iodine or any iodine that may have been there?
6

7 BRONSON: I know we talked about it a week or so later, but I want to
8 emphasize the point I said earlier. The xenon background did not interfere
9 with the ability to detect iodine. It interfered with the ability to
10 determine whether or not xenon was in the background or on the sample
11 you were counting but didn't interfere with the ability to quantify
12 Iodine-131.
13

14 ESSIG: Okay. Could you summarize the different types of samples that
15 you were given to be counted as to their source, like you already estab-
16 lished that you had charcoal cartridges, now were these from both in-plant,
17 like effluent monitors and from out-of-plant or?
18

19 BRONSON: The best that I can remember, the first few days the samples
20 were, that we were getting, were primarily air samples which were charcoal
21 cartridges and particulate pre-filters on the cartridges and they were
22 from three sources: one and being the most important one, meaning the
23 samples which we analyzed, first if they were there, were Control Room
24 air samples; second being other in-plant breathing air type samples, the
25

1 Control Room samples or breathing air samples, other in-plant or onsite
2 samples, and the third ones were special offsite samples, special meaning
3 apparently not a part of the routine environmental monitoring program
4 but part of the emergency environmental monitoring program. So those
5 were the three best or major categories of air samples that were there
6 in the first three or four days. And that was the bulk of the things
7 that we analyzed. I could go through the log book and see if there were
8 anything different than that. There were a few liquid samples, but the
9 bulk of samples were air samples, those first few days that we analyzed.
10

11 ESSIG: Were you asked to analyze any samples other than either air
12 samples, charcoal filter and or charcoal cartridge, a particular filter
13 or liquid samples? Were you asked to analyzed any samples other than
14 those, in other words, say a vegetation sample, soil sample, that type
15 of thing?
16

17 BRONSON: Well first of all I didn't analyze every sample personally, I
18 have the log book, I could go through and look what's in the log book if
19 you wish right now, but I do not recall any environmental samples other
20 than air samples that we were analyzing, such as vegetation and soil.
21

22 ESSIG: Could you take a minute and go through your log book and in
23 fact, while your doing that, I have a copy and I'll just read it for the
24 record. It's a copy, I believe of a log book that you had started dated
25

1 3/29/79 and starts with the word calibration, and proceeds to give then
2 TMI Numbers for various calibrations and sample counts that you had
3 performed beginning on the 29th and ...
4

5 BRONSON: Yes, that's the log book I, we started the day we were there.
6

7 ESSIG: Okay. So this is a copy of the same log book that you have
8 sitting in front of you?
9

10 BRONSON: Yes. Now what was the, rephrase the question specifically, so
11 I know what to look for?
12

13 ESSIG: Were there any samples that you were asked to count other than
14 charcoal particulate filters for air samples and liquid samples from
15 in-plant? I think you said you had charcoal filters from both ...
16

17 BRONSON: During the first three days.
18

19 ESSIG: During the first three days, right.
20

21 BRONSON: Okay. It's gonna take me a minute or two to look these up.
22
23
24
25

1 ESSIG: The, we'll just let the tape run.

2
3 BRUNSON: You're talking about samples as opposed to check sources,
4 calibration sources that I brought or entered.

5
6 ESSIG: Yes.

7
8 BRUNSON: Okay.

9
10 ESSIG: There's one other thing that I'd like to ascertain to and that
11 is, if is my, the copy of your log that I have, is it reasonably complete?

12
13 BRUNSON: Well, you can tell that by looking at the sequential numbers,
14 are they all in order, is there anything missing.

15
16 ESSIG: Okay, twenty-five, thirty-four, thirty-five.

17
18 BRUNSON: Okay. There was a gas sample, a 5 cc gas sample, that was an
19 effluent sample. Yes there were several effluent type samples which
20 had, which were also charcoal or particulate air samples. One of them
21 here was a ...

1 ESSIG: What number do you ...

2
3 BRONSON: 51. TMI-0051.

4
5 ESSIG: Okay. That's Waste Gas Decay Tank C, okay.

6
7 BRONSON: And 53 likewise is Waste Gas Decay Tank B, that's a 5 cc.

8
9 ESSIG: Okay.

10
11 BRONSON: Is that in your ...

12
13 ESSIG: Yes.

14
15 BRONSON: That's one of them that's an answer to your question.

16
17 ESSIG: Yes.

18
19 BRONSON: Okay.

20
21 ESSIG: There was one problem I had with your log here, it wasn't, I
22 wasn't always clear to me what date I was ...

1 BRONSON: Yes, that's true.
2

3 ESSIG: I was looking, I see the sample that was being counted and the
4 day it was collected but I wasn't sure of the date.
5

6 BRONSON: Ok, what we tried to put on the log book was everything that
7 was on the sample. Any writing that was on the side of the sample which
8 was the only information we had to go by, and then the counting time is
9 on the individual data sheet. So what I can do for you, well ...
10

11 ESSIG: Is it a good assumption to make the log number that you assigned
12 here as that's the order in which ...
13

14 BRONSON: Yes. They are chronological order, that's the order in which
15 they were counted and ...
16

17 ESSIG: Okay.
18

19 BRONSON: If you just want to know specific dates ...
20

21 ESSIG: Yeh. What I'd like to do is, the log that I have ...
22
23
24
25

1 BRONSON: Okay. Everything before sample number 5 is on March 29th.

2
3 ESSIG: Okay. So on samples 1 through 4 then ...

4
5 BRONSON: 1 through 5.

6
7 ESSIG: Oh, 1 through 5. Okay. This is 3/29 then as 1 through 5.
8 Okay.

9
10 BRONSON: 6 through and including 87 are on the 30th.

11
12 ESSIG: 6 through and including 87. Okay. I think as I go through here
13 I'll just make sure that I'm not missing any numbers. There's 57, 64,
14 65, 72, 73 to 80, 81 through 87. Okay.

15
16 BRONSON: Okay. Do you want your exception list of the air and liquid
17 samples, effluent samples such as those with RMA designations? They are
18 air and charcoal and particulate samples.

19
20 ESSIG: No, that won't be necessary.

21
22 BRONSON: So you only want things up to sample number 87, up to and
23 including the 30th.

1 ESSIG: Right. Right. Could you give me some idea of the turn a...,
2 once you ...
3

4 BRONSON: Well before you get into that, I've gone all the way through
5 the 89th and don't see anything other than air and liquid samples other
6 than that one sample, which was a gas sample.
7

8 ESSIG: Okay.
9

10 BRONSON: I'm sorry for interrupting you.
11

12 ESSIG: No, that's quite fine. The turn around time on these samples,
13 could you give me some idea of what had it been running or was it variable
14 depending on how many samples were stacked up at the time?
15

16 BRONSON: I don't think during the first few days the sample turn around
17 time within the lab was very long, the best of my recollection were in
18 the, rarely as short as an hour cause we usually had a couple of samples
19 backed up but, and we didn't have a very big place to store samples so
20 there couldn't of been more than 10 or 15 samples sitting there at time
21 which is, that's a few hours. 3 or 4 hours turn around time. So my
22 guess is on the average, it was in that kind of range between maybe an
23 hour and 3 or 4 hours between when we got the sample to the trailer and
24 when we had the result ready to be picked up.
25

1 ESSIG: Okay. When you say result ready to be picked up, could you
2 elaborate a little bit, in other words, how is the result then communi-
3 cated back to Met Ed?
4

5 BRONSON: Okay. We filled out the, we counted the sample, the computer
6 printed out a, its data, we calculated the results on the computer
7 printout sheet and then transcribed the appropriate portions of the
8 results and sample identification data similar to what you're holding
9 right now. Do you want to identify it?
10

11 ESSIG: Okay. I'm holding a sheet here called Sample Analysis Results,
12 and it's labeled Radiation Management Corporation and it gives a sample
13 identification, date and time collected, following the sample the time
14 of analysis, geometry, counting time and the analyst and then the result.
15

16 BRONSON: Right. Okay. We transcribed information, the official reporting
17 information to that form and we had a bunch of blank forms made up,
18 copied on the xerox machine and transcribed that information. That was
19 the official result that was given to somebody in the Observation Center
20 and their system changed as we got farther into the incident, so I'm not
21 sure exactly you know within these first three or four days what system
22 was going but somebody in there received them. It started out, somebody
23 up in the front area, I'm not sure what that area is called, the guys
24 with walkie-talkies ...
25

1 ESSIG: Okay. I know the area that where you ...
2

3 BRONSON: And then they radio the information over to the Unit, 1 or 2,
4 I'm not certain which Control Room, but somebody else in the Control
5 Room was then receiving that information and disseminating it to wherever
6 it was necessary and the hard copies were staying in the Observation
7 Center. Later they set up a group which was involved in sample coordin-
8 ation and we gave them the information and then they gave us the samples.
9 I'm not sure when that later group got started, you know it was 2 or 3
10 or 4 days in.
11

12 ESSIG: Okay. Again referring to these Sample Analysis Result Sheets
13 that I have in front of me, there were a couple of these that I had a
14 question and apparently you did also, I just want to establish for the
15 record whether or not the date, the collection date was unclear, you
16 got, I'm looking here at a sample collected from location S as in South
17 S-21.
18

19 BRONSON: What's the sample number at the bottom?
20

21 ESSIG: The TMI-34. And you have noted here a date UNK which I assume
22 means stands for unknown and you have 3/29 and 3/30 indicated that ...
23
24
25

1 BRONSON: Yeh. It was either the 29th or the 30th. There was no date
2 written on the cartridge and we tried to write that down on the sample
3 sheets so, if it was important to somebody when it was collected then
4 they would try to find out the actual date.
5

6 ESSIG: Okay. Now in this particular one, I noticed that you have the
7 result for Iodine-131 on the charcoal and the particulate recorded as
8 less than 1×10 to the minus 11 and less than 2×10 to the minus 11,
9 respectively. And you originally had these recorded as 10 to the minus
10 10, was that just a computation error which was corrected ... These are
11 your initials ...
12

13 BRONSON: That's my initials underneath it. I presume that is the case
14 by looking at the record I can't recall, I can see what is sample 38...
15

16 ESSIG: Okay. These are your initials.
17

18 BRONSON: That is my initial.
19

20 ESSIG: Which is a change that was made by you.
21

22 BRONSON: Um hum (Positive Response).
23
24
25

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1 ESSIG: These results that I have here appear to all be less than your
2 MDA which was, well with one, no I was gonna say that was an exception.
3 You reported Zenon-133 on this, 133, 133M and Zenon-135 and Iodine-131
4 as being less than the MDA. Did you, do you recall I think the sheets
5 bear this out, at least the ones that I have here, recall detecting any
6 iodine above MDA in any of the offsite samples that you had analyzed?
7

8 BRONSON: As I recall I was very marketedly surprised at the lack of
9 iodine in the offsite samples. In fact, I think I don't recall the date
10 of the first one but it was several, quite a few days into the incident
11 that we finally saw one sample which we thought we saw iodine in one of
12 the offsite samples and I was very surprised that it just wasn't there.
13 That's the best of my recollection. I have not gone through the data
14 specifically to say, to confirm, that we didn't see iodine but or to
15 confirm the actual date which we did see an iodine on and offsite samples.
16 As I recall there were very, very, very few of them, remarkable so.
17

18 ESSIG: I notice that the less than value's here appear to range over
19 more than an order of magnitude.
20

21 BRONSON: So does the volume.
22

23 ESSIG: Let me just, okay here you got one, I'm looking at sample desig-
24 nation, as your number 60, TMI-60, SW-11, you have volume of sample
25

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1 unknown, could you state how it was that you came up with a concentration
2 on these particular sample? You have less than 6×10 to the minus 10
3 microcuries per cc for Iodine-133.

4
5 BRONSON: Per cartridge.

6
7 ESSIG: Okay, that is per, that activity is ...

8
9 BRONSON: That's what I would assume by looking at the data sheet. Let
10 me go back and see if I can reconstruct that one, 60. Volume according
11 to my log sheet is unknown, 60. I assume 10 to the 5th cc's which was
12 the common for that case.

13
14 ESSIG: Okay.

15
16 BRONSON: And it was not written on that Sample Sheet.

17
18 ESSIG: I'll make a note on here then that it was an assumed volume
19 equal 10 to the 5th cc. Would you say that the MDA, you made a comment
20 a minute ago about the MDA being, when I said that appear to vary over
21 roughly an order of magnitude and you indicated that the volumes were
22 also, was that the, would you say that was the prime contributor to the
23 MDA varying, was a difference in sample volumes?

1 BRONSON: Well MDA can vary by several things: one is counting efficiency,
2 the other is counting time and the last is how much material, in this
3 case, air flow is on the sample and we tried to keep the other two
4 constant. Counting efficiency was for most samples, they were low
5 enough that we could put it right in contact with the detectors. So
6 therefore, efficiency was held constant and counting time was in general
7 pretty standard length of time at 300, sometimes 500 seconds. Therefore,
8 the biggest contributor to ranges of MDA's are ranges in the air flow or
9 total air quantity on the sample.

10
11 ESSIG: Okay. I believe that takes me probably up to the end of the
12 questions I have on the gamma spectroscopy of samples that were collected.
13 I would like to come back just for 1 question on the whole body counting
14 that was done. What, could you describe what is the normal calibration
15 procedure for the whole body counter and when was it calibrated prior to
16 the 28th? Or was it recalibrated during the event or?

17
18 BRONSON: Okay. That system is not operated out of my division so I
19 don't know exactly what was done. I know the system was originally
20 calibrated using solutions of either NBS Standards where they were
21 available or typically whatever the best available source is, Amersham
22 is a very common one that we use when NBS Standards aren't available.
23 These liquid standards were distributed in a bottle phantom commonly
24 known as a Bomab. In the distribution that you would expect that nuclide
25

1 to be in a body and so then the system was calibrated since, at that
2 time. At that time also, a cross calibration was made with a simpler
3 kind of a phantom which then can be reproduced easily and routinely in
4 the field which consists of a point source and I think that one happened
5 to be NBS Mixed Point Source, that it decayed enough so the dominant
6 things were cobalt and cesium, Cobalt-60 and Cesium-137. That particular
7 source or any other known point source could be calibrated in this
8 reference phantom, can be counted in the referenced phantom and if you
9 end with the correct result, you know then the calibration has not
10 changed since then and you don't need to do a recalibration. It's done
11 with a primary calibration and then continuing a secondary calibration
12 on a, routinely on a daily basis when you're in the field.

13
14 ESSIG: Were these done on a daily basis during the period of time in
15 question to your knowledge?

16
17 BRONSON: To the best of my knowledge, yes they were. It's a routine
18 experience and the guys have traditionally been very very good at it. I
19 know I saw quite a few of them over the next, over the first week anyway,
20 I don't recall directly whether one was done on the first day. But the
21 system has historically been stable, it just doesn't change calibration.

22
23 ESSIG: Okay. I think that pretty much takes care of the questions that
24 I had for you Frazier. I think we have a few minutes left on the tape
25

1 and I'd like to give you the opportunity if you so desire to make any
2 comments you wish to make on the record in terms of your, you care to
3 offer a personal opinion as far as what you think we've learned as a
4 result of the TMI Incident, and the followup of it, what we could of
5 perhaps done better in terms of either personnel or in the form of
6 training or equipment or any such thing like that. If there are any,
7 now that we have 20-20 hind sight, now looking back on the followup, are
8 they any things that you come, that come to your mind that you'd suggest
9 that we do differently in the future? Now we being the whole community,
10 the NRC, the licensees, contractors, the whole community.

11
12 BRONSON: I would like to comment on one thing which I think deserves to
13 be made known. The first thing I was told when I got there was that any
14 data that I have or anything I'm collecting is to be completely shared
15 with any of the other regulatory people there, specifically the NRC. So
16 that was essential the comment that was made when I walked up and I
17 think that kind of attitude during this kind of an emergency is one that
18 has to always instilled in any sort of a situation. The, I think one of
19 the things I hoped we've learned is that in an emergency plan, emergency
20 plan is only good as long as the people that are responsible for enforcing
21 it, are following it, and if people get into having a say so in an
22 emergency plan they're not familiar with all the preliminary thought
23 that has gone into and are not routinely involved in part of the decision
24 making chain, then it's very hard for them to utilize all of the planning
25

1 and preliminary training that has gone into developing that emergency
2 plan. Therefore, try to limit the responses, make sure the decision
3 makers in any sort of an emergency plan are involved in its preparation
4 and keep anybody that isn't involved in it out of making decisions.
5

6 ESSIG: Okay. Seemed like a comment well taken. Any others that come
7 to mind that you care to put on the record?
8

9 BRONSON: None that I think of at the moment that would be best served
10 in this form.
11

12 ESSIG: Okay. Very good Robert, I think we're done unless you have any
13 futher comment.
14

15 MARSH: No, I think that covers it all. Just like to say thank you for
16 coming in sharing your time with us. I know you're busy too especially
17 with a page on. The time being 10:13 reading 905 on the meter, we'll
18 end this tape at this time.
19
20
21
22
23
24
25