UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:

IE TMI INVESTIGATION INTERVIEW

of

Ex-Radiation Chemistry Senior (RCTK)

Trailer #203
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TMI Nuclear Power Plant
Middletown, Pennsylvania

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NRC PERSONNEL:

Gregory P. Yuhas, Radiation Specialist

Owen C. Shackleton, Investigator

SHACKLETON: This is an interview of Mr. RCTK. Mr. RCTK is a former employee of Met Ed, having been employed as a Radiation Chemistry Senior, and he was assigned to the Three Mile Island Nuclear Power Plant. This interview is taking place at the Skyways Inn in Swatara, Pennsylvania. The interview has begun at 12:35 p.m. on April 25, 1979. Just prior to the beginning of this interview, I gave to Mr. RCTK a two-page document from the U.S. Nuclear Regulatory Commission which is an advisement document setting forth the scope and the purpose of this investigation, as well as, the authority given by Congress for the United States Nuclear Regulatory Commission to conduct this investigation. Also set forth are the rights that Mr RCTK has to refuse to be interviewed. At the end of this document are three questions to all of which Mr. RCTK answered affirmatively. At this time to make it a matter of record, I'm going to ask Mr. RCTK these questions. Mr. RCTK, did you understand all of the information on those two pages?

RCTK: Yes.

SHACKLETON: And do we have your permission to tape this interview?

RCTK: Yes.

SHACKLETON: And would you like a copy of the tape and transcript?

RCTK: Yes.

SHACKLETON: Thank you very much, that will be done. And now, RCTK, for a matter of record, would you please give us your background and training in the nuclear industry.

RCTK: Okay. I think I might as well start with my college education. I do have approximately 30 credits of chemistry in college. I have, I'd say, 8 credits in physics, and I think I took three semesters of calculus, and I have a semester of statistics. And I guess you would think that I was a chem major but as it turns out now I really was a psychology major. I have a degree in psychology, but I did have a strong science background, which was a situation where I was interested in the sciences from very young, and I more or less got side tracked into psychology in college and became interested in it and pursued it. After I got out of school, I worked in the psychology field for a short period of time and then decided that this wasn't what I really wanted to do. I went back into looking for a job in the sciences. And that is where Three Mile Island came into the picture. I applied for a job as a chem analyst in 1973, and was granted the position and started there December 3, 1973. And shortly thereafter I was given the opportunity to an advancement with a greater pay scale. I was given the opportunity

to become a radiation chemistry technician. And I worked there for five years and five months. In the past year I received a promotion to a senior radiation chemistry technician. Now, I have had a little bit of experience working as a chem analyst during my college years, also in the summer time-one summer. Also, at Three Mile Island I had some training through the people on site. A lot of it was pretty elementary, though--the basics, I think, to provide for people who were in the department and maybe had a more deficient background. I was also sent out to the Babcock/ Wilcox Reliance Research Center for a two-week training in water chemistry, which was also fairly elementary, though. But I would say, just working in the field, on-the-job type training, I received a fair amount of radiological health physics type training. There have been various courses offered to the company, on company time, to familiarize you with some of the things that you might have forgotten over a period of time. That would be about it.

SHACKLETON: Fine, thank you. For the purpose of those people listening, present to conduct this interview is Mr. Gregory P. Yuhas. Mr. Yuhas is a Radiation Specialist from Region I of the U.S. Nuclear Regulatory Commission. My name is Owen C. Shackleton. I am an investigator assigned to Region V of the U.S. Nuclear Nuclear Regulatory Commission.

YUHAS: Mr. RCTk, you mind if I call you RCTk?

RCTK: That's fine.

YUHAS: RCTK, what college did you attend?

RCTK: Lebanon Valley... Annville, Pennsylvania.

YUHAS: When did you graduate from college?

RCTK: '72.

YUHAS: '72. Did you complete a college preparatory course in high school?

RCTK: Yes. At York Suburban, York, Pennsylvania.

YUHAS: York Suburban, okay. Could you briefly describe the content of the B&W water chemistry course?

RCTK: Well, the course was fairly elementary, there again. It was provided for the majority of the technicians which had a fairly deficient background, scientific background. Which meant that they talked about the basic cookbook procedures that we use in the chem lab and, more or less, in detail how to do each step, one step at a time. For example, they would take the chloride procedure that would use

mecuric thiacyanate and ferric alum, and they would show you properly how to clean the glassware, to prepare for the analysis, and actually do it. It was more geared toward the actual procedures that we use at the plant than a more encompassing educational preparation in the chemistry field. It was just more of a specific cookbook procedure.

YUHAS: Are you trying to say this was a technical course, in other words?

RCTK: Yeah. It's a little hard for me to compare, I mean, going to college, of course, and taking a course in chemistry is far different than this type of industrial related thing, because you're talking about the theoretical aspects in college, and here you're talking about very specifics: do step A, B, C, D and down the line, and they're showing you how to do exactly these steps, technically.

YUHAS: Do all rad chem techs attend the B&W school?

RCTK: I don't think all of them have. I think it was--I was able to attend only because of a vacancy that existed on an employee that was supposedly to be starting and never did, or that type of thing, and there was a vacancy. They had scheduled, made a contract with B&W to send, like, four individuals. They usually send four at a time. And one of them wasn't present, so they said, "Would someone else like to

go" and I said "Yes". And, so it wasn't really specifically for me. I think they felt I had the background and didn't need it, but if there was a vacancy, they let me go.

YUHAS: Let me ask you a few questions about your radiological health physics training. Did the licensee provide, on an annual basis, a training program which included formal lectures, demonstration of practical factors, and a written or oral examination, to continually enhance the qualifications of the Health Physics Department personnel?

RCTK: Well, straightforwardly, I guess I'd have to say yes. We did have a little test once a year; however, whether that is an adequate test, to test your health physics knowledge...

YUHAS: Let me interject. The test that you are referring to, is that not what's called a general employee training test?

RCTK: Yes.

YUHAS: Let me clarify my point. Now, I'm not referring to general employee training. I am referring to the Health Physics Department personnel. Were they giving lectures of a technical nature to enhance or to refresh their health physics expertise on an annual basis?

RCTK: Well, I really don't recall any examination of that type. I don't-- we have had lectures on various things over the years. However, none of them have been--I can't really put my finger on that many of them. It would be just my opinion...you know, I didn't feel that--

YUHAS: Can you give me an example of several lectures--titles and what was covered?

RCTK: Well, we did, one that I remember that was fairly good was on ion exchange resin, given by Mr. Ken Fredericks.

YUHAS: Is that health physics related?

RCTK: Oh, no, I'm sorry. I'm sorry. That was not health physics, it was chemistry. In radiological health...oh geez, I can't remember anything specifically. We were given, I'm sure that we might have been given a little review of something or a procedure, but nothing in detail of great significance that I can remember.

YUHAS: When was the last time you read 10 CFR Part 19 or 10 CFR Part 20?

RCTK: Well, 10 CFR 20, of course, we utilize frequently in MPCs and that type of thing. So, on a regular basis I was looking at that document. 10 CFR 19-I'm not sure exactly what's in that.

YUHAS: 10 CFR 19 is titled, "Instructions to Workers".

RCTK: "Instructions to Workers". I'm not familiar. We may have it in another form in the lab, which is taken off of 10 CFR 19 and I'm not familiar with the exact code number, okay.

YUHAS: What we'd like to do now is to have you present a chronology of your involvement in the incident of concern that began on the night--excuse me, on the morning of March 28, 1979.

RCTK: Okay, well, I was expected to be at work at 7:00 and I came in at about 7:00. And immediately, as we got on the island, we at first didn't suspect any problem at all, we didn't know what was going on. We walked into the security building, and as I was about to go through the security line through the metal detectors, etc., I was--my foreman, head foreman, Pete Velez said "Let this man go right through". So I went right through and other technicians, I imagined, following behind went right through and we all went back to the lab area, the control center- Unit 1 health physics lab. And at that point, of course, I first recognized it was a serious problem. And I don't think that--it

kind of caught us by total surprise, of course. We didn't know what was going on at all. And all of a sudden the radiation levels were coming up everywhere. Everyone was reporting these, that they had a problem the night before. And I really wasn't sure for quite a while exactly what the problem was and what had happened. But the levels--I didn't have any chance to really think about it--but the levels immediately started coming up, and we immediately prepared the, as in the drill, the emergency plan procedure, pretty much so as we did in the drill. They set up the communications center at the health physics lab and they started to direct some people, various people out on search parties. And I happened to be stationed at the control point and wasn't one of the individuals that was sent out. There was a lot of chaos, as there typically was even in the drills, because I think I was sent out, initially I was sent out to be on a offsite party, and when I got out there the piece of equipment that I was supposed to pick up was not functioning. And the health physics technician who had already gotten to them told me that, so I returned to the lab. And I just helped, myself, with little things that came up constantly, like people coming in with contamination. As it turns out, most of it was gaseous, inert gases, activity that was caught in their clothing which would dissipate. But this was a very chaotic situation. We had--none of us had seen anything like this before. So we were getting down to the fact, getting down to the basic protection, just worrying about serious contamination. It was kind of a... it's hard for me to say because the excitement

level was pretty high, and I was just helping with what I could. If it be a man came in and was contaminated, I checked him out with an RM-14, and if his clothing seemed like they were highly contaminated, I had him drop his clothing off right away there and go back and take a shower, whatever. And it wasn't very long, I would say, maybe 9:00, when someone said "We've got to get a reactor coolant sample from Unit 2". And I still wasn't sure what had happened but I thougnt at this point we must have a pretty serious problem and possibly some fuel damage. But I was concerned about getting a reactor coolant sample from Unit 2, very much so. Right away, I thought, "Oh boy, if this is the line is coming over, the sample line, was coming over from Unit 2..." Across the auxiliary building was reading, I think, a couple R. Somebody had just walked out of the auxiliary building and found that it was reading a couple of R from that little 3/8", or whatever, line that came across. And so I was really concerned about getting a sample, and I hesitated a minute, and I think I did because I've always felt a little bit reluctant, lacking a little confidence in my immediate supervisors. And I think this is one of the points that, about this whole thing that, as far as if you want to point a critical finger at the Health Physics Department, as I've always felt a lack of confidence in the ability of the people that were supervising me. Many of the cases, they were not--their educational background was fairly deficient themselves. And I just did not... many times things were said and things were suggested that were not in the best interest, I think, of

an individual's health. And so I was hesitant, and my foreman, chemistry, said, "I said do it. Get it". And so I did proceed to get a Scott air pack on, and all the equipment. And another technician ran in and took an reading at the nuclear sampling panel. It was 200 R at the panel where you take a sample. So I figured I had to run in there and get this sample, I guess I'm going to have to. And I did very, very quickly. With the Scott air pack on, full pc's, plastic suit. But I was hesitant and I didn't like it at all. So I did get it and I picked up--I was very quick, 200 mrem exposure. In the back of my mind there was the question of protection factor of the Scott air pack affording me maybe 1000 protection factor, and what, you know, what if whatever is coming off of this system is going to exceed that, and a lot of other things in a situation like this were going through my mind, as far as how much internal contamination might I pick up. Okay, well, I got the sample and left the room immediately and took off all my stuff and came back to the lab. At the point, the levels in that area came up, and the air activity came up extremely high, which I had mentioned before taking a sample. I thought, "You've got to be kidding, taking a sample down here, we're going to wipe out this control point". Because when I take the sample, that's right on the other side of the wall from that area. And obviously, from previous experience in there, we have seen that when we have activity in that room of a high level from taking samples, we frequently get diffusion out through into the hall area. So, it was

my judgment, to begin with, that this was a poor idea to take that sample at this type of a critical situation. But this was what I was told to do and this is what I did. And immediately we did have to evacuate the control area, as a result, because the activity levels came up very high. And I understand, I don't know much about it, but I understand the ventilation picked it up, or whatever, and was recircing it through and it started coming up the entire control tower. And that was a problem, I guess, with the ventilation, which I think we've had before. We've had problems of that type, we've had problems with people sampling reactor coolant in the hood, in the nuclear sampling room, and the control room getting a shot of air activity as a result of the ventilation picking it up. I don't know the exact reasoning why, but it's happened before. So we plugged that area and went over to the Unit 2 control room and set up a little bit of health physics area there. And it was this type of chaotic situation. We fled from there in a hurry, took what equipment we could and got over there. And activity levels were still coming up, of course. They started putting respirators on, everyone had put respirators on in the control room in both units, I think, at that point. We had those on for about six hours. And it was touch and go. It was just basic radiological health, trying to protect the people in a very, very basic sense. It's really all I can say. There's not a whole lot...I mean, there are little things that go on and on and on, but there's really not a whole lot I can say.

YUHAS: Okay. I'm going to go back through now and start looking for a little more detail and look at some of the subjective comments that you've made. You arrived at about 7:00 in the morning. There was--was there any encumberance at the north gate? I'm assuming you came through the north gate.

RCTK: Right. A normal procedure. I came through the north gate, normal procedure, showing my badge and not suspecting any real problem.

YUHAS: Okay. When you got to the security building, otherwise called the process center, right?

RCTK: Right.

YUHAS: Okay. Did you hear any announcement over the site PA or the site radiation alarm?

RCTK: No.

YUHAS: Did you, at any time that morning, hear an announcement that a site emergency had been declared?

RCTK: Not until--it was difficult to get that information, in a sense. I got--not until I got back and it was obvious that there was a situation, site emergency situation.

YUHAS: My question was, did you hear it passed over the PA system?

RCTK: No.

YUHAS: Did you hear the siren?

RCTK: It may have been before I arrived at the island, but I did not, no.

YUHAS: Are you fairly sure you came at 0700 in the morning?

RCTK: Plus or minus five minutes, I would say.

YUHAS: Okay. At about 7:30, did you hear a siren? Site evacuation radiation siren?

RCTK: I don't recall, but then, in the excitement, geez, who knows?

YUHAS: Okay, so you proceeded to the Unit 1 chem and HP area, which at this time had been designated as the emergency control station.

RCTK: That's right. That is normally the primary, number 1.

YUHAS: Okay. Who, to the best of your recollection, was present at the emergency control station?

RCTK: Okay. Directing, Tom Mulleavy was setting up his... Tom Mulleavy, Bob McCann, and Dick Dubiel of course came into the picture also. I'm not sure when. I think he was there, as I recall. Pretty much in the same time. Trying to put these people in place at a time is difficult in the confusion, but I know Tom Mulleavy was there initially, as soon as I got there.

YUHAS: Okay. Did anyone attempt to make an announcement as to what the reason was for the emergency?

RCTK: Not really. But that didn't have to, I have to say that. Because we knew, all of us, that there was something going on, pretty serious.

YUHAS: Did you Know?

RCTK: That's why the commotion and the fact that they were setting up the emergency control center at that point.

YUHAS: Did you know which unit it was from?

RCTK: Yes.

YUHAS: How did you gain that information?

RCTK: Probably just by asking the first person I saw there when I got there.

YUHAS: Okay. The next thing, you said that you were sent back out to the process control center to piece up a piece of equipment...

RCTK: Right.

YUHAS: ...and head out for an environmental team?

RCTK: Offsite radiation monitoring equipment. We have several suitcases prepared with various pieces of equipment in then, and the one was not operating.

YUHAS: Okay.

RCTK: I think that was known before, but I think in the confusion when I was sent out, the person perhaps forgot.

YUHAS: Who sent you out?

RCTK Tom Mulleavy.

YUHAS: Okay, and he said, "RCTK, go out to the process center and get an emergency kit"?

RCTK: With another operator.

YUHAS: Okay, so--

RCTK: Who was assigned to be my ... Len, what's his last name?

YUHAS: Landry?

RCTK: No, not Len Landry. He was an operator. I don't remember his last name at the momemt.

YUHAS: Okay, so Tom Mulleavy sent you and an operator out to the process center?

RCTK The offsite, right, to the offsite team.

YUHAS: Okay, now tell me what you found when you got out to the process control center.

RCTK: When I got out there Ed Eginrider, who is also a technician, was standing there. And he was--took the liberty to issue these kits to the people coming out as they needed one. And he, as I got there, he just said "This one doesn't work and so we don't have one for you". And so I immediately turned around and came back.

YUHAS: Okay. How many kits are normally stored?

RCTK: I think there's four.

YUHAS: Okay, now... Mr. Egenrider, or...

RCTK: Egenrider.

YUHAS: Egenrider. When he pulled this kit down he said "This kit doesn't work". Could you explain to me? 'Kit' to me seems like a box full of equipment. What is it?

RCTK: Well, they are suitcases. Essentially, with the...

YUHAS: The kit doesn't work and you couldn't get it open?

RCTK: No, no, he got it open. I think that it might have even been tagged "out of service", I don't know. But I know that one of them was--information had been given to me that one of them was out of service, and that this was known by several people, several of our foremen or supervisors.

YUHAS: Can you give me an idea of what's in the kits?

RCTK: Okay. There's a gamma, a general gamma surveying instrument.

YUHAS: Do you know the model number?

RCTK: I think maybe a Pic 6 and then there is a Sam 2, I think a Sam 2 it's called, which was for the purpose of to discriminate, and it will discriminate the energy level of what you're looking for. You can pick out iodine, it's calibrated for iodine-131 primarily, and that was the intention, of calibrating iodine-131 so that you could take samples out in the field and see if you did have iodine-131. They had, we had other kits before this but this was a more recent edition, these Sam 2's--Sam 2 or Sam 1, I'm not sure--but to be able to discriminate that...

YUHAS: Is this the piece of equipment that he said didn't work?

RCTK: Yes.

YUHAS: Okay. So he stated to you then that the whole kit was useless because the Sam 2 didn't work.

RCTK: Well, there again, I can't say that. I don't know. He just said simply "This one doesn't work so we don't have a kit for you".

YUHAS: Okay.

RCTK: I mean, I don't know whether or not it was that or that all the equipment was there.

YUHAS: Do you have any idea how long that kit had been out of service?

RCTK: No.

YUHAS: Okay. Do you have any idea, or have you used the Sam 2 instruments before, and could you comment on their reliability or your functional response when pulled out of a kit to be used?

RCTK: Okay. My experience, my practice with that instrument is very, very short lived. We had a course, a short course given by Len Landry on how to operate that piece of equipment. And then I think we might have even had a little refreshing talk for an hour or so a year later. But obviously not using that piece of equipment, the question was in my mind as I went after that piece of equipment, would I be able to use this in a rush? I really questioned and I think that a lot of people had to hesitate and certainly would have had to have maybe take the procedure out, which I think was with it, and look it over before they'd be able to operate it, since we don't use that piece of equipment on a normal basis.

YUHAS: Did you have a Sam 2 instrument, other than those which were stored in the emergency kit, for individuals to check out to use during routine counting so that there was some degree of familiarity, prior to the emergency utilization?

RCTK: I don't know what to say about it myself, no. They were locked into the suitcases in the front, in the processing center, and I don't really think that we had adequate reviewal of the operation of that piece of equipment.

SHACKLETON: Gentlemen, we'll close the interview just for a few moments at this time to turn the tape. The time is now 1:04 p.m., April 25, 1979.

SHACKLETON: This is a continuation of the interview of RCTK. The time is now 1:07 p.m., April 25, 1979. Please continue.

YUHAS: We left off with, we were just concluding talking about the Sam 2 and the fact that you had had training approximately a year ago for a few minutes on the instrument, and that you yourself had not had the opportunity to actually count samples, to follow the procedures to develop a degree of familiarity with the Sam 2 instrument in the last year.

RCTK: Oh, there again, I don't want to specifically say how long it's been since. I don't remember, but obviously that, in itself, indicates that I'm not too familiar with the instrument because I don't remember the last time I was checked out on the instrument to see if I can operate it.

YUHAS: Let me ask you a more direct question. Do you remember the last time that you collected an air sample with the air sampling devices in the emergency kit and then measured it with the Sam 2 and calculated the iodine concentration from that sample?

RCTK: No, I don't think I ever did that. I simply worked with a, in a--at the time that I was introduced to the instrument, I was given a standard, I think I was given a cartridge, a charcoal cartridge which contained a source. And I went through the calibration process. And that was about it.

YUHAS: That would have been the Barium calibration source, Barium-133 and it's normally used to set the windows on the Sam 2.

RCTK: Right, Right.

YUHAS: Okay. Can you give me an idea how long the Sam 2 instruments have been available for emergency use at TMI?

RCTK Oh, geez, I think...this again is just a... This could be off. I'd say maybe two years. Something like two years.

YUHAS: Okay. You get the information that the equipment is not available. You come back to the Unit 1 ECS station, correct?

RCTK: Um-hum.

YUHAS: Okay. At that point you said you were assigned to a control point.

RCTK: Right. I was assigned to--well, I was more or less staying there. I think maybe that was when I had get the sample of the reactor coolant.

YUHAS: Specifically, who told you to collect the reactor coolant sample?

RCTK: Kary Harner.

YUHAS: What is Mr. Harner's position?

RCTK He's the chemistry supervisor. His exact title, I couldn't tell you. They have rather elaborate titles sometimes. He's a chemistry superviso, basically.

YUHAS: Is Mr. Harner your supervisor?

RCTK Yes. In chemistry.

YUHAS: Could you describe the standard operating procedure for collection of a reactor coolant letdown sample?

RCTK: Okay. The standard procedure would be-first to inform the control room that you're going to take such a sample. And after you have been granted permission to do that, and they want that permission in case there would be a potential problem with a release or something as a result of this, then you would proceed to the panel in the nuclear sampling room and line up your valves correctly to recirc the sample.

YUHAS: Excuse me. When you line up to recirc the sample, do you recirc through the sample bomb or through the sample cooler?

RCTK: Oh, it depends on the type of... you always recirc... well, it depends on what type of sample you're drawing. If you're drawing a sample, then you are going to recirc it through the bomb first, return it to the cooler and then back to the system. If you are sampling a normal reactor coolant sample for other analysis, you would put it through the cooler most likely, and then to the sample sink--return it, but then eventually you'd be drawing it into the sample sink.

YUHAS: The directions to you provided by Mr. Harner were to recirc through the bomb, or just through the cooler?

RCTK: Oh, he didn't even specify. He just said "get a reactor coolant sample". I don't think that was important or relevant. He knew that I would know to get the sample in the conventional fashion for analysis.

YUHAS: Which is through the cooler, right?

RCTK: Which would be through the cooler, right.

YUHAS: Okay, go ahead.

RCTK And, well he simply told me that "we've got to get a sample". And I think I said something like "Oh geez. That sounds risky". And I think I stalled a little bit, actually. I stalled a little bit on getting that, sort of hoping that maybe he'll change his mind. And somebody...of course, I didn't really call the control room or anything about this, it wasn't necessary. My supervisor was telling me, and that, in itself, is sufficient to expect that they understand the sample will be drawn. But I stalled a little, and he said to me something in the order of, "I said get it! Now!".

YUHAS: Getting back to the normal sample procedure in the nuclear sample room-- is there a device which measures the ambient airborne concentrations of radioactive particulate nuclides and iodine?

RCTK: Uh-huh.

YUHAS: What's that called?

RCTK: I think there's an area monitor. I think it's 12, the number--RMA-12, which is located in that room. And I don't know the condition of it at the time of the accident. It has often been out of service.

YUHAS: Why is it often out of service? Could you be a little more specific?

RCTK: Well, this is another issue-those monitors. I don't feel that much confidence in the radiation monitoring system that we have. They are poorly engineered, and for as much money that's invested in the plant in other ways, those instruments are not very... I had myself reported the instruments out of function many, many times--for various things like, they have flow alarms on them and I have taped an iodine cartridge shut with tape, masking tape and put it in and the flow alarm did not indicate any flow problem. And I have done this in several of them. RMA-12, I think we had a motor problem or something had burned up. But it was frequently out of service. And I think the main reason, I mean, I don't want to... I think it had a very, very loud and annoying alarm and I think it alarmed frequently as a result of the gas that was given off, the inert gases during the sampling. And I guess you can say, maybe somebody conveniently pulled the cord on it, or whatever, a lot of time. I don't want to specifically accuse anybody. I don't know the reason, but I've been in there many times when it has not been functioning.

YUHAS: Let me ask a more specific question. Does the sample procedure, the SOP for drawing coolant sample, require that RMA-12 be in operation when the sample is recirced and cooled?

RCTIK: I don't know. It might. I don't know that for sure.

YUHAS: Another specific question--have you gone into the sample room and collected reactor coolant samples when that device has not been in operation?

RCTIK: That's a question maybe I should not answer. I really don't know--if I said yes or no, I don't think it's the type of thing that perhaps I've checked as carefully as I should have in the past, and it may have well not been operating at times when I sampled. That's being very honest with you. But I can't, I don't want to specifically say "oh yes, it was not operating when I took the sample" because I just am not sure.

YUHAS: OK. In the week that we're concerned about, the preceding Monday and Tuesday, do you know if RMA-12 was operating during that period of time? Those couple of days?

RCTIK: I don't know.

YUHAS: Okay, fine.

RCTK: It tends to be a thing, like I said, I have frequently noticed the thing out of commission or tagged out, and this leads me to believe maybe it's not in the procedure. I'm not sure whether it has to be operating or not, but I've seen it out of commission and it is the type of thing that very often it has been out, and so very infrequently has it been operating, that it becomes a piece of background equipment. And that's why I couldn't answer the question, did I exactly get a sample with it not operating. I may or may not have, because I don't even notice the instrument too often. That's poor, but that's the way it is.

YUHAS: About, could you give us again a subjective comment about as to the percent of time that that monitor was operational?

RCTK: No, I really couldn't.

YUHAS: Okay. Is there any other radiation monitoring equipment in the nuclear sample room?

RCTK: Well, we sometimes carry a portable GM counter in there...if you were expecting a problem, or you are routinely surveying the area on a once a week basis. We work with the coolant, so really, it's not

quite as bad as it might seem, that we don't more carefully watch that. We work with the coolant, we do the analysis on it, so we're pretty familiar with what the content of it is--the microcurie content, the types of air activity that's coming off, gaseous activity that's coming off of it. So generally, if we see a problem developing, we would tend to be more cautious.

YUHAS: You say you're fairly familiar with the reactor coolant chemistry effluent aspects. For Unit 2, what would a nominal gross iodine run? In terms of microcuries per cc?

RCTK: Well, okay. Unit 2 now, there again...I don't think we saw, prior to this accident, any...now lets see, I'm not sure we saw any iodine.

YUHAS: Are we talking at minimum detectable levels of 10^{-4} microcuries per cc of iodine?

RCTK: I'm not sure, what is that... Is that the...?

YUHAS: I don't know, your analysis...

RCTK: No, oh, okay. No, I was thinking of MPC. I'm not sure. We don't see, I don't think we've seen very much iodine in Unit 2 prior to this accident. I'm not that familiar with that. I just became a senior radiation chemistry technician in February of this year, and that was my first chance to actually work with the isotopics, and operate the multichannel analyzer. So, therefore, my exposure has been short-lived to that type of thing. I have not seen that many Unit 2 reactor coolant sheets, and I'm just not that familiar with the numbers.

YUHAS: Okay, Tom. Let's go back to drawing this reactor coolant sample. All right, you were told by Kary Harner to collect the reactor coolant sample and you suspected that high doses may be involved.

RCTK: Right.

YUHAS: And that high airborne activity may be involved.

RCTK: Right.

YUHAS: Could you tell me how you dressed yourself up to collect this sample?

RCTK: Well, I put on coveralls and a wet suit.

YUHAS: Wet suit being a plastic raincoat...

RCTK: Pull, yes, and a coverall. The full PCs-protective clothing which entails boots, coveralls, hood and then the plastic suit fitting over the top of that with the hood also, and the Scott air pack.

YUHAS: What sort of personnel dosimetry devices did you wear, and where did you wear them in relation to your body and protective clothing?

RCTK: I had a TLD high range dosimeter-self reader-a low range self reader, and that is it.

YUHAS: Uh...

RCTK: I should have had, I'm sure, something on my hand.

YUHAS: What were the ranges of the high and low range pocket dosimeters?

RCTK: Okay, the low range was 0 to 300, and the--

YUHAS: 0 to 300 what?

RCTK: Mrem, millirem. And the high range, I think, was possibly 0 to 5 R.

YUHAS: Where did you wear them in relation to your body?

RCTK: At my waist.

YUHAS: At your waist. Based on location of the sample hood and the geometry of the situation, is the waist, wearing your pocket dosimeter--

RCTK: I think so.

YUHAS: --the most representative place to wear it?

RCTK: I'm pretty tall and I think--I generally wear it there because I've been working with samples at the counter level. I will pick up most of my exposure there. I, of course, there again, I should have had dosimetry-ring dosimetry or whatever-on my hands taking that sample. I think that I felt at the time that if I'd have said "Hey, how about, I need a dosimeter on my finger", somebody would have looked at me and said "Get the damned sample".

YUHAS: By finger, you mean extremity monitor similar to a TLD, thermo-luminescent dosimeter finger ring?

RCTK: Right.

YUHAS: Are those finger rings routinely available?

RCTK: They are--we have them available, although I have not seen that many of them issued. Probably, I think more of them should have been issued in past history. But there isn't, I've always felt a sort of reluctance to push this type of thing. It really should have been pushed more. It's the type of thing, I think, that involves a lot of extra work. And I think that human nature has a tendency to look the other way and not even point out the fact that, hey, "this man should have extremity badges." And I think that's where it stands.

YUHAS: Okay. So you did not have extremity badges on, but you did have your pocket dosimeters and your TLD on your waist. Now, could you read your pocket dosimeter?

RCTK: I did, right after I left, as soon as I got out.

YUHAS: After you left. Was it accessible?

RCTK: I was only in there a seconds...

YUHAS: Okay. All right, so you had the Scott air pac on--

RCTK: ...less than 10 seconds.

YUHAS: When was the last time you went through Scott air pac training?

RCTK: Well, Scott air pac training might have been quite a while ago, but I do use them. I've used them. We use them pretty frequently in going into different areas. I'm pretty familiar with them. We did have a pretty extensive training in them, also, from the Scott air pac company, a year or so ago, which went into detail-how to disassemble the masks, and the whole thing. We might have actually trained on that once a year. That's not bad.

YUHAS: Were you in the demand mode or the pressure demand mode when you went in?

RCTK: I was in the...okay, I forget, what is it? Pressure demand is the constant pressure inside the mask--that was the mode that I was in, such that you break the seal and you get a continuous flow. I guess that's the mode.

YUHAS: Okay. Now, knowing that you were anticipating higher than normal radiation levels on the reactor coolant sample, did you take a portable survey instrument with you?

RCTK: I had another technician with me.

YUHAS: Who was the other technician with you?

RCTK: Mike Janouski.

YUHAS: Okay. Was he dressed in the same fashion?

RCTK: Yes.

YUHAS: What instrument did Mr. Janouski have with him?

RCTK: Teletector.

YUHAS: Teletector. What--

RCTK: He told me that he read 200 R at the hood, and he was there for the purpose of monitoring me. He said that if he told me to get out, to drop what I was doing. So he was going to look after me.

YUHAS: Okay. Did Mr. Janouski tell you what the whole body dose rate was to you?

RCTK: You mean give me that type of reading before I... No, but I don't think...he felt that by telling me what the reading was at the hood, at the point where I would be taking the sample, he felt that... being in the same field I'd be able to judge.

YUHAS: Okay. Was that 200 R per hour, the dose to your hands to operate the sample valves?

RCTK: I got a 200 mrem dose on my self reading dosimeter. Low range, at my waist.

YUHAS: Okay, but what I'm getting at, is the number that Janouski gave you, the 200 R per hour, was that the number that was represented as the dose rate to your whole body, or the dose rate to your hands as you collected the--

RCTK: I think more, it would be more in my hands. Because I think it was right at the hood.

YUHAS: Okay. Before you went in there, did you consider the use of, let's say, a shielded container to drain the sample into, or special handling tools, or anything like that?

RCTK: No. I mean, no one suggested--this type of caution, I don't think, I don't know if it is reasonable to think that you had to put this aside in an emergency situation. Everyone was excited. My foremen were extremely excited. And I think they...it was "do it, get it, we've got to have it, it's an emergency".

YUHAS: Did you yourself voice any concern to your foremen about the need for special precautions?

RCTK: I expressed, during this whole incident, I expressed the fact that I didn't like what I was seeing, I didn't like the fact that I was going to be utilized to do some very dangerous and risky things, and this is my feelings of the whole time. I felt I was going to be a guinea pig. I was going to be the one that was going to have to be sacrificed if somebody has to run in and make some sort or a uncontrolled emergency inspection of something.

YUHAS: RCTK, are you familiar with the guidance of the NRCPs and the ICRPs with regard to large single exposures for the protection of vital equipment or for saving a human life?

RCTK: Well, I understand in an extreme emergency, the 5Rem-18 rule, I guess would be permissible under extreme emergency, life endangering emergency. I imagine that type of permission could be granted from, what, the NRC? Is that correct? I'm not positive of that. But I sort of thought that this was maybe the possible in an extreme emergency. However, generally, I had understood that we were permitted 12 rem per year, and this was only under an emergency and the... Well, I felt that, I mean, the limits I know we go by, I think that, like we generally go administratively to an R per quarter, hoping to keep under 1.25 R per quarter. And then we also hope to keep exposure down to 5 R per year. And it's, I don't follow--what are you asking again?

YUHAS: What my point is, is the guidance of the NCRPs and ICRPs clearly dictate the emergency exposures, that the individual should be volunteers. And I'm getting the impression you did not volunteer to collect this reactor coolant sample.

RCTK: No, no, I knew nothing of that at all.

YUHAS: Okay, fine. Did you have any perception of the amount of exposure you would likely get from collection of this sample?

RCTK: Would you repeat that again, please?

YUHAS: Did you have any idea of the amount of whole body exposure that you would likely get from the collection of this reactor coolant sample?

RCTK: Well, I didn't feel that... I only did it because I felt 200 R at the hood, I thought I could get away without excessive exposure and do the job. There was, the thought in my mind, of course, was "under this circumstances, at any moment, is this going to change? Are we going to some mixed fission products through the line"? or... I wasn't very confident. It was to me a high risk operation to do it, and it just left me with a lousy feeling.

YUHAS: When the 200 rem per hour number came to your attention, was that after the coolant sample had been put on recirc?

RCTK Yeah. As soon as it was put on recirc I think that was the time maybe when we got... I, in fact, didn't put it on recirc. Somebody else did. I think that was when somebody came running from the auxiliary building, who was in the auxiliary building, and said they were getting, like 2 R, in the sample line running across the...

YUHAS: So the sample, the Unit 2 reactor coolant letdown sample was already on recirc mode before you ever entered the nuclear sample room?

RCTK: Yes, yes.

YUHAS: Okay, fine. Okay, so now, yourself and Mr. Janouski enter the nuclear sample room, both on Scott air pacs.

RCTK: Uh-huh.

YUHAS: Okay. Were either one of you wearing lapel air sampler?

RCTK: A lapel...?

YUHAS: Do you know what a lapel air sampler is?

RCTK: No.

YUHAS: Okay. You obviously weren't wearing one. That's simply a device, a little small pump that clips on your belt--

RCTK: Oh.

YUHAS: --on the back of your Scott air pac, that collects a particulat in an iodine ampule so that later on someone can analyze the airborne concentrations to which you may been have exposed.

RCTK: No. We have little clip-on pumps. However, I've never seen them used in that fashion.

YUHAS: Was the--did someone set up an air sampler in the room that you were entering? And leave it running throughout your evolution?

RCTK: No.

YUHAS: Okay. Then you and Janouski enter in, you adjust the drag valve, open the--

RCTK: It was all set up when I got there. I don't know who was in, prior to me, doing that.

YUHAS: Okay. How much sample did you draw?

RCTK: Geez, I only drew maybe 50 ml.

YUHAS: 50 milliliters?

RCTK: 50 milliliters. I got, he told me that he wanted a rough, we needed a rough boron--and just get anything, a little bit.

YUHAS: Okay.

RCTK: So I did just do that. And under like, under 10 seconds I went in there and opened the valve and grabbed a little bit and shut it off and backed off, and then another person went in and picked up the bottle.

YUHAS: Okay. A couple of specific questions. What sort of, excuse me, container did you drain this 50 ml into?

RC.TK: Okay, the sample line has a poly tubing on it, Tygon tubing on it and I put it into a polyethylene bottle.

YUHAS: What size?

RCTK: About a 1 liter bottle.

YUHAS: One liter bottle? Okay. From the isolation valve off the cooler, from that tee...

RCTK: Yes...

YUHAS: ...through the length of poly tubing into the bottle, is 50 milliliter sufficient to flush that line out?

RCTK: Actually, you've got recirc passed to the tee which is, you're talking about--

YUHAS: I'm talking about from that tee of the isolation valve to the sample bottle.

RCTK: Okay. That sample was a very unrepresentative sample. There was no question about it. That was a ridiculous--I mean, I don't know what the needs were, but I did what I was told more or less.

YUHAS: Specifically, explain why you feel that sample was unrepresentative.

RCTK: Well, obviously the recirc time was short, and from familiarity with the system, we know that it takes approximately, at least 30 minutes to get a representative sample from Unit 2 through the recirc line. And number 2, there was not sufficient sample drawn out of that line to adequately ensure that it was a representative sample.

YUHAS: How much do you normally draw so that you can say you've collected a representative sample?

RCTK: Okay, we normally will, like I said, recirc the line for a half hour and then open the valve in the sink and let it go for--oh it doesn't have to go that long. Maybe if it just runs 15 seconds, that's adequate for that short piece of line that has to be flushed.

YUHAS: How much water would you collect in the 15 second flush?

RCTK: I think that possibly 500...possibly 300 maybe mls, I think. Three or 400.

YUHAS: So, you're giving me the impression, then, that this 50 ml may have little to do with what was going through the sample lines, what was being recirced.

RCTK: I wouldn't want to put any confidence in the numbers that came from it.

YUHAS: Okay, fine. So you did collect the approximately 50 ml in a 1 liter poly bottle?

RCTK: Right. I was instructed to do this, by the way: turn the valve and just grab some sample, and that's it.

YUHAS: Could you see, as the sample flowed out of the tube, anything other than the normal, what you would expect to see?

RCTK: No.

YUHAS: Okay. You didn't see any gas coming out of the solution, any milky colored liquid?

RCTK: Nothing that I could see.

YUHAS: Did Mr. Janouski take a dose rate on this 50 ml sample?

RCTK: I don't think so.

YUHAS: Okay, so you just cracked it and came back out.

RCTK: Right.

YUHAS: Okay. How long were you in there total?

RCTK: About 10 seconds taking the sample.

YUHAS: 10 seconds.

RCTK: Less--I'd say less than 10 seconds.

YUHAS: Okay, then you and Janouski retreated?

RCTK: Right.

YUHAS: And you took off your protective clothing...

RCTK: Right.

YUHAS: And you saw that you took 200 millirem?

RCTK: Right.

YUHAS: Do you know what Mr. Janouski took?

RCTK: No.

YUHAS: Okay. Did you guys frisk out?

RCTK: Yes.

YUHAS: Were you contaminated?

RCTK: We had the gaseous activity clinging, once again, or entrapped, entrapped in our clothing. I was fairly clean. I mean, I was less--after a short while you could tell. It would just blow off. Everybody, at that point, almost everybody that was walking around at all, had a fairly high level of gaseous activity trapped in their clothing. There again, the question comes in is, was it gas for sure, or was it this, and everyone was asking their supervisor. They would generally say they think it's gas, but I think we didn't know for sure until we had several of the samples counted on the Ge(Li). But that was difficult also, because we had the activity in the air so the Ge(Li) was...you really didn't have to put anything on it.

YUHAS: What is the Ge(Li)? Did anybody just punch out a background and look at it?

RCTK: Yes, they did.

YUHAS: What did that show?

RCTK: It did show, primarily, gaseous. I think it showed--I mean, this is where the information came from that this was the gaseous activity in the area. This is where they--

YUHAS: Was the 363 peak coming in? Could you tell?

RCTK: I did not even look at any of the Ge(Li) work that day.

YUHAS: Let me ask you a question. Are the sample lines from the Unit 2, reactor coolant letdown sample lines, shielded?

RCTK: Not--I think portions of it are not. I think only if it's... you know, I don't really think it's specifically shielded, the whole line. I'm pretty sure it's not. I think, you know, there is places where it goes through concrete areas, that it is.

YUHAS: For instance, where the sample lines run through the hot machine shop and down--

RCTK: Yes, they ran down. They go across the--

YUHAS: Those are bare 3/8" stainless steel, right?

RCTK: I think they are. Yes, I think so.

YUHAS: Okay, fine. Now, who went back in to collect the sample that you had drawn and left sitting in the hood?

RCTK: There again, I think Mike Kuhn is the name.

YUHAS: Okay. Was he dressed the same way you were?

RCTK: I don't know.

YUHAS: Okay.

RCTK: Once again, there's a lot of "I don't knows" here--

YUHAS: That's fine, that's fine.

RCTK: ...because of the situation, I really didn't...

YUHAS: I understand it.

RCTK: We were just trying to figure out what was going on.

YUHAS: Okay, we're going to have Shackleton break the tape here so we don't lose anything.

SHACKLETON: The time is now 1:35. We'll be off for just a few minutes. The date is April 25, 1979.

[END OF CASSETTE]

SHACKLETON: This is a continuation of the interview of RCTK. The time is now 1:38 p.m., April 25, 1979.

YUHAS: All right, you've come out, you've been frisked, you're clean, you took 200 millirem. Now you're back in the ECS station. Someone else went in to pick up the sample. Did you hear from anyone what the, what either the dose rate was on that 50 ml sample, or what the boron numbers were, or anything like that?

RCTK: No.

YUHAS: Ok, so you're standing there at the ECS watching, milling around, people trying to get things organized. About how long were you there before the next significant event comes to your mind?

RCTK: Well the next significant event would be the evacuation of that control area.

YUHAS: About what time did that happen?

RCTK: In fact, I don't even know for sure if they got the boron, because of that. There again the time--I lost all track of time during the incident, I mean, as far as relative, whether it was 10:00--I'd guess at like 10:00 that we left there.

YUHAS: Now what was the initiating criteria for evacuation of the ECS?

RCTK: They were taking air samples in the area.

YUHAS: With what?

RCTK: With, I think, an air impactor or something of that, or of the same variety. You know what I mean, a small...

YUHAS: Graph sampler?

RCTK: Yeah. A graph sampler. Some of them have filters, some of them use a round two inch planchette, or whatever, and put a little bit of grease in there. One of the other, they were using, and they got greater than the MPC for, I think it was cobalt, I think they had

identified cobalt-58... I'm not sure what it was that they were using. The MPC--they had made some identifications at that point. They had put some particulate filters on the multichannel analyzer and counted them and gotten an idea of what isotopes exactly we're dealing with in the air activity, aside from the inert gases. And I think cobalt-58, it seems to me rings a bell--it was one of those that's like, 10^{-9} was the MPC value, and they exceeded that. They exceeded it by a good bit, I think.

YUHAS: Was this evacuation very shortly after you collected the sample?

RCTK: Pretty shortly after.

YUHAS: Do you think do you think collecting the sample had something to do with the increase in activity?

RCTK: Yes, I feel it did. I felt that's what did it.

YUHAS: Ok, is this feeling based on some knowledge of the inadequate ventilation of the nuclear sample hood, or the nuclear sample room?

RCTK: Yes.

YUHAS: Could you elaborate a little bit on that?

RC TK: Well, in previous experiences have been that the ventilation was not adequate in Unit One. Among the technicians that I worked with, they knew it. We've had numerous histories of taking samples or putting samples on recircuit in nuclear sampling hood, and if we left them on just a short time, just a little bit longer than the minimum time necessary, we would get releases that would go into the ventilation system and into the control room, and into the control tower, essentially. And we have seen in past history, also, that we have gotten activity in the lab area, in the same--when you open the door.

YUHAS: At the point of evacuation, did you have any indication as what the air activity was, either, say, due to hand and foot counter alarms, or RM-14 HP-210 probe alarms or general dose rate measurements taken with the E530 or E520?

RC TK: Well, the hand and foot monitors, as soon as we put the sample on recirc were zapped out, because the wall is--there's a wall which is the only separation between the sampling area and those monitors, and radiation was intense enough that it penetrated that wall and caused those instruments to go very high.

YUHAS: About how many people are standing around the ECS, which is where these hand and foot counters are located?

RCTK: Quite a few . . . .

YUHAS: While you're in there doing that?

RCTK: Quite a few.

YUHAS: Do you know what the dose rates went up to where all these people were standing?

RCTK: I don't, I don't think it was--it was less than 5 millirem. I think that there was enough people milling around that had monitors in their hands that would have noticed that.

YUHAS: Ok, so the hand and foot counters went off. What else?

RCTK: Well, everything started, everything we had started going up drastically. The backgrounds on all the instruments, when you attempted to use them, were ridiculous. The air samples that we'd gotten progressively were coming up right away. So we left pretty hastily.

YUHAS: Who made the decision to evacuate the ECS?

RCTK: I don't know.

YUHAS: Who told you to leave?

RCTK: I don't know specifically, I . . .

YUHAS: Everybody just left?

RCTK: Everybody just left.

YUHAS: What directions were given, where were you supposed to go?

RCTK: To the Unit 1--or Unit 2, I'm sorry--control room.

YUHAS: Ok. . . .

RCTK: That is, we know that is the second . . . .

YUHAS: So about how many people, instruments under their arms, etc., headed for Unit 2?

RCTK: I would say, 25 . . .

YUHAS: Ok, what course did you take?

RCTK: Ok, we went out through the secondary part of the plant, past the IWT area and the neutralizer tank area, and back along the corridor between the two units.

YUHAS: Through the roll-up door?

RCTK: No, actually, the roll-up door is down. There is a corridor that goes down along the--it would be the, it's the east side, it would be the streamy side, and it goes along and it comes in a door, both security doors, down further, which enters the control tower of Unit 2. And you go right up the stairs there and into the control room.

YUHAS: Ok, describe the condition in the control room on your arrival.

RCTK: Well. . .

YUHAS: Unit 2 control room. . .

RCTK: Well, everyone was, more or less, concentrating on the gauges, and there were quite a few people there, and once again it was filled, the control room was filled with people. . .

YUHAS: Can you give us an estimate of the number of people in the control room?

RCTK: I'd say fifty...I'd say fifty people, various people concerned with the problem. And we had a desk there, we set up the equipment that we had.

YUHAS: Where did you set up your equipment in your alternate station?

RCTK: This was a desk just a large desk . . .

YUHAS: Where in the control room?

RCTK: In, it would be I guess the north side of the control room. Let's see the control room is . . . . . Well, it would be the side toward the instrument shop, whichever that is--north, I think it might be the north side. We had a desk over there in that end of the control room, off to the side of the control room there, and set a desk up and brought some instruments that we had. We didn't have a whole lot, we didn't have a whole lot of instruments.

YUHAS: Why not?

RCTK: Some of them--we, first of all, have a shortage of instruments. It seems like we never really had enough instrumentation for both units that was calibrated. And so that problem with the great need at that time, and some of them left in area that were inaccessible because of the radiation. We had lost most of our instruments and we had very few.

YUHAS: Can you give me a general description of the type of instruments that you did bring with you up to the Unit 2 control room?

RCTK: I think they brought a Ludlum--these were instruments as far as counting smears--and I think that teletectors was the primary thing that people were bringing because of the high exposure we were encountering; maybe a couple of E520s. That was primarily it. We didn't have very many instruments.

YUHAS: Ok, the condition in the control room at the time of your arrival, you said you had about 50 people. Are you familiar with the operating area designation of the control room, you know, there's some tape on the floor that say's don't come. . . .

RCTK: Yes.

YUHAS: About how many people were in the operating area of the control room?

RCTK: Oh, maybe 25.

YUHAS: There were 25 people between the control consoles and . . .

RCTK: Well, is that glass office in the center, is that included in that area in the back?

YUHAS: No.

RCTK: Well, ok, I don't know, then. Maybe 15 people. Quite a few people. I mean, at various times throughout the whole first three days, there was quite a group.

YUHAS: Ok, at the time that you got there, though, what was the general noise level? Were there a lot of talking, a lot of discussions going on, or were people quietly watching what was happening, or what was going on?

RCTK: There were a lot of discussions going on between, maybe two people. Most of it was going on in the glass office, though, and most people outside were just keeping, concentrated on various instrumentation.

YUHAS: Was it apparent to you who was in control of the situation?

RCTK: I think so, yes, I think Seelinger was there, Jim Seelinger. I think he was running . . .I saw that, it was apparent that there were people that were running the operation, and they were staying primarily in the glass office there.

YUHAS: Ok, about how long did you stay in the Unit 2 control room that morning?

RCTK: That day I didn't get out until, maybe 7:00 that night, or later.

YUHAS: What were you doing while you were in there?

RCTK: I would say I was probably there close to eight hours, maybe seven hours . . .

YUHAS: Ok, what were you doing in there?

RCTK: Well, about six hours I had a respirator on. Everyone had respirators on.

YUHAS: Why did you go on respirators?

RCTK: Because the air activity level came up that high in the control room.

YUHAS: As measured by what?

RCTK: As measured by the air samplers which we did have, a couple of air samplers we had brought over there-portable grab air samplers. And we took samples periodically and levels had come up to significant, around MPC for the suspect isotope that we had.

YUHAS: Is the Unit 2 control room monitored by a fixed air monitoring series of equipment?

RCTK: It should be.

YUHAS: What channels, what capability does that air monitoring system have?

RCTK: It should have a gas detector, and it should have an iodine and a particulate.

YUHAS: Do you know what those read at the time?

RCTK: No I don't.

YUHAS: Did they alarm?

RCTK: I have a feeling that, as I recall, most of the instrumentation, most of the RMS system, was high. It was alarming. Most of the instrumentation, a lot of it was pegged out. So we weren't relying on it very much. We were relying on the grab samples. I don't think that--now my supervisor, Dick Dubiel may have been paying attention to it. We had--I think he did, as a matter of fact, look at it a couple times. Yes, that's right, we did. We did look at that a few times to get an idea whether things were coming up or not, but a that's pretty rough--the meter on that, for the activity, I think--the way it's calibrated, the way it's indicated, you can't see small change with the dial, the indication is, I mean, the change-it's in hundreds or whatever, you know what I mean. But you couldn't really read it accurately enough. It stayed fairly stable at a certain point, and we would continually grab samples. It was more accurate.

YUHAS: What were you counting the grab samples with?

RCTK: Ludlum.

YUHAS: Ludlum, with what type probe?

RCTK: I don't remember.

YUHAS: Was it HP-210 probe?

RCTK: It was the upright probe.

YUHAS: Which is a end window G.M.

RCTK: Yes, I think it is.

YUHAS: Ok, and you collected a grab sample of about what volume?

RCTK: I think that the volume on the the thing--there again each one varied. I think I ran it for like, three, at three standard cubic feet per minute for approximately 15 minutes. I think that was what I was running it at.

YUHAS: Did anyone calculate the half life of the isotopes that you were seeing on that?

RCTK: Yes, we did do some rough and dirty, once again, rough and dirty. Most of the work at this time was not very, extremely accurate because we didn't have the, I did not have a calculator. I had to do it all by hand, so therefore, I rounded it off to the nearest figure. We did do some rough half life calculations to try to determine, narrow down what type isotopes we had. And this is when we determined every time that I was there, that it was dominately noble gas effect because it would decay off very rapidly.

YUHAS: So the half life was less than two hours?

RCTK: Yes.

YUHAS: Ok. How was that information used?

RCTK: Well, we tended to be more conservation on...if we counted a smear and it dropped off very quickly, the number of counts per minute that we observed, then we were much more, you know, we relaxed the respirator requirements because we thought it was noble gas.

YUHAS: You took, you came off respirators? I thought you said you were on respirators for six hours.

RC TK: We were on for about six hours because we had, we were getting in the order of, I think as low as 10^{-6}, 10^{-5} maybe even, air activity when we calculated it. And I don't think we had a good idea of whether that was gas at that time or not, so until we really got everything together, it was probably about six hours.

YUHAS: Okay. What type of respirators were being worn, and were they being worn by everyone?

RC TK: Everyone was wearing a respirator in the control room during that time. As things went along, of course, we got more control of the situation, and we made, it worked very well as far as, when I saw levels coming up, I had RM14 sitting there and you can usually see it coming up, I would take an air sample if I saw change where, when we had respirators off, and then I would immediately inform Dick Dubiel that "we got a problem, let's get the respirators back on". And that's the way we did it off and on, as things came up, you know. It was a problem to identify what you had specifically. At first, sometimes we got conservative obviously. We wore the respirators when we weren't sure what it was because we had no...that was the best thing to do.

YUHAS: What type of respirators were used?

RCTK: All different types, well, as time went along we got them from other...

YUHAS: What I'm...

RCTK: Initially, we had the MSA respirators.

YUHAS: Full face or half face?

RCTK: Full face. There were a few half faces being used.

YUHAS: What type of cartridges. . . ?

RCTK: There again, we were running short. And in fact I found myself in a particular situation where I didn't have one, and levels were coming up in the control room and I didn't have one. I set mine down and somebody else picked it up and was the one monitoring, looking at the levels coming up. I didn't have a respirator--I had to borrow somebody else's and go over to Unit 1 through the plume, and try to obtain one with the respirator on and come back, which I did, and then set up again. They were in short supply at that point because they were in such demand.

YUHAS: What type of respirator cartridge, or your purifying cartridge, was used on these respirators in the control room?

RCTK: Just strictly, I think, paper type. Almost all of them were paper type. They do not have the capacity, I don't think, to filter out iodines.

YUHAS: What effect did putting everyone of these fifty people in the control room on respirators have, as far as the flow of information to and from the control operators . .

RCTK: Extremely difficult to talk to anyone through the respirators.

YUHAS: Were any of the respirators equipped with speak easy type devices?

RCTK: No, not that I know of.

YUHAS: Do you know if that has every been suggested to the licensee?

RCTK: No, I don't know that, whether it has or not. I doubt whether it has. I never heard any discussion about that type of thing at all.

YUHAS: Ok. Could you describe some of your other duties and responsibilities while you were in the Unit 2 control room that day?

RCTK: Well, ok this is where a lot of my time was involved, not just taking the air samples. But I was helping the guys that were making entries into the auxiliary building of Unit 2. At that point, we were making a few entries and I was either helping them suit up--that was the main job. I was just standing by and helping these guys suit up giving them information, and the other guy was usually was escorting them in, another health physics technician, to escort them in, and I was getting them all prepared.

YUHAS: Can you, can we start off with and try to go through who went into the auxiliary building?

RCTK I don't, couldn't tell you exactly. This was, as I said before, a chaotic situation, with a lot of excited people. And we did the best we could. Many, many people were going in and out to check things and I really didn't pay attention to who, specifically. And seeing all this, I was, you know, providing functions, like surveying these guys when they came back, making sure they were ok, checking air samples occasionally, and taking care of that type of thing-getting the circulation set up of the empty Scott air bottles, to get them back off the island and refilled, that type of thing.

YUHAS: Was anyone documenting who was going in and at what time, to the auxilliary building? Was there a log being maintained?

RCTK: I don't think so, that came about later, I think you people . . .

YUHAS: Was anyone logging the exposures these guys were receiving when they came out?

RCTK: No, no.

YUHAS: Was anyone making up survey maps, based on the information they took?

RCTK: Yes, I was. They began, eventually--I don't know which day it was, it might have been Thursday, it wasn't Wednesday--Thursday or maybe Friday, that I was given a list to take to the control room when I came in that day, of people and their exposures, operators primarily, and their exposures, so that they could utilize these people, simply that had not had as much exposure. And I did take that list to them; whether they were using it or not, I don't know.

YUHAS: Ok, we're still back to Wednesday. So we've got no one logging...

RCTK: No, okay, Wednesday, no one was logging and we had no . . .

YUHAS: Did you hear anybody asking for volunteers for trips into the auxiliary building, or were people being told to go in?

RCTK: I think the general--although there were people that were very dedicated. There were people that felt there was a certain amount of that that goes with this. There's a lot of people that are willing to take extreme chances and do things and not question it. There is very much company loyalty in a plant like this. It something that will be very characteristic probably in a lot of utilities. So I can't say that there weren't people that volunteered, but there were many people who I talked to who I think felt the same as I did, that "what is going to happen here, are we going to be guinea pigs", and we didn't like it at all. But we felt that we were in the postion of, in fact it was even said to me, "it's your job". You do it or you felt--it wasn't specifically told me that I'd be fired, but I thought if I stood ground and rejected doing some of these things that I would end up just being fired.

YUHAS: How about the HP foremen, were they screening some of the request and trying to determine the need or the safety signficance of these individuals who were entering the auxiliary building?

RCTK: They were leaving most of that up to me.

YUHAS: The HP foremen were leaving that decision up to you?

RCTK: Yes, or the escorts they didn't have any information to go by, many of the first times that they went in. They had an escort, an HP technician escort-- the person in and see what they found. They did not really know what the levels were going to be a lot of the places.

YUHAS: What type of instruments were they using on these escorts?

RCTK: Teletectors, primarily.

YUHAS: What type of detector does a teletectors have?

RCTK: What type of--I think the teletector is a GM tube.

YUHAS: How does a GM tube respond to low energy x-ray, or gamma rays?

RCTK: To the low energy end of things? I think that, a GM tube to me, is an instruments that is a fairly average type of instrument. It would deal--this is what I think--it deals in a fairly common level of energy gamma that you see in a nuclear power plant. Now whether it's

too good in the low end, I guess its maybe not as good on a low end, near the low end, although I guess it would be better than a proportional counter.

YUHAS: Did anyone, did you overhear conversation, for instance, people talking about sending someone in to change out the seal return or seal injection filters.

RCTK: Yes, yes.

YUHAS: What type of radiological environment existed around those filters?

RCTK: Ok, I was thinking, just a minute, I was thinking back to what you asked me before. I guess, getting the GM tube--I guess the GM tube would not detect low level energy. I guess you would want a proportional counter, something of that type, I guess to get to the lower...I guess you have to much interference and too much secondary ionization from the higher energy. I don't know, that just what I... Ok, now getting to this question-yes, I did know of a guy that was asked by, I think, Earl Showalter, asked a couple mechanics to change the filter in the auxiliary building and a technician went along to inspect them. And I think he got--this is, there again, I heard this from other people--I think they said it was something like a thousand R at the doorway to this filter.

YUHAS: So I assume these people returned without changing the filter.

RCTK: Well, right, I think that this guy was rather--these mechanical maintenance people were rather upset about the fact that they were being asked to change this filter and that's the story that I got--this guy had actually told me he was ready to punch the guy in the mouth. . . .

YUHAS: Now, ready to punch who in the mouth?

RCTK: Earl Showalter.

YUHAS: Showalter is what, a supervisor of maintenance?

RCTK: I think so, I think that's what his title is, I don't know, this is heresay.

YUHAS: What about health physics involvement-did you hear, did you overhear your supervisors or your management stating to individuals that entry into such a cubicle with those kind of dose rates has to be carefully evaluated in terms of the radiological health significance?

RCTK: I don't know if they were even--I'm not saying that they certainly acknowledged the situation. Maybe my supervisor, Dick Dubiel, would have said immediately, I'm sure he probably would have, "no, that's right we don't go in there." Whether he was aware of that situation or the whole problem, I don't know.

YUHAS: Who was directing these entries? These are technically what would be called recovery or search entries, right?

RCTK: A lot of it came about from maintenance or operations requirement. They had to turn a valve, they wanted to try something, so they would come down and say we've got to go in here.

YUHAS: Now would they come through Dubiel every time, or did they just usurp the level of health physics responsibility?

RCTK: I don't know, I don't remember. . .All I know is that they were being taken care of by somebody other than me, because they were coming to me and saying, "we're going to make an entry here. And I would say, "who's your escort," and as long as they had a health physics escort, and I didn't know any different to think that they were going into something that was extremely dangerous, I really didn't say a lot about it. I figured ok, they're covered. Now whether they got their permission, I don't know.

YUHAS: OK, so you didn't challenge the validity of the . . . . .

RCTK: Right, I didn't challenge the validity of the requirement.

YUHAS: What were you outfitting these people with? You said you were helping them dress.

RCTK: We were outfitting with coveralls, the wet suits and the Scott air packs similiar to what I wore to go in, and I think double boots even. I think the same that I wore when I went into for the sample.

YUHAS: Were you outfitting any of these guys with extremity monitoring?

RCTK: I didn't.

YUHAS: Were extremity monitors available in the control room then?

RCTK: I think we would a had to use a conventional TLD instead of a--I mean, you know, just tack it . . . .

YUHAS: all it a wrist badge. . . .

RCTK: Call it a wrist badge...I think we would have had to do that.

YUHAS: Ok, but did you didn't see this being done and you did not yourself do it.

RCTK: No.

YUHAS: Ok. All right so you're there for eight hours that day?

RCTK: I think--well, the whole day I was there twelve, approximately 12 hours, but I mean, I think I was in the control room somewhere between six and eight hours, in that area, in and out.

YUHAS: Ok, In that period of time you must of gleaned some perception of what the problem was with the reactor. Could you describe that?

RCTK: Ok, well, we were getting different stories. That was like, everyone else.. I really sympathized with the people--when I finally got home and turned on the news that night, I sympathized with the people who were getting a confused picture, because I certainly felt when I left, that there was a damn serious problem, that the people up there seemed to really, really sweating it out. And I just got that feeling, certainly, from it. As far as, exactly, some people would say

there was fuel damage and some people were saying there wasn't any fuel damage and different people had different opinions. And I got some things that I found the next day even that were very humourous, because people would say people would say, "we won't be back on the line for another month," or whatever, and I'd say, "a month? You've got to be kidding me, it'll be much longer than that." But, you just got different opinions, and I guess, its like, I don't know that the intricacies of the system, as far as what exactly what went wrong now, and a lot of people didn't at that point. I think the only people that might have known were the few that were involved at the time. The rest of them, you knew the problem but you didn't know exactly how bad it was. I think it was the following day that I really was in there and saw the dome monitor reading--I think it was reading 8000 R, with the calibration factor 100, with the shielding factor that was on it. And I asked an individual, an NRC man, at that time, "Is this correct, how would you read this instrument?" because I wasn't familiar with it. And he said "Yes I think it's 80 here on the indicator, and then you take it times a hundred. "And I though-but 8000 R, whew! I knew we had a problem! But I can't say that I knew exactly what was happening. I was just getting information like everyone else, as it was coming up. I got it right away because I was right there. But I knew we had core temperature problems, and I didn't know the fact that the valves stuck open on the reactor coolant system, the relief valve. And I didn't know that the emergency pump surveillance valves had been left closed. I didn't know those things until several days later.

YUHAS: So you left that night, the twenty-eighth, or was it early in the morning of the twenty-ninth?

RC TK: It was that evening.

YUHAS: We're going to pause for a second...[interruption]... Ok, so left at about what time that night?

RC TK: I think it was around 7:30, maybe 1930, if you use military time.

YUHAS: Whatever. Ok, so you left the evening of the twenty-eighth. When did you return to work?

RC TK: The next morning at--I think that was the morning that I came in--no that was the next morning at 7:00. Yes.

YUHAS: OK, so it was 0700, and where did you report to?

RC TK: The 500 KeV substation.

SHACKLETON: We'll have to cut the tape at this time. It's now 2:07 p.m., April 25, 1979.

SHACKLETON: This is a continuation of the interview of Mr. RCTK, the time is now 2:10 p.m., April 25, 1979.

YUHAS: Ok, RCTK, let's go back. I just want to catch one quick remark. We've determined, based on your conversation, that logs of personnel going in were not being maintained, that RWPs were not being used, that no one was recording doses out. But you said you were recording some survey data based on what apparently the escorts were telling you.

RCTK: Right. I ran some copies off of the prints--the floor plans--and I was filling in. . . .

YUHAS: Where did that information go to, where did you lead it?

RCTK: Oh, I led it, I laid it on the desk before I left. As a matter of fact, the next day I came in it was lost.

YUHAS: So you don't have any idea of what happened to that survey data?

RCTK: No. I started another one the next day.

YUHAS: Did you maintain any log books or records of your own, apart from what you did at work?

RCTK: No.

YUHAS: Okay. All right, so you came in at approximately 0700, and this would have been on Thursday, March 29?

RCTK: Right.

YUHAS: You reported to 500 KV substation. Would you pick it up from there, please?

RCTK: Ok, I think that initially, I was sent from there into the island. We might have gone over to the Observation Center first, I'm not sure. And we were sent in to the--me and the gentlemen I work with--were sent in to set up a respirator exchange program, or respirator exchange system, at the processing center, which was vacated at that point. There was no one in there, and we went in there. And we got respirators, cleaned and new filters or whatever they required, checked out and stacked and placed in position so that the people coming into the plant could grab one and put it on, get dressed, we also got the, all the protective clothing organized that whole, that whole area so that it would be an access point for the plant.

YUHAS: Through the north gate?

RCTK: That's right, I did. We drove in--Tom Leech, the gentleman that I work with, he's a junior technician, he drove his car in, I drove in with him in his car.

YUHAS: Ok, so you drove in through the north gate, showed your identification...

RCTK: Right. . . and drove in . . .

YUHAS: And drove in. Was the car searched at the north gate?

RCTK: No.

YUHAS: Ok, you parked at the process center. You walked in the process center, were there any guards there?

RCTK No.

YUHAS: Was anybody there?

RCTK No.

YUHAS: When you came in that morning did you come in via the north gate?

RCTK: Yes.

YUHAS: Ok. How many guards were at the north gate?

RCTK: I don't remember.

YUHAS: Was this a double bus thing, where you took a bus in from the 500 KeV at the Observation Center?

RCTK: Yes, I think we took a bus or we got a ride in with the Met Ed truck.

YUHAS: Ok, and they dropped you off at the north gate and then somebody else picked you up and took you in?

RCTK: I think that's the way it was on Thursday. Either that, or that might have not been established until--I'm not sure. But we got in on a company vehicle . . . Oh no, wait a minute, no, no, no, no. On Thursday, we drove in on a private vehicle.

YUHAS: Ok. Were the metal detectors in operation?

RCTK: No.

YUHAS: Where the chemical detectors in operation?

RCTK: Everything you had to consider, it was just like almost in a movie, everything was laying all over the place--jackets, lunches--just left to lay the way it was, when everyone took off.

YUHAS: Inside the service building, were any of the guard force manned at the service control building?

RCTK: I think there was a guy that was at the--I do recall there was a guy just before you go into the control tower. There was a guy standing there.

YUHAS: This was on Thursday?

RCTK: I think there was I'm not trying--at one time there was a guy there. It's really hard for me to remember . . . .

YUHAS: Sure . . .

RCTK: . . . whether it was Thursday, Friday, or what day it was. I don't know for sure.

YUHAS: Ok, one other question about security-the key card lock doors...

RCTK: Yes.

YUHAS: . . . What condition were they on?

RCTK: Most of them, ok, were propped open.

YUHAS: Ok. So you didn't have to have the key card to have access to the plant.

RCTK: As a matter of fact, I got in the situation where (1) the prop was knocked out, and that was when we had the 200 mR plume over the outside of the building, and I was in the corridor between the two units. And I was trying to get over to Unit 1 to get that respirator and it was a 200 mRem plume, I was looking on my E520 and I saw that reading and I couldn't get in the door, the door was locked, because somebody had pulled out the door stop. And I was stuck, I had to run back and I finally got in.

YUHAS: Ok. All right, so you came to the process center, you established a inventory of respirators . . .

RCTK: And protective clothing. . .

YUHAS: Ok.

RCTK: We set up a whole thing. We got everything organized. We moved everything off the tables, that's security people stuff. We put it all in a pile, we took a huge piece of plastic, and made a large bin to throw protective clothing in as people came out. At that point, as you walked beyond this processing center, you had to be fully suited and you had to have a respirator on.

YUHAS: Ok, and did you stay there most of the day?

RCTK: Yes. We stayed there and watched as the clouds would blow by plumes, small plumes of . . .

YUHAS: Who was directing your activities there?

RCTK: No one. Just, we were doing our own thing.

YUHAS: Did you have frisking equipment available there?

RCTK: Yes.

YUHAS: Was it functional?

RCTK: Yes.

YUHAS: How about when the plumes were around?

RCTK: We did not have air samplers. We had, there again, we were relying on information that it was inert gas. So we had an E520 and RM14 friskers, so that's all we could really check for.

YUHAS: What direction did you give the people, lets say, many a times those friskers must have been on the times ten or times hundred scales.

RCTK: Yes, they were. Times ten.

YUHAS: What direction did you give the people leaving the process center?

RCTK: To go to the 500 KeV station to be checked out again. They were supposed to be checked out again, their car, and then, surveyed because of the fact that we couldn't assure that they were clean, from that point.

YUHAS: Right. Did you spend you whole day there, on Thursday?

RCTK: No, I spent half, I spent the morning there. . .

YUHAS: Ok.

RCTK: And them I was sent to the Unit 2 control room once again. And, ok, as I was sent there, I think it was Thursday, pretty shortly they were telling me that, "It looks like you're the one who's going to go in and get a sample of the reactor building air inside the Unit 2 reactor building from HPR227." And of course, once again, I was thinking "umm, I don't know if I want to do this." And I really didn't say a whole lot, just thinking that I probably won't do this if they tell me to do it. So they were trying to get permission. Dick Dubiel told me "we want you to go in and get this." I said, well...I thought about it, I was willing to go in and line it up, provided they kept the valves shut in the control room-the isolation valves to the containment--and I was going to line it up and put a small glass vial in the line up of the system and put some shielding around it and get out of there, and

then I was thinking in my mind, if I had to be the one to go back in and get it I wasn't going to do it. But they never got permission that whole day. I was there, I didn't get out of the control room until, that day, until maybe eight o'clock that night and then I went over, on my own, and got a whole body count, because I was really getting concerned about-no one has checked me for any isotopic contamination internally, and I keep getting sent in here. And I felt I was going to be a guinea pig because I was lowest, I'm one of the lowest exposure people in the department because I always was careful about that. So I was afraid they were using me as much as they could, and they were going to use me as much as they could. So I did go back and I got the whole body count and I came out clean, as far as initial interpretation of the individual running the counter, was looking for peaks. So then I got home maybe 9:00, 9:30 that night.

YUHAS: That would have been the night of the twenty-ninth?

RCTK: Yeah, and there--that was a day, that was a rough day because that was when a lot was going on in the control room. They had to 200 mrem plume that was blowing around right outside the--I mean, as a matter of fact, I walked out the door of the control room and downstairs and went to go in that corridor. When I opened the door up, my E520 on the scale had pegged. It was reading like 75 mR, as the air blew in and hit it. And of course, there again, I was rather petrified, I

thought, I had no idea whether this was iodine or what was involved, and I only had a paper respirator, paper filter on my respirator. So I went back-- this was when I was attempting to go over to Unit I for something that Dick Dubiel had sent me for. And when I returned--let's see, he sent me over to Unit I...to get some more. . . I think charcoal filters or something like that, he had sent me over there, and I went down, and when I went out the door and I got that reading, I turned right around and came back to the control room and said, "hey I can't go out there." I said "I got 75 mR air activity on the E520 when I opened the door." And he said well, I really think that's something like sheen, or something off the reactor building--shine would it be--shine off the reactor building, something like that. I really didn't understand that particular terminology, what he was refering to. I don't know, is that like secondary ionization through the walls of the reactor building, or is he talking about something else?

YUHAS: I have no idea.

RCTK Yeah, I don't know what he meant. And he says "I wouldn't worry about it." Once again, maybe it was foolish, but I said well I gotta believe him I guess. And I took off and I went through it, and I saw it went up to 200 mR on my E520. It just went up like this and I crossed my fingers and hoped that I wasn't receiving iodines and other sorts of things. So I got the stuff and came back. It's a situation

that you get into when you work for a company like that, and you realize that you can be fired maybe, if you don't--if you feel that way. You told me before that there's a regulation that, you know, you can volunteer in an emergency situation; well, I wasn't even aware of that regulation, or perhaps I would have, you know, easily said no. I felt it was my job or that my reputation, I'd better do this stuff. There's a lot of pressure on you to try to perform. Now I'm sure a lot of the guys did things that they got overexposed, as some did, or considerable exposure as a result of some haphazard things that they did, because they felt it was an emergency and they had to do it. It's difficult--that day was a bad day. Ok, I saw in the control room, things were going bad, they had a bubble develop, and I was surprised when I got home, first got home and heard the news that everything seemed to be going ok, etc., and I thought, how can they possibly say this, because I felt everything was going terrible, being in the control room. And then it was the next day, I didn't get out, I was suppose to be on a shift of twelve hours. Well, I was in the control room and there was a lot of pressure, seeing what was going on, the temperature in various parts of the core going up, the bubble and people talking about up there, talking about explosions, and I knew they wanted this HPR227 sample because they were worried about danagerously explosive hydrogen/oxygen mixture in the building. All kinds of things were going through my head that day so I was really getting upset about it. And of course, at that point, my family was also at my house. My wife was upset, and the rest

of my family was upset. The next day, ok, I got home so late and I was so exhausted and they told me, and I said "the heck with it, I'm not coming in at seven o'clock the next morning".

YUHAS: Now, lets clarify the day, are we talking about. . .

RCTK: Thursday.

YUHAS: Thursday, you said you were not going to come in on Friday, which would have been the 30th.

RCTK Right. Because I, everyone else was getting off in approximately 12 hours, and I was there from seven until like, until I got home. I left there maybe eight-thirty or nine o'clock and I said--I realized, once again, that I was staying in the control room and no one was relieving me because of the fact that I was low exposure. I felt that this--so I thought well I'm not coming in at seven o'clock in the morning. So I came in about eight thirty the next morning. I came in late. And the next day...it was another day, it was Friday...wasn't too good. Friday, I was in the control room and we were hearing things about people--run on banks in Middletown and people, relatives and friends were leaving, of people that were working at the plant. And I was getting this information. And people, more people would go into the auxiliary building, and we were getting readings that varied

YUHAS: Did you hear of any overexposures--I say overexposures, I mean exposures in excess of three rem per quarter?

RCTK: Yeah, I think that--I think at that point I heard--I'm not sure but I think at that point I heard Ed Houser receiving over four rem, taking the sample which I would have undoubtedly probably had to take if I'd have been around there when they took the second reactor coolant sample. I think at that point, I think Friday I had heard about that. I'm not sure when that was, the exact sequence there of events. But I had known that, and had heard, that there were several people. And of course, I had seen several people, Carl Guthrie, come into the lab, I think all the way back on the first day, Wednesday, I'd seen him come into the lab with, I think he had as much as 200 millirem contamination on his skin. . . .

YUHAS: Do you know how Mr. Guthrie got that?

RCTK: . . . . And he went through the auxiliary building, I understand. He ran through the auxiliary building. I'm not sure--Unit 2--I don't know the exact circumstances of that incident, but it turns out it was mostly gas because he got rid of it when he took a shower, and after a while I think he got rid of it. I don't think he had any fixed contamination or internal. I don't what his, I have no idea what his

whole body count would be, but he came into the lab and he set off everything. He was extremely contaminated, or at least appeared to be. And I had seen several incidents of that nature and they had given me the creeps, and that the situation wasn't too well under control. And the people that were going into the auxiliary building were coming back with readings that were-- one person had said it was 2 R at the door of the reactor building, at the hatch, and various readings in the hall that were fairly high, and they were continuing to send more people in on small different odd jobs--turn a valve, or do this or do that. I can't remember anything much more specific than that, all the way through Friday. But then Friday when I got home. . . .

YUHAS: What time did you leave to go home Friday?

RCTK: I think at seven. I left at seven. . . .

YUHAS: Seven at night?

RCTK . . . . Yeah, maybe got home at 7:30. I got relieved on time that day, and finally got home my family was there again. And they were saying "you are going to get out of this place." And everyone--talking to a lot of people I felt that I was going to resign, because my exposure-- I thought I was going to be utilized for the sole purpose of absorbing the exposure and doing some things that were very hazardous. And I

don't have confidence in the people that are over me at that plant to have any kind of assurance that this would not indeed happen, that I would not be sent on some foolhardy task to perform something with very little degree of control. And there was some, in the back of my mind--related to this there was some discontent prior to this incident that I had an interest in leaving Three Mile Island anyway because of a problem of this nature. My educational background, versus the people that I work with, was a conflict situation. Many of them barely had a high school education, and in fact, I know of an individual for example that even could not even subtract weights, filter weights, on a filter in chemistry, after five years being there, correctly subtract the filter weights. I was--my immediate foreman's education was very often deficient. So I just didn't feel I was in the very best of hands, and I wasn't about to do anything, make any heroic effort, to go into some area and check something out without adequate control. And I more or lesss put down on my resume that I just felt that that my continued employment would simply result in excessive exposure to low level radiation.

YUHAS: So did you, you made your decision on the night of the 30th then that. . . . . you would not return on the 31st?

R.CTK: Right.

YUHAS: The 31st was a scheduled day off though right?

RCTK: Right. I was scheduled off until Wednesday, the following Wednesday.

YUHAS: Ok, so you prepared your letter of resignation on your normal days off, and then did you report to work on the 1st or 2nd?

RCTK: No, what happened, well--I did not report to work, I did not even know who to get a hold of, in the chaos. The people that normally you would call in the personnel office were not available. I knew the situation was so chaotic, so I did not come in, and I think it was Monday night that I was called by the personnel man for Metropolitan Edison Company. And he said "where have you been, where are you" or whatever, and I mentioned that I did not come in because I felt that, for the reasons that I just told you. And he said "well you were expected to be at work." And he said, are you coming in tomorrow? I said, "ok yes" I said "yes I'll come in tomorrow morning," which was Tuesday, or, yes this was Tuesday. I said I'll come in tomorrow morning." And he said a couple things to me and I said "well, that's your opinion," about where was I, why shouldn't I have been there, I said, "well that's your opinion" and I told him that I didn't--I felt that I was there to be exposed to a lot of radiation. And so I went in Tuesday morning and handed my resignation in dating it for the next day.

YUHAS: Have you been contacted by representatives of Metropolitan Edison since you resigned?

RCTK: No. Haven't heard a word. I went, ok, as soon as I turned in my resignation, which was Tuesday morning, I think it was the next day that, Wednesday, I went in and took care of--to the personnel office and found no one there but the secretary--and took care of the paper work. I was very reluctant to, of course, end my employment under those circumstances in that way, and I certainly wouldn't normally have done that. I was a fairly loyal employee for over five years. And it's just the fact that I had anticipated leaving anyway, and if I was just going to stay there, which I felt I was going to be exposed, that was ridiculous to do that.

YUHAS: Did you discuss your intentions to resign with any other employees of Metropolitan Edison?

RCTK: Yes.

YUHAS: Who?

RCTK: Well, quite a number of them. I'd said that I questioned doing what's going to happen here to us. They're going to send us in here as guinea pigs in these various jobs to attempt to get samples.

And I felt that the responsibility of the incident should certainly not fall on the lowest rung of the ladder, that the people who--if the sample has to be gotten and its a high risk operation, then I felt that my boss or my supervisor should be the one going in there, who is best qualified to grab that sample and take care of the situation. To send me as a lower responsibility employee to, and have him sit back...I mean, he can look at it in his terms, I guess. This is a personal thing. And I've had to look at it in my terms, of what's going to happen to me if I get exposed to a considerable amount of radiation--is there gonna be compensation for me, or this type of thing--and what is going to happen. And I felt that probably nothing, just the exposure, and that I did not want that risk. But other employees, I expressed these same thoughts to them, as we're talking about here, and I got many of them said, "well, it's your job, you gotta do it, it's your job, well this, I don't think this radiations really gonna hurt ya." I mean, you know, and this type of thing- "this isn't gonna hurt you, they're gonna keep you under your exposure limits and it's set by NRC so, get your 5R or whatever and be done with it, then you can sit in a desk." That type of thing is what I heard a lot of. Of course, my co-, the worker, the individual I work with, who also went to Lebannon Valley College, felt the same way I did.

YUHAS: Who was this?

RcTK: Tom Leech, and he resigned also. He resigned actually before. No, I guess his resignation, he turned it in later than that, but I don't know when he dated it. He was on the same schedule as me so he would also have had those four days off.

YUHAS: Have there been any other incidents, preceeding this incident that you felt were not consistent with good radiological health practices or regulatory or license requirements?

RcTK: Yes, I feel that--the main point, if I make any point about this whole interview is the fact that I can't help but think that, I always wonder-why doesn't somebody see that this place is not being run by people who are taking an agressive interest in attacking these problems, these radiological problems. Not only is it a question of just costing the company more money, some of it could actually improve efficiency and guarantee a safer plant. And some of it, it seems like everytime you come up with a radiological problem, like the filters in the RMS system, which I expressed several times, that, you know, the flow problems and how shoddy they are. . . .

YUHAS: What is the RMS system?

RCTK: The Radiation Monitoring System for Unit 1, I am mostly familiar with but Unit 2 has its problems too. . .

YUHAS: Which filters are you talking about?

RCTK: These are in line or in various locations in the plant. They continuously monitor air, most of them air, gas and particulate, grabbing a sample. And they have read outs in the control room. Now those monitors, to me, are shoddy pieces of equipment with a lot of flow problems, a lot of cheap seals in them that leak--just poor design. Like I say, I used to go around and put cartridges in there and tape them shut and restrict the flow completely, and some monitors wouldn't even change. The flow indication on--the flow indicator wouldn't even change. And there's a flow alarm light which is supposed to go off, which didn't even signal. And I reported this several times. . .

YUHAS: What method did you use to report this?

RCTK: I usually just went up verbally and said something, however, I think I did put a work request in on that item.

YUHAS: To who, to who did you tell?

RCTK: To either Tom Mulleavy or Dick Dubiel, and I think I did put a work request in on that item once or twice in the past few years. And it would be interesting to see if it's still, if they aren't still the same as they were.

YUHAS: Do you remember which monitors specifically you put the work request in under?

RCTK: I think maybe RMA 1, 8 or 9 possibly...and I'm not sure, there's quite a few of them that didn't operate correctly. And we've had, its just a constant problem. Even RMA 2, which we take our sample from for the Unit 1 reactor building, and we estimate a lot of things off of that, including our releases. It's a shoddy piece of equipment. I just--you have to work with it as a technician to really see what I mean. But there's frequently times, if you are the type of person that has enough of curiosity to fool with it and not just go down there and take the sample, you shut the valves off and check if it restricts the flow. You break the seal on the jar, which is contains water that you have the aerator in and see what the effect of it is. And you take a look at attempting to inspect a piece of equipment, so many times its not operating correctly, and it just seems like it gets to, for everyone, to be a futile effort. You report it and you report it. It's the same with the movable particulate filters. They so often jam in RMA 2. They're so often not operating correctly. Maybe there is an indication

in the control room that it's operating because the needle is bent back. That indicates a jam on the roller in the actual particulate filter, but actually ...

YUHAS: What needle is bent?

RCTK: There is a small sensor, which senses the movable belt of the filter paper from being across in the proper position. I've been down there already where they did not have an alarm in the control room but the paper was jammed up but the thing was just back, bent back.

YUHAS: Why is that needle bent back?

RCTK: This may be by the instrument itself having ajarred it to the side, I mean pushed to the side, or...not that anyone did that. I don't necessarily claim anyone down there that anyone bent the needle back. But, it's just that this type of equipment, I can't have much confidence in. It doesn't look like precision equipment, or else it should be maintained better... It's hard to put your finger on. You can test the equipment out and you can get fair results, I guess. They are getting fair results. But the program for doing this doesn't seem to be adequate to me. There should be more, a closer look at such vital pieces of equipment. They should be inspected for leak tested, and that type of thing, more often then they are. And the technicians

doing the sampling should probably be observed more often as to, you know, what type of procedure they use, exactly. I mean, how do they do it.

YUHAS: Is it your experiences that technicians frequently do not adhere to standard operating procedures, written operating procedures?

RC TK: I think that there is alot of cutting corners. There is a lot of cutting corners in the procedures. There is procedures that we obviously violate every day, and it's perfectly understood that it's that way. As for example, the radiation work permit procedure ...

SHACKLETON: This is a continuation of the interview of Mr. RC TK.

The tape went off at 2:38 pm, April 25, 1979. We are now resuming this interview at 2:41 pm, April 25, 1979. Continue please.

YUHAS: We were talking about, or just about to get into why the RWP procedures were not followed as a routine matter of course.

RC TK: Okay, the procedure states that the person initiating the RWP fillout the first section, I can't cite the exact number for each section there are because I don't have a copy here with me, or anything. And then it states that he take this then to his foreman. His foreman, and his foreman--adds the names of the individuals who are authorized

to go in. Then he bring it back to the technican and the technican will then provide the radiological data and the exposure limits, stay-times for the individuals on the RWP. At that point, he will, the health physics technician, will make sure that this individual understands the radiological hazards involved, and the necessary protective clothing to wear. If the individual says that, then you tell him to sign at the bottom that he understands, initiated by, that he understands that, and then you sign it. This procedure isn't followed, standardly, a person, an individual comes in in past practices, I don't know about right now--came in and filled out the whole half front section, and put in the data, the job, ticket number, description, personnel going in, social security numbers, job foreman initiated by "boom," and handed it to you. This is standard. Then you fill the radiological data out and you sign it. Boom. Of course, then it goes to the shift supervisor, either way, and he signs it. That's one, for example. Another one, things like the air sampling procedure, I think, says that in their samples you should wait 15 minutes after obtaining their sample to count it. I think if you checked the record, I think that many, many times that type of thing is not followed. That's a small insignificant detail, maybe, in a sense, but maybe not in a place like this. Maybe it should be very, very correctly done. I think their is something in there, like taking urine samples as the first one of the morning, first void of the morning, and that's ridiculous. It's never followed--you take the uranium sample whenever a person comes. I think thats even

including for an NRC staff that might come in. I think it would just be taken any time. Then there's things of that type, as far as procedures go. There's a lot of things in chemistry that are, I think are more obvious. There are procedures like the fluoride. I think that if you would examine the average person doing the fluoride analysis in chemistry, you would find that they don't begin to pipette 50 mls of sample into a beaker, 50 mls of standard into a beaker, and make the additions that they say in the correct fashion. It is more like sighting it with their eye on a beaker. And this type of corner-cutting, which results a lot of times because a lot of things are pushed on you, and little requirement for accuracy. There is little--it seems like numbers are important, and the accuracy is second nature, as long as as it's a pleasing situation of numbers. And I think that attitude, more or less, not stated directly, but that attitude--a guy who wants to look good will give a lot of numbers, generate a lot of chemistry numbers. This is probably human nature in a lot of places. I don't know if you can stand it in this type of an industry. A man that generates a lot of numbers looks very good, he's admirable, he gets a pat on the back. The guy that does half the analysis, which does them in detail as they are supposed to be done, very accurately--this is not the type of atmosphere in this plant where that type of thing is rewarded. "Come on, can't you get it done faster than that" is more adequate because there's just not that intellectual interest. It's production line oriented. Maybe I'am being to idealistic, but it just seems that some

of these things, we take samples, we do borons in the reactor coolant system. Frequently that titrater leaks. It has flat teflon stop cocks, and we go through them all the time. They leak, leak, leak, and I would say that chances are there's lots of people that run it leaking, because it sounds good to say, if if leaks, you are supposed to go and get another stop cock and put it in and completely drain the system and flush it and spend a couple of hours preparing it. And many times new ones leak right off the bat, because I felt that it should have tried to obtained glass stop cocks for that procedure because the teflon seem to warp. And I've mentioned this and my answer to that was that they weren't availabe, the glass ones. So they continue to use the equipment. So it's human nature-after so long, a guy is going to run a boron with a leaking titrater.

YUHAS: What is the effect on the direction of the analysis results, the result of a leaking stop cock?

RCTK: Well this could be in an erroneous boron reading.

YUHAS: Erroneous high or erroneous low?

RCTK: It could be, well--if it leaks while you'rr titrating, it would give you a higher mls of sodium hydroxide, which would produce a higher number...ok, you run your caps initially, and you divide your

number that you obtained from the caps into 1082, which is a number to standardize the solution. So actually, if you had a higher reading than you should have, you'd have a smaller operations number, and theirfore a lower boron. I don't know. I guess you will have an erroneous boron number--I mean, you will have erroneous boron. I don't know, I can't think of anything.... If someone would look at some of the data I have generated, I think that it would be evident that some of it doesn't mean too much. I think if you look at the flouride data, plot it, take a look at it, it would be kind of evident that the analysis isn't to accurate. I think a lot of things indicate that. If somebody would take a really good look at them, I don't see how you can not avoid seeing this unless the man in charge does not have enough time to adequately look over these results that are generated. But this is on the corrective side. I'm mentioning things here that I feel that could be done to improve the situation. If someone wants to point out some things, what you would consider being done to improve the department. It all comes down to the same thing--I don't feel there's enough educated, well-educated, people in the Department of Health Physics Chemistry to adequately assure that this stuff is done correctly. There is not enough awareness. There are people that think tritium is H_3O, or that have in the past. You know, I mean, that's what they think tritium is, I mean, it's that type of thing. I mean, if you don't have an educational background in what you are dealing with, a lot of things are going to go over your head, and this atmosphere isn't there.

YUHAS: Ok, let me just ask a few more quick questions and then we'll call it. Do you feel that their is any reason whatsoever to suspect that a disgruntled employee or disillusioned individual may have had something to do with the course of events that occurred on the 28th.

RCTK: I don't feel, I would have no reason to feel that way. I have no knowledge of any particular individual that was especially disappointed, other than on his own personal level--maybe he just wanted to leave the job or whatever--they were talking about leaving the job, but I don't see any connection at all. I don't see how the incident that occurred either could be.... One man, obviously, responsible for the surveillance valves, whoever that is, and I don't know, has his own answering I guess, to do for that, but for whatever reason that was. Aside from that, the failure of the valve that stuck open, I mean, that couldn't have possibly been foreseen prior to the accident. I don't think, that someone would have tried to, attempted to do that.

YUHAS: Did you have any interface with the NRC in the first couple of day.?

RCTK: Casual, I talked to a guy, or one or two, I don't remember their names. Casual. One guy came to me on Friday. It was when NRC arrived there and said to me, about exposure, "how about, lets keep some track on exposures," and setting up areas at each control point to

assure that the people's exposures--I think they even set up somebody out at the north gate try to to take exposures of people coming in and out. Probably found it was difficult. It was because, under the circumstances, I even felt that if certain individuals that works there, if they are not educated enough to realize that this exposure is something he has to watch out for, I think it is almost impossible to not make the person ultimately responsible on a individual basis for his exposure. There are too many ways, that I don't think you can possibly avoid, if a person wants to get overexposed deliberately. There is no way you could probably stop him.

YUHAS: Ok, I want to, on the behalf of the Nuclear Regulatory Commission, thank you for comming in today and for spending some time with us. We will need some time to get the tapes transcribed and allow a couple of weeks for that. We will either call you and deliver them or mail them to you. In the interim, Owen will give you a card telling you where he can be reached if something else comes up.

RCTK: I hope I have been of some help.

YUHAS: You certainly have. We appreciate your candid comments.

SHACKLETON: Thank you very much, RCTK and we appreciate you presence here and giving us all of this time. If you have any additional information that comes to your mind, please utilize that phone number and contact either Mr. Yuhas or myself. The time is now 2:53 p.m., April 25, 1979.