UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:

IE TMI INVESTIGATION INTERVIEW

of Mr. James G. Reed
Chemistry Foreman, Unit 1

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

May 22, 1979
(Date of Interview)

July 3, 1979
(Date Transcript Typed)

250
(Tape Number(s))

7908290172

NRC PERSONNEL:

Mr. Larry J. L. Jackson
Mr. William H. Foster

FOSTER: This following interview is being conducted of Mr. James G. Reed. Mr. Reed is the Chemistry Foreman, Unit 1, Three Mile Island Nuclear Power Facility. The present time is 4:20 p.m. Today's date is May 22, 1979. The place of the interview is trailer 203 located immediately outside the south gate of the TMI site. Individuals present for the interview are Interviewer Larry J. Jackson, Radiation Specialist, Region II. My name is ready

JACKSON: This is Jackson, that's Larry L. Jackson.

FOSTER: My name is William H. Foster, Senior Inspector Auditor, Office of Inspection and Auditor, NRC. I will be monitoring the interview. Prior to the interview being recorded where Mr. Reed was provided a document explaining his rights concerning the information contained regarding the incident at Three Mile Island. In addition Mr. Reed was apprised of the purpose of the investigation and scope and the authority by which the Congress authorizes the NRC to conduct the investigation. On the second page of the advising document Mr. Reed has answered three questions. The questions and Mr. Reed's answers will now be recorded as part of the interview. Mr. Reed did you understand the document?

REED: Yes I did.

FOSTER: Do we have your permission to tape the interview?

REED: Yes you do.

FOSTER: Okay and would you like a copy of the tape?

REED: Yes I would.

FOSTER: Okay. Gary at this time if you would, would you provide us with a brief summary of your academic background and your employment history as they relate to the nuclear field?

REED: Okay. I went to college at Penn State University. I graduated in 1967 with a Bachelor of Science Degree in Animal Science. I joined Metropolitan Edison Company at the Saxton Nuclear Experimental Corporation in July of 1968. I worked there until the fall of 1972 when I guess the decommissioning of Saxton Nuclear was begun. From there I was transferred to Three Mile Island Nuclear Station, have worked here as first a Chemist and later Chemistry Foreman, primarily assigned to Unit 1.

FOSTER: Okay thank you very much Gary. At this time I'm going to turn the interview over to Mr. Jackson.

JACKSON: Okay Gary would you as best you can recall describe the events that took place on the morning of 3/28. I'm looking primarily for chemistry type activities when you took samples of...who you provided these results to...this type of thing.

REED: That's a little tough. I'm stretching my memory a little bit. I arrived there I guess about 7:00 a.m. that morning. I'd been working fairly long hours up unto that point. Unit 1 was still in the process of getting started up from a refueling. I was involved with that. Upon arrival at the north gate, several cars ahead of me were turned away, sent evidently to the Observation Center and the guard recognizing me as one of the Health Physics/Chemistry group mentioned to me that they had a radiation emergency in Unit 2 and suggested that I go in, which I did. When I got into the plant I immediately went back to our Emergency Control Station which is located in the health physics lab area in Unit 1 and there I got the word that we had taken samples of Unit 2 reactor coolant letdown sample and I think the sample that they were talking about was one that was taken about 0600 and this sample was just being analyzed on our multi-channel analyzer, analspectrometer, and shortly thereafter we got some results out of that thing that showed in the neighborhood, I think of around 1150 or so microcuries per mil of I-131 which was higher than anything I'd seen for a long time. In fact I guess it's probably higher than anything I've ever seen. I did work with some darn hot samples at Saxton...we failed some fuel up there on purpose and we did have some pretty high sided

samples, of course fission products but not quite that high. Primarily that morning I was involved with... really my position during the emergency is one of obtaining any samples that may be requested, coordinating the effort of getting samples that are necessary to determine what's happening with the plant. Most of our union or barganing unit people were involved with the various radiation monitoring teams either on-site of off-site so I really didn't have anybody much to designate as you go get this sample and you go get this one. There weren't really that many samples requested the first morning. The boron numbers I guess from some of those early samples...I guess there was also a sample taken at maybe 0300 or 0400 or somewhere a couple hours earlier than the one I had mentioned before. Some of these boron numbers I know were were very low compared to what everybody thought should be in the reactor coolant system, but we did not reanalyze any of those samples at that point. I'm not sure why, nobody really requested it that they be reanalyzed. Sometime later on that morning I know we got run out of the that area as far as our Emergency Control Station was concerned, I think probably around 10:00 or 11:00 in the morning readings back in that area were, I don't know, 10 MR per hour or something. It was a fairly high dose rates compared to what we are used to so we decided I guess, to move the ECS out of there. I was involved with moving equipment, dose rate instruments and that kind of stuff. We I guess first of all moved up to their north auditorium of the service building and from there I know I went outside and did some monitoring just outside the service building out in the parking lot.

We monitored some automobiles, we monitored some people who were then be requested to actually leave the site I got involved with a lot of health physics activities. Sometime around 11:00 a.m. I think Kerry Harner and I got together and we went down to the plant discharge and we grabbed a sample of RML-7s, station discharge, just in case somebody wanted it. We weren't requested to grab that sample we just went and got it and later on I think around 7:00 that evening we went and grabbed another sample down there just in case and I guess I hauled those samples around with me in my car for several weeks until finally somebody said there's a missing link we recognized maybe we should have analyzed those samples. And I guess RMC then did...those were the people we turned the samples over to and I guess they have analyzed them although I haven't seen the results. We did some monitoring also on site Harner and I did a, I took my own vehicle and we drove around the island and we found some fairly high dose rates. I think the highest we found was right near the Unit 1 warehouse, somewhere in the neighborhood of 40 or 50 MR per hour dose rates. But as far as the chemistry sampling, and so on and so forth, it was little we did other than grab a few river water effluent samples and to do some health physics type work. I got involved a little later on, I guess it was the next day, with a Unit 2 letdown sample with the boron analysis, but the first morning I think was mostly involved with

JACKSON: Okay. This is Jackson. What kind of reaction did you have to those boron numbers when you first saw them? Did you at that time know what to expect from the boron?

REED: No, I did not. I think I hadn't been following Unit 2 for one thing. I really hadn't been following it, I had been very much involved with Unit 1. I didn't feel, though that I had heard which I really didn't see written numbers, I had heard numbers like 700 PPM boron and occasionally I do glance at the Unit 2 log book and I know that in talking to Kerry Harner he'd told me how I guess this plants more of a chem faller, their boron doesn't bounce around as much as Unit 1. So and they were running over 1000 ppm I knew that. And the 700 PPM I didn't know what to make of that. I didn't know if they had gone with injection of sodium hydroxide. I thought possibly that was the reason that maybe the guy hadn't adjusted the PH of the sample when he ran his boron and possibly the result was that it had caustic in it already and thus is tritration would have been, it would have taken less caustic to do the boron analysis and therefore his number would have come out low. I thought that was a possibility and Kerry and I did discuss that a little bit but not to any great extent. I don't even remember who I was talking to anymore...I thought that possibly we'd gotten a running sample that maybe there was some type of make-up, maybe the system hadn't mixed. Although a reactor coolant system mixes pretty fast, it doesn't take long...you inject something in there and within seconds you got a pretty representative sample, pretty well mixed. Thought maybe we might have had some steam form somewhere along the line maybe something got hot, maybe we had just nothing more than condensed water in part of the sample line. Really didn't delve into it, just had a few thoughts about it. I know that

the next day I actually ran boron analysis such as it was, and knew that the boron was greater than 1500 PPM.

JACKSON: On this analysis the next day though, you for sure back titrated...

REED: We for sure...

JACKSON: Or someone did right?

REED: Ed Howser did.

JACKSON: I believe Howser was the one.

REED: Ed Howser adjusted the pH down to seven on that sample and I ran the boron analysis on it and in running that boron analysis I think the page phone must have... they must have paged me four times at least while I was trying to tritrate that thing. Being in a hurry, knowing the sample was very hot I just plain forgot whether I had our titration procedure we have a five milliliter measuring leg on a burette and if it takes more than five milliliters you certainly have got to refill. We typically tritrate down to three milliliters, refill, tritrate down again to three, refill and however many milliliters it takes. I've forgotten whether I'd come down to three milliliters twice or whether it was three times, so the only number I can report

to anybody when I get out of there was the boron was either 1500 and whatever came out to be or it was 2100 and whatever it was. There was a difference of around 600 ppm there depending on whether I'd used 6. something milliliters or 9. something milliliters. I knew that the boron was at least up. I knew it was greater than 1500 ppm and several days later one of our technicians retitrated that sample he in fact got 2200 and something PPM. So I think the 2100 and something that I had was probably my number, in that particular sample.

JACKSON: In retrospect, what do you think is the feasibility of sodium hydroxide being in those early samples?

REED: I don't know. I don't know what the PH of the water was. The sample certainly earlier that night prior to the problem beginning, showed normal PH of 6. something, the boron of a thousand. I looked back at this later. I noticed that somebody had run a sodium analysis on...I think the sample was drawn around 0600 and that sodium only showed, I don't know, 150 something PPB as I remember. And that indication, that doesn't indicate to me that we had injected caustic, certainly it would be many many PPM had we injected sodium hydroxide enough to effect the boron analysis that much.

JACKSON: What is the concentration of the boron...of the sodium hydroxide that would have been injected?

REED: It would be around the twenty weight percent solution-two hundred and something...about two hundred thousand ppm in that ballpark. And tech specs in Unit 2 says that they've got to maintain between one hundred and eighty some thousand PPM and two hundred and four thousand PPM somewhere in that ballpark. So had they injected that would have been the stuff that would have been injecting and a little bit of that goes a long ways in a reactor coolant system. A few gallon of that and you're gonna see appreciable PPM values.

JACKSON: Okay and that would probably take in the neighborhood, at that concentration of four or five hundred gallons to knock a thousand ppm boron down to six or seven hundred PPM wouldn't you think?

REED: Yah, it would take an appreciable amount. Yes. I can do the calculation but I know it would be more than a hundred and fifty PPB. Our system typically probably has a hundred PPB or better sodium in it. We've got probably a PPM of lithium which, you know, lithium and sodium are both strong, lithium hydrozide and sodium hydroxide, they are both pretty strong bases. So I know definitely the lithium was going to affect me...a PPM lithium would not affect me that much. I know a hundred PPB or two hundred PPB of sodium isn't going to do anything. I am not going to be able to measure as far as its effect on the boron analysis.

JACKSON: Do you have any of the logs, personal notes, is there anything possibly that might be laying around you are aware of that that might have some of these early results written on it?

REED: The analysis that I did I know the paper itself was contaminated and I the only communication I had was with the control room I did call my numbers to the control room and that paper I guess has gotten scrapped. I don't have that. The ...I think the control room log probably has my results of...when I ran the...when I ran the Unit 2 letdown samples it was on the 29th. I also ran an analysis on Unit 1's RC letdown and Unit 1's "B" bleed tank. I think I ran those prior to the Unit 2 letdown sample. I think the Unit 2 letdown sample was the last sample I was running. I'd run a standard to standardize my sodium hydroxide first of all and I did the Unit 1 RC letdown and the Unit 1 "B" bleed tank because they were looking for a shutdown margin also...they were started to get Unit 1 down and try to get on decay heat and all and that was requested of me on the 29th. On the 28th I guess I worked ...I came in at seven in the morning and I think I got out of here at 5:00 a.m. on the 29th and I went home and slept for six or seven hours and I think I got back here around two in the afternoon. And when I got back here one of the Unit 1 supervisory operations people...I don't remember who, it may have been Mike Ross...called and asked me for a boron analysis on Unit 1's reactor coolant letdown and also on the "B" bleed tank which they were gonna use to add to the letdown system and they wanted a boron analysis for a sure shutdown

margin. So I headed for the lab and I had also talked with some of our people, I think Tom Mulleavy or somebody up front, who said that Ed Howser or Pete Velez who were back there in the process of lining up to do the Unit 2 letdown sample and I said boy I'd like to get back there and get Unit 1 samples before they start fooling with that thing. I wanted to get into the sample room and get out of there before they get that on recirc and recreate a high radiation area. So I did do that, I managed to get...I think Ed Howser actually drew probably the letdown Unit 1, letdown sample and I think he actually put it on recirc and maybe even drew that sample...I think I went in and grabbed the "B" bleed tank sample. I was only in the sample room forty-five seconds probably. I came out and ran the cap and the one standard to standardize the sodium hydroxide and enter in the Unit 1 letdown and the Unit 1 bleed tank "B" and by that time Howser had gotten Unit 2's reactor coolant sample and

JACKSON: I didn't mean to interrupt I thought you were at a pause... this is Jackson...but when you say ran a cap you mean KAP right?

REED: Yes potassium _____ .

JACKSON: Okay.

REED: It's to standardized the caustic. Typically we would run three of those but under the circumstances I thought one would do.

JACKSON: Um-hum. Okay you ran...alright you tritrated a Unit 1 boron

REED: Yes, at this time.

JACKSON: Did you get a Unit 2 sample after that?

REED: Yah the Unit 2 sample was actually being taken whi e I was running the Unit 1 samples. Ed Howser or Pete Velez...I dc n't even know which of the two of them went in and grabbed the hundred mils or two hundred mils of Unit 2 letdown sample, while I was actually out in the lab part of the area there running the Unit 1 analsis.

JACKSON: What kind of health physics protections did you take when you went in there to take those samples?

REED: I had full PCs on. I had double coveralls double plastic boots and latex gloves double, full-face respirator, and of course, we had... Pete Velez in there with us who is a Health Physics Foreman with dose rate instruments and it did concern me a bit when they came out and said their hundred mils or two hundred mils of samples was reading greater than 1000 R. I'd never seen anything like that.

JACKSON: So then Ed Howser prepared this.

REED: Ed Howser then went about taking five milliliters of that sample and putting it in ninety-five milliliters of demin water and adjusting the pH down with a little bit of hydrochloric acid...I didn't know that he was doing that we fouled up there between the two of us a little bit and created some extra exposure because we didn't know what the two, each guy didn't know that the other guy was doing. He did that and sent the sample over to me. I did not know that he had already adjusted the pH and really I didn't even know that had diluted the sample I thought that was straight sample that he handed me so I went about pipetting five mils out of that. Actually, started from scratch to do the analysis and he shook his head no and said no that that's not the right thing to do that he had already adjusted the PH and diluted the sample so it cost us a few minutes there.

JACKSON: About how long would you estimate it took you to get through this operation?

REED: I was probably in the lab total, I would say about a half hour.

JACKSON: About how long were you handling this Unit 2 sample?

REED: I handled it very little. The only thing that I did handle was a diluted sample. I handled a five mil diluted to ninety-five mil sample. Ed Howser and I don't know if Pete handled it a whole lot, but I know Ed handled it the most. Substantially, he carried that

thing I guess out of the sample room, brought it over and did actually pipette five mils into a beaker and added ninety-five milliliters of water and adjusted the pH with a small pipette with some hydrochloric acid and I think he was just using litmus paper to get close to seven in his pH.

JACKSON: Did you have on any extremity dosimeters?

REED: No I did not, no.

JACKSON: Do you know if Ed had on any?

REED: I don't think he did... I don't think so...I'm almost sure he didn't. Although those two guys were in the sample room and they were in the lab when I got back to the lab area they had already gone in there preparing to start recircing the Unit 2 sample. Unit 2 has a long sample line, it comes over quite a distance and we know from past samples that it's a minimum of forty-five minute recirc for getting representative samples. I think they had gotten in there and possibly even had started recircing Unit 2 samples by the time I got to the lab. But, I do not know if he had extremity badges... I don't think he did.

JACKSON: Do you know what the exposure or the exposure rate was on the sample that you were titrating. Did you'all measure that?

REED: No, I didn't measure that at all. I kept it behind lead I did build myself a little lead shield there out of a few bricks there and I kept it behind the lead bricks as much as possible, in fact, I think I'd even built the lead up high enough that with it sitting on a stirer which is three or four inches high, that I had lead between me and the actual samples, you know, from a direct standpoint I had to work my hand around there and work the stop coupler burette. I did realize it was an extra hot sample.

JACKSON: How did...do you know how Ed made the dilution from...

REED: I think he used an epindorph pipette. I think he took... it's the largest we have back there is a one mil and I think he took a one mil pipette and actually five times five mils which is a pretty quick, probably quicker than actually pipetting one volumetric pipette type volume. I think he did use the epindorphs...I can't swear to that but I think that's the way he did it.

JACKSON: Okay I believe that when Velez and Howser left there they were fairly contaminated and said something about meeting you in the shower or something... what was your condition?

REED: Well I was contaminated also...I don't think I was as much contaminated as those two. I had some areas I guess... my forehead, I had a fairly hot spot on my forehead...my hands were somewhat contami-

nated...I don't remember exact readings I think in an RM 14 and background again was a pure problem back there you could hardly tell what you had you couldn't tell from back there in a HP chem lab area that you were contaminated you had to get out of there and monitor yourself and even the service building was at times several MR per hour background and probably the only best frisk I had then was after I really got off the island and we got to the 500KV substation. I found that I still had contamination on my hands, my forehead, on my neck, my chest somewhat. The spot of contamination on my forehead stayed for quite a while and it was still a couple hundred counts above background... with an RM fourteen probably a month later. The hottest probably, it I don't think it was ever more than maybe a couple thousand counts with an RM-14. It gave them some problems...I did get a whole body count I think five days after, first whole body count...and it did show somewhere in the neighborhood of two hundred and eleven I think the first count was, mampciroes of iodine. They ran me through a couple of times once with a lead collar, this was RMC. About a week later I think I had another count and it was down to a hundred and something nanocuries and eight or ten days later another one it was down to about thirty-some nanocuries. I plotted those things for my own edification. I was coming down with some kind of four day half-life which I don't know, at least to me that indicated that it wasn't all internal, I had to have been scrubbing some of this stuff off. It did concern me. I didn't know what what allowable levels were for iodine at thyroid and you're telling me that I got two hundred and eleven nanocuries I

wasn't sure what to make of that. I did talk to Frazer Bronson I guess, of RMC and he put my mind at ease somewhat and at least indicated that you know therapeutic doses for iodine at thyroid are much greater than that, you know, microcurie ranges. Investigative level I was something like seventy percent or something on the investigative level that made me feel a little better.

JACKSON: What actions did you take over at the 500KV...?

REED: Okay at the 500 again I scrubbed there...I had taken a shower in the service building which is the cleanest area I knew of to even try to get clean, you know I certainly didn't want to go back to our own decon area back in the control building. I figured well, you know, dose rates up in the service building have been high anyway I not going certainly certainly going contaminate too much of anything up there with what I've got on me so I went ahead and showered up there. I was probably the first guy to shower up there. After I got out of there and had gone over to the 500 they surveyed me and my clothes over there and found still my clothing had some contamination on it so I got out of that and got into some coveralls and that's the way I went home I left my clothes there in the bag...I never did find those again. I think they're lost forever.

JACKSON: Back on this whole body count bit did RMC state that that was...what was it two hundred forty-nine?

REED: Two hundred and eleven I think was the first one.

JACKSON: Two hundred and eleven?

REED: Yes

JACKSON: Nanocuries was that stated as a thyroid?

REED: Well they didn't really like to say that it was all internal or that it wasn't they couldn't really tell me that. After putting a lead collar on it only reduced the thing down to like a hundred and seventy I think and I don't know maybe I thought about it wrong but to me with my thyroid shielded and it's still showing up a hundred and seventy nanocuries at least to me that meant that probably this stuff wasn't in my thyroid. Yet it may be somewhere else in my body or it may be on my body. It may be a skin contamination. But it reduced it somewhere in the neighborhood of twenty-five percent as I remember or thirty percent of what it had been is all that it reduced it.

JACKSON: So when you left there how much contamination did you take home with you?

REED: Well I took probably...on my forehead at least which I scrubbed with radiac wash and anything I could get a hold of...I probably took home still a couple thousand counts with an RM-14. I'm not sure what

that means exactly, but I couldn't smear any off I tried several times to smear some off...now Howser could...he had one finger that was very hot and that finger he could actually smear it and still get some off, but yet he could wash and wash and wash and it didn't seem like the finger got any less.

FOSTER: We are going to take a break and change the tape. The time is 4:49 p.m.

FOSTER: We are going to continue with the interview of Mr. Reed. The time is 4:50 p.m.

JACKSON: Yah we were talking about...I think the last question perhaps I asked was what kind of contamination level did you take home with you that night? Did you have any concerns over the contamination at that time?

REED: I did have some concern certainly, I was very willing to let my clothing here and go home in coveralls after many many hours here I was ready to go home. I did spend probably two hours in trying to get myself deconned and I felt that I had done as good a job as I possibly could in getting myself cleaned up. I was concerned that I didn't take something home to my family. I left everything I could leave at least at the plant...I did later on wind up with a pair of pants that had been laundered in back of my car and they checked out clean so

there was no problem there. That was the first nights incident...now it seemed that...I got contaminated the first night...the first day sometime and it seemed that that was very easily deconned. My hands were contaminated somewhat and pants... poly-knit pants...a double-knit pants...and I know for a fact that xenon loves it. It latches right on to that stuff and that stuff did come out very readily. The second day after working with that Unit 2 letdown sample, things didn't quite decon nearly as well and I personally feel that the first day was nothing more than xenon. The second day was a mixture of things like iodine, cesium and just last week one day I counted the shoes I had on...I had these shoes stored in my locker in plastic bags I did stick those on our Geli detector and they do show up iodine yet and they show up cesium and I did take these shoes and try to decon them...now there was very little...an RM-14 it may raise a hundred counts over background, but the Geli still sees the iodine and some cesium and a little cobalt-58 probably a few of those things. So I guess there was reason that this stuff was a little bit different animal to try to get off you.

JACKSON: In what...what were the levels on your hands when you left?

REED: Hands weren't real bad, I think they were probably around a thousand counts over background with an RM-14.

JACKSON: Okay. Do you know if there are any samples from the first day that are still in storage somewhere...somebody might have set back?

REED: The first day?

JACKSON: We have results pretty much from the 29th on, but that first day we don't have very many results, you know, other than than word-of-mouth type results like the early samples, 5:00, 6:00 those type of samples?

REED: I don't know personally of any samples that are stored. The chem lab and the sample room has been cleaned out I don't know how many times and I would have to say that those samples probably were sent down the drain?

JACKSON: Are there any other samples that you were involved in taking during the first three days such as steam generator samples or like the condensate condenser vacuum pump exhaust samples.

REED: I didn't get involved with condenser vacuum pump exhaust...Kerry Harner I think had drawn a Unit 2 steam generator sample, probably the "A"...both "A" and "B" generators as I remember. I think he had drawn those samples over in the Unit 2 secondary lab...I don't know if I ever saw any results on those samples... I personally didn't count

them...I think somewhere along the way I'd run some reactor building gas analyses on the gas partition in the primary lab. That was the probably second or third day.

JACKSON: Where did you draw these samples?

REED: I did not draw samples. Those were taken over at probably HPR and H-227, the actual radiation monitor for reactor building atmosphere.

JACKSON: Okay and you can't pin that down, time wise to some event maybe?

REED: I can't no. I would just guess then and have to say that it was the third day...I do remember that it was in the ballpark of a couple percent hydrogen. It was this type of analysis that we did on it...it was a percent hydrogen, oxygen, nitrogen analysis.

JACKSON: Do you remember what time of day you ran that analysis...what shift you were working...day/night?

REED: I've lost all track of time. I really don't know.

JACKSON: Okay fine. Okay I can't think of any other questions at this time.

FOSTER: Okay. Gary thank you very much...this is Foster speaking...we are going to conclude this interview at 4:55 p.m.