August 7, 1979
Occupation: College professor

INTERVIEWER: Can you remember when you first heard that there might be a problem at Three Mile Island?

NARRATOR: Yes, it was Wednesday morning. And I went to the development office for something and one of the secretaries over there said what do you think of the accident at Three Mile Island? So I don't pay much attention to the news media in the mornings because I am so busy. And I had no idea, and I said well what is going on. They said, well I think they had a bad accident over there and they have spilled some radiation. So when I came back to my office, I asked some of the people in the physics department if they had heard and Neil Wolf had gotten wind, I don't know how, and we turned on the radio. And at that time WITF was carrying a press conference which involved DER representatives being asked by the media what they were doing about monitoring the radiation. And they were, the spokesman for DER I recall as being very halting and really putting his foot in his mouth rather wildly. It was interesting because he was, they were saying. Are your men out monitoring to find out how much radiation? No, we don't have any equipment. Well, what are your men doing? Well, they are sitting in the office with the Met Ed people drinking coffee. But Met Ed has assured us (laughter). But that's when I started following the situation.

INT: Did you pay attention to the media thereafter, then?

NAR: Yes, I started following it. I was concerned about what I was looking at newspapers during the next week. Very carefully listening to the radio first thing every morning.

INT: More attention than usual?

NAR: Much more attention, yes.

INT: Any television?

NAR: Yes, in the evenings.

INT: Did you know there was a reactor there before the accident?

NAR: Oh yes.

INT: How far is Three Mile Island from us?

NAR: It is twenty two and a half miles as the crow flies, not road maps.

INT: Now your initial reaction. How did you feel? Did you feel it was a serious situation or?

NAR: I was concerned, but I certainly. It wasn't until Friday afternoon, or actually Friday morning that I thought that things might get out of control.

INT: What, in other words your opinion changed somewhat. You got more concerned as time went on?

NAR: Yes.

INT: What led you to be more concerned then on Friday?

NAR: Well, Friday morning there was another large radiation release and it was one of the largest. And it was reported as uncontrolled and pregnant women at that point and young children were asked to leave the area. So John Luetzelschwab and I put a bunch of monitoring equipment in his car and went down there. And we, at York Haven we were picking up four and five times background in the air dose. And we got some more soil samples. I have worked with radiation since I was an undergraduate at college for research and I am familiar with monitoring health and safety procedures. I was a radiation control officer at Bryn Mawr College to supplement my graduate income. It involved taking, monitoring on a regular basis all the departments that used radiation and into the room where radiation was stored and seeing that it was stored properly, that things were disposed off properly. This was for radio isotopes, so I have some background in this area.

INT: So you were immediately attempting to. What did you go down to monitor?

NAR: We wanted to; I felt it was important for two reasons. One is that I didn't, I wasn't sure about all these conflicting reports, and I felt that it would be valuable for me and for the community to have some independent assessments. Now, there is a lot of uncertainty when one is doing monitoring. And when you talk about an independent assessment it is not a matter of making an accurate judgment, but it is a matter of distinguishing between people who are saying, well there are no radiation levels and people who are giving shocking figures for what might be happening by over.

INT: You were hearing this on the media?

NAR: Yeah. By overplaying things like the measurements in the stack, which is not where anybody is. So I, that was one thing. The other thing is that John Luetzelschwab is set up rather uniquely to do very careful soil monitoring. It is a line of research that he has; he had started as an undergraduate when they were looking at fallout compliments in soils. He has had students here doing some research and he had all the instrumentation set up so that he was able to.

INT: Swing right into it.

NAR: To swing right into seeing it. We saw what might be deposited in the soil. And actually Thursday he, the morning he picked up the soil sample and brought it down, by afternoon we knew we had some xenon gas in it. Because it had been right after a rainfall. And it was sort of fun for me because I had. We, it was a mystery peak and I had ended up identifying it while John was gone and I, it felt good.

INT: so then did you continue to do this monitoring?

NAR: Yes. I focused, John collected most of the soil samples because he lives down there and Lisa Pawliski coordinated student volunteers and I sort of supervised the things here. It largely involved for me keeping people consistent about what they were doing because everybody was around running in circles and it was hard for me to keep from running around in circles, because the press was calling here for information and people were calling here for reassurances and so that all our phone lines were tied up and people were running in and out of the building, wildly wanting to know what was going on. But I remember sending some students over, especially Friday morning when I knew we were going to have to start monitoring more consistently for a lab notebook. And I started setting up a procedure for what we were going to keep records of and I remember feeling that was very important and I remember the sensation of forcing myself to slow down so that I would stay rational about what was needed. And I went; I went almost into low gear and to a semi cationic state in order to.

INT: This was because of the reactions of other people around you?

NAR: Yeah.

INT: Who were calling? Did you have any sense of the population? Students from the town?

NAR: From the town, people from the local media, little newspapers – things like the West Shore Times and The Guide and the Nuclear Regulatory Commission was calling about. John had called Met Ed to tell them we were doing the monitoring because he had contacts and they had called somebody from the NRC. And since he was in and out the guy from the NRC would call back and say well we are particularly concerned about certain aspects of your monitoring. That you do this or that and we would have to incorporate that into our record keeping system. The other thing we did on Friday was set up a Geiger counter which would notice any changes in the background as a function of time, and called the radio stations regularly just to help reassure people in the community or at least to have people in the community know that things were going on. The other main call on our time was that the county commissions were calling, and wanting us to be a committee to advise them. And I remember at the time I was very nervous because they wanted us to advise them about when an evacuation might take place and what the criteria should be. And I felt totally unprepared to help them make that decision. I think I have the kind of background that might help to have a month or so to study the situation, and think it over and look at the pros and cons to help with those

sorts of judgments. But I didn't think they ought to be made at the county level and I felt that federal officials would be in a better position to have the expertise. Because it has to do with a meld of Civil Defense, and there are a lot of costs and benefits of evacuation. People can die in automobile accidents and so on. But I remember I did go down to the courthouse and talk to John Broujos and brief him on health effects of radiation and what might be the consequences of not evacuating under certain circumstances, in terms of long term effects of low level. Not a major blow up where we have high levels of radiation, but where's the trade off. When do you start moving a community?

INT: It worried you to be making those judgments?

NAR: No, I felt very uncomfortable, unqualified to make those kinds of judgments. I was aware of the fact that the local Civil Defense Agencies were totally unprepared for this sort of thing. When Neil was working with them they had a few survey meters. No one knew how to use them. The batteries were all dead. Even if they had known how to use them, they wouldn't have known how to interpret the readings and so on down the line. So I spent a couple hours over there after talking to John Broujos, making out some little charts as to how long a person could stay at each needle setting without exceeding Occupational Exposure Limits if they were to send people in for fire and police protection in case of an evacuation. Things of this nature. But it was a matter of doing simple minded things where we would draw a picture. If the needle is here on the average and it is going to verbal around you write in a note, you can stay in X number of hours. And if the needle is here you can stay in Y number of hours and things like that. It was just quite a revelation to realize how totally unprepared we would have been at handling, had it been worse.

INT: The, you might go on with that a little bit because now you are talking about some interaction you are having with government agencies. How do you feel government agencies at each level were responding? Were they responding appropriately?

NAR: I think it is a little hard for me to give you an accurate overview of that because I was aware of the fact. I had called some people at the Bureau of Radiological Health by early the next week, after that weekend. And I was quite aware of the fact that,

INT: Now that is a federal agency?

NAR: Yes. That every government agency from local to federal that had anything to do with radiation, or being in the area was working full time. And I was just galled by the disruption of the whole thing. That is to say when. My contacts are with the Bureau of Radiological Health and they were primarily responsible for regulating radiation in consumer products and medical and dental uses, and have nothing to do with nuclear power. But because they have monitoring equipment and expertise every single person in the Bureau who knew anything about calculating doses or monitoring was called in.

INT: Was that here in Harrisburg?

NAR: Up to Harrisburg or to work down in the office down there assessing the information that was being fed in almost on a twenty four hour basis. And they were like a side agency. They weren't the Nuclear Regulatory Commission. And I don't think people realized this because the same thing was for the environmental protection agency, you know, for the Nuclear Regulatory Commission. And so on. And my, it turned out, you see the person I had been collaborating with for the last few years had been on this inter-agency task force to assess the doses and they were pulling all-nighters and working weekends and evenings for a good month after the accident, putting together that report. Because they felt it was important to have it out.

INT: To get it quick, yeah.

NAR: And that was a group of eight to ten people, probably with an equal number of staff support people.

INT: Are you willing to speak to the question of the function of the media in all of this? Do you have some opinions about that?

NAR: Yes I had expressed those I guess in some of the open meetings that one of the real dangers in this kind of a situation is a panic. Because I think a panicked population can hurt itself and I did feel that the media exaggerated a lot of things, partly because radiation, and how one interprets information about radiation is very complex. It is a very, it is frighteningly technical and it underlines one of my major concerns about certain kinds of technologies. I am getting a little of the subject but I am very much of the Schumacher school of thought, that small is beautiful or people ought to look for technologies that ones doesn't have to be highly sophisticated to understand. I think the example of Three Mile Island is precisely the example of an extremely capital intensive and complex technology. And it is very hard for even experts to coordinate on a crisis basis in understanding information. So I can't in sense blame the media. I don't want to point my finger and say the media is irresponsible. I think it is a, I think the media could have been more responsible on the one hand but on the other hand part of the inability to interpret complex information on a crisis basis is fundamental. It is a fundamental flaw of technology.

INT: Do you feel, what about the industry? Do you feel that they were?

NAR: I think the industry has its head in the clouds.

INT: Go ahead.

NAR: Well, my first contact with the Three Mile Island people was in about 1970 when we invited two top physicists over to talk to a little group we had here called Scientists Information Group. We were trying to learn about environmental problems and we wanted them to talk about the reactor which was then being built. There was unit one and what they considered to be the potential problems, both for occupational, on an occupational basis with people working around it and for the citizens and what kind of

radiation was going into the environment. And a lot of us were environmentalists and they knew it, so they were a little on edge. And one of the health physicists was making statements like, "Well, I have been working around reactors for years and I have gotten much more radiation that the population will ever get and my children are perfectly normal." At which point Paul Biebel in the biology department hit the ceiling because there are a lot of genetic affects which are recessive and do not express themselves until future generations and most of the risks of low level exposure are what we call stochastic and that means that you don't know which individual is going to be affected in the exposed population. So you can't go around with the example of one saying "I am perfectly normal and I have a lot of radiation." And it doesn't mean anything. And I have felt that somebody who is educated and working for the industry and whose profession is health physics, the protection of workers and the population should know better. And I think that kind of naiveté runs right through the industry from top to bottom.

INT: Did you feel in the particular incident, now that you say you started having.

NAR: Well, what I am saying is that I think this is just an example of their thinking and I would rather have people call a spade a spade. I am saying we have technology that has some benefits and some risks, and obviously if somebody is going to work actively for Metropolitan Edison within a nuclear reactor, unless they have no scruples at all they have made a decision that the benefits outweigh the risks, but. They have a right to their opinion and I think to articulating their belief. But I think the belief needs to be based on recognition that it is not a black and white situation.

INT: And you felt that the industry performed in that way throughout the incident?

NAR: Yes.

INT: The same way?

NAR: Yes.

INT: Can you give some examples?

NAR: Well, I can't give entirely examples from the Met Ed. I have been to Met Ed several times and I have picked up that same attitude when we are over there talking with them about the setup. Another example is that the first time we visited unit one it was in operation so we could not go in the reactor building. But they showed us health physics section, their monitoring equipment. They described their procedures for when workers go in to work in the hot areas. They wear suits and air masks and various things and how they check to see that they are not contaminated when they come out. And we said what about radiation emergencies and various things. How would you handle that? Because I was concerned about that sort of thing. And they said well, we have so much regulations and so many backup systems that they would never have to worry. For example, and they pointed to a shelf that is about this much material, right here. And they said in all of these binders we have a set of procedures for what to do in the case of emergency. And I

looked at those binders and said to myself who is going to have time to read all of those procedures in emergencies! Because it is obviously an IBM like thing where you say if thing X happens to go to manual Y and look on page 79 paragraph 2. And then it says in Paragraph 2, if the radiation level is above this go to manual 78, paragraph 99 or so. You can't imagine! And I just thought it was naïve to wave at a huge shelf full of binders, which are an example of the complexity of the system. And also when you visit a reactor facility it is enormous in the complexity, I found overwhelming. I visited the unit 2 reactor and when it was about 98% constructed and, we just walked out with a tour. And we were able to go inside and it was really fascinating. I was glad to have that visit because I have an image of what the inside of that building looks like which most people don't. and the walls at the entrances, at the base, are eight feet thick concrete on the outside containment vessel, and I think that's what made me feel any kind of chemical explosion was not going to blow the building up and release radiation to the atmosphere. I felt it's been over built because of its proximity to the airport. There are other ways for radiation to leak and I had other concerns, but I just. That exposure to the people at Met Ed, plus following the kind of stupid stuff that comes out of an organization called the Atomic Industrial Forum, which is an industry mouthpiece about nuclear power is wonderful. It is so incredibly one-sided. Now we have seen examples, on the other hand, or environmental groups exaggerating just as much in the other direction and so there is a tremendous amount of polarization about the issue. There is a gal named Helen Caldecott who is an MD who I have seen on film who will say, "All it takes is one particle of ionizing radiation to completely destroy a human being." That is true, but taken out of context it is a totally misleading statement.

INT: Now I am going to take you back. We got Friday; you got more concerned on Friday. Was that the height of your level of concern?

NAR: The height of my level of concern was probably about 5:00 until midday Sunday.

INT: What happened midday Sunday?

NAR: I think the status of the situation. The fact that I was living with the crisis and I had to relax and nothing had happened yet with the bubble. It felt, and they had had more time to be thinking about it so I became a little more hopeful that it, that they would be able to cope with it without a major.

INT: Because the thing itself, even though not in a great condition, was stable?

NAR: Yes.

INT: Can you recall when you came away from that tension?

NAR: I never. I don't think any of us. Well, I can't speak for other people. It dwindled, it wasn't. There wasn't a now everything is alright, you can relax. People, started relaxing very slowly.

INT: Do you think the people that were handling the situation over there; do you think they were in control of it?

NAR: I don't know. I was very glad that the Nuclear Regulatory Commission people came up. I felt that they probably ought to have more expertise than the local people, not perhaps so much knowledge of the exact workings of the plant, but a more broad knowledge of the kinds of things that could go wrong with reactors. And also less in a way, at stake in trying to save face.

INT: Would you say that of the people operative in the situation, they were the people you trusted most?

NAR: Yes, somebody like Herold Denton. And I think part of it, the thing that built my confidence in Denton was that he seemed like a very down to earth and although he probably got too technical for many people, he got up there and said what he knew. He didn't talk down to people. He didn't say now, now you people won't understand all this but you're alright, which is the attitude that Met Edison had. Now kiddies let us take care of it.

INT: Would you say that of the people involved, that those are the people you mistrusted most?

NAR: Yes, I guess so.

INT: Do you think they are in control of the situation now?

NAR: Well. I think it's as the reactor has gotten cool enough. (Telephone rings)

INT: I had asked you if you felt they were in control of the situation now.

NAR: Well, I think the situation is being monitored more carefully by the NRC and that it is a less critical situation because the thing is shut down. So that we may have some more radiation releases. You know there's quite a flap about sort of slipping a few things in the drinking water for the Lancaster area. But they are going to have more radiation releases as they clean up. I know it. It's a mess. I just know this from little rinky Bryn Mawr, it's probably the smallest graduate school in the country, and you get a little radiation spill and its invisible and it is really hard to decontaminate. And I just imagine trying to multiply this by the scale of that plant.

INT: I have asked this in several different ways, but maybe you can pinpoint it. In the total situation, what worried you most about what was going on over there?

NAR: I guess the possibility of the meltdown. I think I wasn't so worried about a hydrogen explosion unless it would end up being very damaging unless it somehow triggered the chain of events that would lead to meltdown.

INT: What would a meltdown do?

NAR: Well. We heard different scenarios and I really. One of the things I did was Saturday after meeting with the senior staff and being asked for what should we do about the college I came over here and tried to dig out materials on scenarios, and I found the materials very scant. Especially the federal materials. And there were some more vivid scenarios in some of the environmental books that I have. Environmental studies text books and things. And there is one here on, where did I put it, on nuclear power and its myth. Oh, Nuclear Energy, its Physics and Social Challenge, that has quite an illuminating discussion that is written by a physicist. It starts out by describing other near accidents in detail and then it talks about some things about meltdown and there were two major things that I got out of what he said and if they could relied upon. It was just one reference, and realizing the uncertainty of single people creating these scenarios, one of them was that it would not be an explosion. That the idea of the thing melting down through the bottom could start contaminating the river quite badly. And I would feel very sorry for the Chesapeake Bay and any people living down river, but it would probably not be of tremendous burden to the Carlisle community. So that I saw the stuff seeping into the groundwater that was going to flow downstream from our community. Not something splatting radiation on us. The second thing was though that the point was made that the radiation levels would be much higher than one would expect in an equivalent amount of fission in a bomb because of the mix of products are different in a reactor than a bomb, and because the reactor had been burning, in a sense the nuclear burning had been taking place over a period of months. It had built up fission products, whereas in a bomb, whatever is created is created in a moment of explosion and dispersed. And so this thing is holding a lot of waste, in a sense. And so the point was made that in terms of radiation levels there is more radiation in that core that there would be in a bomb, even in the larger ones.

INT: So that although it wouldn't go all over the place it would be a heavier. It would be a much bigger burden there.

NAR: Yeah. So that I was, really started feeling very sad about the possibility of contaminating Central Pennsylvania, but not threatened in terms of my immediate welfare or the welfare of people in the community. I felt, I always felt people could get out.

INT: Did you have any mental images of what this would look like if this happened?

NAR: Well, yes. And the mental image I realized was not a rational one; this is the sort of thing you are talking about. It was like after a bomb had been dropped. There were no leaves on tress and things looked gray. You know, Central Pennsylvania sort of this area around the plant looked devastated. Not piles of rubble so much as just silent devastation.

INT: Quiet.

NAR: Quiet, but.

INT: Animal life? What about people and animal life?

NAR: Gone. People and animal life gone. Leaves off trees and just bare branches and everything a gray color.

INT: Did you make any plans different from what you ordinarily would have?

NAR: Well, I. My time was totally wrapped up in trying to answer questions, to keep the monitoring going here and meeting with senior staff and having. But.

INT: Ok, we might go to that now.

NAR: Yeah, but what I'm saying is that I did not make plans to evacuate. We made no, we didn't pack any suitcases. We didn't do anything about that but certainly my life was quite different as it was everyone's I think.

INT: Ok, we might go to that now as it will probably take in some of the other questions. How did this affect your work?

NAR: I didn't get any work done, except in so far as being a physicist I was doing physics.

INT: Ok, you might go on with that. Rather then what you usually do as a physicist you were doing something. (telephone rings).

INT: Ok, you were saying that you didn't make plans to leave the area or anything like that.

NAR: That's right.

INT: And did you ever think of the possibility of leaving the area?

NAR: No.

INT: How did you feel about the people who did?

NAR: Well, I had mixed feelings because the first thing that happened was Friday morning. I saw people leaving the Middletown area when we were going to monitor. I just remember passing farmhouses and people were loading up their cars and putting suitcases in a trunk. Just, I have an image of that. And the place was eerie because there were no people walking around when we got to not Middletown but to. Oh, what is the name of the place? Goldsboro. And there was nobody out on the street other than a couple of state policemen. And I felt under the circumstances if I had not been a physicist and I had been living within a couple miles of the plant I certainly would have left. And that seemed very sensible to me. When I came back to campus we called from John

Luetzelschwab's office, I called the president's office and suggested, since we were doing some monitoring that we at least report on what we were finding as independent because I could tell that the media was getting a little wild, to the college. And I expected a group of maybe fifty people to show up who were interested and was totally unprepared to be confronted with essentially everyone who had heard about the possibility that somebody was going to give them some new information being on hand. And that was the point, I don't know if you were at the meeting on Friday night, but people were asking me should they leave. And I said at that point if you feel more comfortable leaving, by all means leave. And I remember George Allan feeling that it was not ethical to consider leaving without civil instruction because one could start a mass panic. Well, what had happened instead was a trickle out, which was really safer. So that I think in very practical terms that it was a good thing for some people to leave. I think also the people who are most nervous about the situation, it's better to have them off the scene if you're going to have evacuations anyway. So I think there is some taking into account a range of… see I think knowing what I know it didn't make very much sense for people to leave Carlisle, but I understood the uncertainties and that they were perfectly legitimate.

INT: Now we are going to go back. I wanted to pick up just before we went on with how this affected your ordinary routines.

NAR: Well, I was staying up late at night. I was on edge emotionally. I was excited. I was a little scared. I think the thing that scared me a lot was the sense of responsibility that people were depending on me to make some judgments and suppose I was just totally out of wack and by Saturday afternoon or Sunday I called my advisor at Bryn Mawr who had worked on the Manhattan Project and had worked with high levels of radiation and I just went over my thinking with him. And he concurred with my thinking and I felt a little better. I have, just to have somebody who I felt had some direct experience. I had, we, my family played a sick joke on me and I don't know if I told you about it, but Sunday was April Fool's Day and I was over here at a meeting or talking to people until late at night and my son and my husband made a little tape that I didn't know about and the next morning at breakfast we were having our traditional Sunday morning pancakes which we didn't get often. Ken said lets have a little music, we all need to relax and so. And we do that a lot on Sunday mornings, we'll turn on WITF so he turned on this baroque music and we were eating breakfast and it was all very soothing. I was getting ready to go to another senior staff meeting later that morning, just finishing breakfast and all of a sudden there was this, this is WITF radio we regret to have to interrupt this music broadcast with an important message. There has been a complete core meltdown at Three Mile Island and there is a large mass of radiation moving with the prevailing winds toward Carlisle, Pennsylvania especially toward 136 N.College Street.

INT: By this time you are taking off.

NAR: Where an April fool resides and I took the joke fairly well. As the thing was emerging, before I caught on to the joke I was thinking I have got to call President Banks about the college because I had been engaged with the project of planning for the college and it was my first calling. And so I was just about to get up and charge toward the phone

but I had to listen to a little more message and by that time the joke was revealed and then I had a good laugh. And then I got up to start doing the dishes and I realized that the adrenalin was running all through my body. I was just Hchchchc. So that was.

INT: You might talk a little more about that. In the course of this three or four day period you were very tied up with college making decisions, right? What was going on, then?

NAR: I think. Have you interviewed any of the senior staff ?

INT: Some.

NAR: Ok, my perception. Let me see. Friday or Thursday John became the spokesman. He was the department chairman and he went in and reassured the president. And then the president requested that Neil and John and I meet with the senior staff on Saturday morning. And that was the first time I was asked officially for my opinion on anything. And I , I shouldn't talk I really probably have been asked not to talk too much about the meeting but I think just the internal workings, the major concern of the meeting was should we close down the college. Would we be endangering the safety of the students and I felt that very appreciative Banks approach, I gained respect for him that I hadn't had before. I don't want to be quoted on this. This is the part where things are confidential in terms having anything attributed to me. But I have always thought of Banks as somebody who simply talks so much that he never listens to what anybody is saying. And what he did that Saturday morning was to organize the meeting in such a way that we started talking about the technical factors first and then built up to the impact on the community of various actions on the basis of those technical factors. And he forced people to listen to everyone. And what he, he did not talk a lot except to direct the meeting. He asked the physicists first what they thought was the problem with the plant and if they could estimate the probabilities of various things happening, and what the consequences of those things would be. If anybody in the sen, and then asked if anybody in the senior staff had anything to add on the topic, not what are we going to do about the students and the phone calls coming in and the other things. And what happened was that certain senior staff members came with this immediacy of parents calling them wanting this and that. And they wanted to interject that into the situation. You know we must do X Y or Z because and Banks would say "Wait. We will hear that and we want to take that into consideration as part of the decision." And then we went into the next layer of, you know, what are the options, for what we ought to do about things. What are the consequences of doing these things and how do they fit into the responses of parents, students, and other people. And I felt it was an excellent way to run the decision. And at that point the decision was that we were not endangering the students and we would keep the college open. Again, when the senior staff met on Sunday the problem became that so many students left campus and now parents were calling Sunday morning saying should I send my son or daughter back? If you are still open can you guarantee that you will be mounting classes? And we felt that people would be very angry driving five or six hours from Connecticut and various places to find that so many people had taken off and, we had heard then at that point that a number of faculty members had taken off. I do know that certain people in the college administration were very annoyed that faculty members

had taken off, very angry about it in the crisis situation. And they seemed more annoyed that they had not informed somebody higher up in the hierarchy. Whether it was the dean or their department chairperson or what have you. So that it wasn't so much the fact that somebody. I didn't get a feeling that it was because people took off were chickens, it was because it was irresponsible when one had an obligation to an institution that had not closed down not to inform. So that came out, and that was a factor in closing down the college. I don't think that we necessarily would have stayed open if faculty had been here, but it became a factor. (Interview interrupted)

INT: Now lets see where were we. Oh yes. We were talking about decision making at the college and so forth.

NAR: Oh, about the faculty and there was some friction.

INT: Do you have any sense about how many did leave?

NAR: The rumor was about twenty. That was a rumor. And of course at that point this was Sunday morning and a lot of it was hear say. There might have been more that had taken off and nobody knew about it, there might have been fewer because somebody might have heard that so and so was thinking of taking off.

INT: And some could have gone and come back, and so on and so forth.

NAR: Some gone for the weekend and come.

INT: There was no really accurate information.

NAR: That is correct.

INT: Was there really accurate information on the students body?

NAR: Fairly accurate because of the dormitory counts. They were doing, Dean Wall was feeding. He was not at the meetings but he was responsible for seeing that people went in and took a (end of side one).

INT: Now lets see. Shift to a different kind of question. Do you think that anything that happened at Three Mile Island might have affected your health?

NAR: No, except the stress. I mean. What I mean is I don't think there would be any directly. I don't think about the radiation.

INT: Radiation caused, right.

NAR: Even though I was down. Well, let me put it this way. I was down in increased radiation for awhile, but I have been that way in research settings before, and the

probability, the added risk over the radiation I have normally absorbed I consider negligible.

INT: Do you think it affected other aspects of your life, or the life of the community?

NAR: I think it has affected the life of the community.

INT: Could you speak about that?

NAR: Yeah, I think having experienced and this is on an emotional level, the uncertainties, and the unprepared ness of Three Mile Island. I think people are a lot more sober about the notion that energy use and technology are simply beneficial and that the risks can just be taken care of by the experts. That it will all be ok. And I think people are a lot more suspicious. I don't think people have made fun, the kind of fundamental changes in their outlook toward how one handles these things that is going to necessary to make substantial changes. That is to say I think unless people get a lot more sophisticated about energy and what they are going to need in the future and participate a lot more, and I don't see that emerging particularly. I don't think that they are going to affect the situation terribly. Now that sounds kind of pessimistic thing to say, but for example I think Three Mile Island is going to go back on line both units. I predict. And the reason I predict it is that I have worked with tremendous logic for environmental things that don't make good sense politically in terms of whose pockets are being lined and where the power is. And this country is run not on logic but on the basis of the special interest groups. And the special interest groups are, become expert and dogged and very persuasive in proportion in which hey have dollars behind them. And this means for example. My example is the bottle bill, where none of us have much stake in throwing away a couple of bottles a day or what have you. And it mounts up because it is a nation wide thing but the bottle industry is a four billion dollar industry can, if a group of environmentalists wants to spend a hundred thousand dollars on a campaign to get a bottle bill in the community, the industry will spend a million dollars, whatever it takes. The atomic energy, the nuclear energy industry is going to spend whatever it takes to get that plant back on line because they have invested a billion dollars in unit 2 in the first place and until it costs more than a billion dollars to fix it up, they are not going to throw it away.

INT: Did you have any concern about the food or the milk from the area?

NAR: No, because we, I knew the levels are low.

INT: Now you have talked with the one mental image if the worst had occurred and so forth. Did you have any other pictures in your mind on the effects of radiation on life?

NAR: No , I have thought a lot about what it is like to have cancer because I have worked on these, and read descriptions of what kinds of cancers, what are the most radio sensitive organs, what kind of cancers and thing. But I didn't, I didn't go through any detailed thinking about the cancers. I just knew there was cancer and genetic.

INT: And this was a possibility if radiation.

NAR: The other thing. It is very difficult for me to get specific, like the flipper image or anything. Because I had just that, a couple of months before been pouring through some two thousand genetic diseases and their codes, and I have a list of them. And there are so many of them that it is very hard for me to have a stereotype of the genetic deformity.

INT: Did you think of your own death at any point?

NAR: No.

INT: That of others?

NAR: Nnnn. I thought of the possibility of a few people getting radiation sickness and perhaps death in the event of a meltdown. And I thought mostly of workers and people living as close as possible to the plant. I, when I go through those scenarios, and I didn't dwell on them a lot, I think of a book by John Hersey called Hiroshima in which he describes the different people after the blast, being refugees leaving the town and being by a river bank and starting to get nauseous and have diarrhea and the symptoms of radiation. And they have no idea why they would be getting sick in that way. And then people started dying. And so I guess I think of that description.

INT: Did you think of God during the incident?

NAR: No, because I'm not religious.

INT: You have talked a lot about what you were doing. You have talked about certain feelings, certain kinds of responsibilities. Could you enlarge on those? Or did you feel certain particular responsibilities in the situation?

NAR: Well, the only particular. Well, I guess I felt responsibilities along two lines and then I had been asked to speak to people here at Dickinson and I had been asked to go to the High School and talk about radiation. And I felt somehow I was reassuring people and I felt. I would have felt very bad if, for some reason we had misread our monitoring and, or misinterpreted the way I put together the information that was coming in and there was radiation in the community and people should have left.

INT: So you felt a strong sense of a need to be accurate in this case and wanting to feel confident about what you were advising?

NAR: Yes. I didn't, I also felt though that I didn't have any stake in advising one thing or another. I felt that Met Ed and even the NRC in a way needed to save face and make the accident as minimum as possible, and that the media wanted to sell newspapers and have people listen to the news and wanted to have a stake in making the information as exciting as possible.

INT: And so you felt yourself in a more objective position than most people.

NAR: I felt myself in a more objective position and I also felt that that's the advantage of being academic.

INT: Did you ever feel any conflicting responsibilities?

NAR: I don't think so. I felt funny about reassuring in the sense that I have been very concerned about radiation, but I also, I did honestly feel that the radiation is lower than medical radiation and if anything it reaffirms my conviction that people are pretty foolish about medical radiation and overreacting. Not overreacting, I shouldn't say people have overreacted in some ways. Because the problem is that ones reactions to that whole incident are complicated by fear of radiation, fears of explosion, fears of catastrophes that might have happened, and I felt the same thing. That one gets a jumble of emotions that it becomes very difficult to sort out and say now look here, this wasn't the problem. Or you can say that only in the sense that so far, I don't think we have been exposed to too much radiation. But that's the only thing you can say, and it gets complicated by the possibility of a meltdown.

INT: You have said a good deal about things you had to do which you otherwise would not have been involved in doing. Can you think of anything else there?

NAR: Well, I had some television interviews afterwards and. I felt, I gave you that medical information. Carl Strang went with me and he has a good background in biology but not specifically in radiation. So we talked a little bit about ecology but he doesn't have the kind of feel that one gets for what different doses mean. That it takes months and years to acquire, you know, working with it. And the radiologist who was on the show was a little bit like the Metropolitan Edison guy who said I have been exposed and my children are perfectly normal. He is a radiation therapist and he was really ignorant about long term effects of low level radiations, which is what we are talking about. He is not ignorant about radiation sickness and what levels it takes to induce those. But he had a very on off notion that you get at those levels, and below those levels there is absolutely nothing that can happen. And so I felt that it was difficult to be on the show, because I felt that I was the only one who knew what I was talking about, and that's that. Did you see the show?

INT: No I did not. I am sure we have it on tape. I mean we were taping it.

NAR: Right, so it was a problem.

INT: You've mentioned that at least one person you were dealing with in the course of this had a notion about the ethics of behavior in the situation and so forth.

NAR: Right.

INT: Did you, did you have an ethical, set of ethical stances that formed the way you were behaving in the situation and so forth?

NAR: Well, I have been in emergency situations before and I counseled in a girls scout camp in Yosemite and two different summers we had forest fire threats that involved evacuating the camp and involved things like guarding the camp in case looters came, and I think it is really important to take time to think in emergencies and I get upset when. Well I guess I felt it was important to keep thinking as logically as possible and knowing that I was emotional, as was everyone. And that was a normal situation, so I guess I, I didn't disapprove. Or I felt I understood that some people got very panicked, but I also felt that I wished that more people would take time to learn more as they go instead of just saying I don't have time to learn anything (mumble mumble of panicked people imitation).

INT: Who was panicked? Where did you see the panic? What groups of people and what?

NAR: Its personalities. Neil got more panicked than the rest of us. I thought John stayed too calm but that was because I was in the middle. You know, I think we always think we're.

INT: Did you see others?

NAR: Yeah. I think, in general I noted that the whole modern languages department left and thought about the different personalities and I sort of. You start later you know, you are reflecting, you start doing a little bit of analysis. Well, you'd expect certain people to leave.

INT: Just their basic personality structure would leave that way.

NAR: Yeah. And I think in a way that is ok. You know you can't have everybody being an Indian Chief in an emergency and as long as panicked people. I didn't see panicked people getting in peoples way in the situation, too much. There was a little bit. I think I had some frictions with people. I think Charley Seller got so tired that he stopped at some point sorting out the pros and cons of different courses of action. But I also appreciated the fact that I was going to bed every night and sleeping. Even though I probably wasn't sleeping as well. And he was up, like for a couple of nights twenty four hours in a row answering parent inquiries and feeling their panic and dealing with it. So he came away with a different perception and I don't think it was so much, I didn't sense that Charley has panic personality but that his. The world of experience that he was pulled into and the lack of rest made it more difficult for him.

INT: You might speak, too about that. You said you were sleeping every night. Was your sleep disturbed?

NAR: I think I woke up once a night on the average.

INT: That you wouldn't have ordinarily?

NAR: Yes.

INT: Did you have any dreams?

NAR: Not that I recall. But I might have. You know, I have dreams and I forget them. I didn't have anything that was so vivid that I remember it as a part of the experience. I remember, I'd wake up a little early in the morning to be sure that we heard the morning news. I was hungry to get that first report on the radio that, what was going on. Was the radiation moving toward us because we had had a meltdown, or were things still the same. So that was a big change for me.

INT: You were more alert than usual?

NAR: Yeah. I would have sprung out of bed if somebody had (unintelligible laughter) I suppose. I wasn't quite that bad. I don't usually have difficulty sleeping, so it is not easy to keep me up all night.

INT: You have already talked about one set of past experiences that you made analogous to this, the forest fire business. Did you think about that during that time?

NAR: A little bit, yeah.

INT: Was there any other past experience you have had that has fed into this? That you remember remembering at that time?

NAR: No, the forest fire thing. And the thing that I remember even telling somebody at the time, one of the senior staff members meetings when we were having a break about the forest fire thing, was that I am aware of the role that my emotions might play to the extent I sometimes devise methods for guarding against the dangers that they may present. Now an example I can give of this is when I was at the girl scout camp there were about six of us on a central staff. I was teaching swimming, so that we evacuated the camp and all the unit leaders and counselors stayed with the girls. And the director and myself and a couple of other central staff members went back to the camp to guard against looters. And we were in the camp lodge, we had a fire going and we agreed that we would have two hour shifts, and each of us would stay awake for two hours and the rest of us were exhausted having gotten the girls out the afternoon. And we had no weapons except an axe , and so that somebody plunked the axe by the fire place and said alright, now when you are on your shift keep the fire going. You know, if you hear funny noises there is the axe. Ok. When it was my turn I did not want the responsibility for getting panicked and clobbering. You know if a prisoner, we had heard some prisoners had escaped. Ok. If a prisoner walked in I did not want to clobber that person with an axe. Ok. But on the other hand I wanted to do something about it, so I replaced the axe

with a broom. Now that sounds funny, but just this idea that this moment might happen in which I am gripped with fear. (Interruption by telephone).

INT: You were talking about past experiences. You finished the story about the accident and so forth. If not past experiences, any, you mentioned Hiroshima Mon Amore.

NAR: Not Hiroshima Amore. The book Hiroshima , Hershey's. I saw Hiroshima Mon Amor but I didn't think about, like I remember the vivid scenes in that movie with radiation burns and things. I didn't think on that.

INT: You didn't think about that. Did you think of any, are there any historical events?

NAR: I thought of Hiroshima. I mean I, but I didn't dwell on it.

INT: Would you say that this sort of accident or incident was more or less frightening than lets say a flood or hurricane or a war?

NAR: I think it was more frightening, even though. Probably a hurricane or a flood. I mean clearly look at something like Agnes did more damage.

INT: What do you mean it is more frightening?

NAR: Lets say the flood did more physical damage. I think that the Three Mile Island did more psychological damage. People knew what to do about floods. They can *see* the water. Nobody is lying to them. They don't feel people have power over them in the same way. There are some of the same elements. There is, if people leave an area because they are afraid their home will be flooded that it might be looted. There were the same fears that one gets in the thought of evacuation and what happens in the community. There were some fires that couldn't be put out because firefighting equipment couldn't get to the places. I remember that distinctly in Agnes but the onslaught of water is a visible thing and one has the feeling that you can make your own decision about when it is time to leave. Even if your stuff will be destroyed, you are making your own decisions about personal safety. You are having to depend on somebody to tell you its time to leave and you don't what criteria their using and you don't know for sure whether they are really telling you the truth about, or if they have measured correctly what's there. Whereas with the water, there it is.

INT: So it is invisibility that is one of the chief problems.

NAR: Yeah, and unpredictability. In a way a flood is unpredictable. You don't know how long it is going to continue raining, but they could say in a flood if the rain continues like this for X number of hours the rivers will crest at such and such time. There is more of a handle that one gets. I don't know. I just, and I know Agnes probably did it, it did much more physical damage. But psychological damage can cost money, and I think we ought to recognize that. In stress diseases, in the disruption of normal productive days people have that are erased, general wear and tear. In the money spent that when people

evacuated. Nobody is going to pay them back for going to a motel, their gas or whatever. So there are all of these things.

INT: Did you think of any TV shows or movies?

NAR: No.

INT: Find yourself singing any songs?

NAR: No.

INT: The WHP crew was all singing, "we'll meet again". Do you have any day dreams that you remember?

NAR: No, not that I remember. I'm sure I had day dreams, I always do, but I'm.

INT: Did you think of any other book other than Hiroshima, Hersey's book?

NAR: No.

INT: Did you notice people changing around you?

NAR: Yes, yes.

INT: You have said a fair amount about that already, the heightening emotionality and so forth. Is there anything else you want to say?

NAR: Well, like John, John Luetzelschwab stutters when he gets nervous, but he is always very calm on the surface. And he started stuttering.

INT: So that would be the only indication, only somebody who would know him would know that is an indication of his feelings of stress and so forth?

NAR: Yeah.

INT: Do you think this changed individuals in any lasting way? Now you have spoken how it has changed the community in terms of its attitudes and faith in people and that sort of thing?

NAR: Yeah, and the faith in technology, complex technology and so forth. I felt, though, we went down to the Washington protest in early May and nobody was. Everybody was talking about ending nuclear power and nobody was talking consistently about alternatives. I mean everybody would have their own different alternative what have you. I guess, you know, people go through stages and my problem is I have thought about all these things before anyway, so I expect people to be at the stage where if you are going to have alternatives what are they? Are you going to use less energy? Are you going to put

up with air pollution from coal? Are you going to put up with international tensions that you are going to get by depending on Iranian oil? Are you going? And I want people to do this kind of thinking so badly. And I don't see it yet, that's all. Yes, I think they have become more cynical, but I am not sure that the change – only time will tell, but I'm not sure the change will be a productive one.

INT: Have you developed an opinion about nuclear power? What we ought to do?

NAR: Yeah, I have always had an opinion about. My opinion about nuclear power has not changed. I think that it was very foolish to invest so much in a complex technology that has a limited amount of fuel and no solution for its storage problems. That is a legacy for future generations. I just don't believe that that is responsible behavior so we can have energy now. And I still feel the same way. I think I am surprised that Three Mile Island happened in a sense that I didn't really believe that when we had problems they were going to be with the operation of the reactors because when you look at some of the summaries of the things like Rassmussen study and so on, it looks like the big problems are going to be containing wastes and with keeping workers safe in operating the whole fuel cycle and things. Of course the Karen Silkwood case was in the news toward the end of the thing. But there is an example of, and there are a lot of, there have been a lot exposures articles but I don't how accurate they are about occupational exposures and being hushed up people in the fuel industry and all of this kind of thing. So I expected the problems to be (continuous).

INT: Rather than what actually happened, rather that an actual problem at a plant. You figured they had that fail safe system.

NAR: Well, I didn't think it was absolutely failsafe but I didn't. My reading of the situation is that it was a chain of human errors on top of some mechanical failures but that the chain was quite long and it could have been broken at any point and it would have been a minor incident instead of a major incident.

INT: Did you hear any jokes about radiation or the Three Mile Island?

NAR: I heard the same things you guys were starting to collect. I went down to the radio station with you and I heard the joke in San Francisco. I was there late May so people were making jokes out there. I made a mental note of that because of your project. But somebody said, somebody said about oh did you know that Hershey bars are the only candy that glow in the dark, or something, I forget.

INT: This was in San Francisco?

NAR: Yes.

INT: Do you remember the others, do you remember what circumstance that was told under?

NAR: Yeah, I was at Sunday morning and my brother belonged to this jogging club and they were going out for their Sunday morning run and he introduced me to someone. I said I was from Carlisle, Pennsylvania and he said is that near Three Mile Island, and so I got the "Oh did you hear." That's the context.

INT: Do you remember any others?

NAR: No, I don't think they mentioned any others.

INT: Is there anything else you would like to say about all of this?

NAR: I don't know. I think the colleges responses was being creative. More creative than the community, but then the college has resources for that sort of thing. And I thought the college handled the situation as well as possible. I say that because I suppose partly I had a role in it and I agreed with the decisions that were made. I think for example that Bank's statement was very accurate and very well. I did not write it, but I know George Allan and Charley said I wrote it.

INT: Which one?

NAR: There was a statement announcing the closing of the college.

INT: Oh right, the letter?

NAR: Yes. And the reasons. And they are understandable, and I think, again I think if I were a parent in Connecticut hearing CBS news or what have you. I am not an expert on which of the media was least responsible or which were the most, but just. I probably would have asked my children to come home. So everything fits, I mean its not. I am disturbed about the people who, the students I have had to talk to whose parents want them to transfer and think they are totally contaminated and completely poisoned because I think its an unreasoned reaction, overreaction. But I have worked with people on medical X-rays, I get letters and phone calls from people who have one chest x-ray and they are sure and they it is like neuroses. They are sure they are going to die of cancer and want to know all about it. They want me to tell them when they are going to get cancer and want it is going to be like and how should they prepare for their doom and things like that. And no amount of reassurance works, and then I have the other people who are totally indifferent to the situation. All, you know, " What do you mean a few x-rays are going to hurt you? Just forget about it." So people run a spectrum and you always get like a gousie, and like images of a gousie occurred. You have a few people out there, some of them are totally under-reacting and some people totally overreact and then other people who are in-between. And so we are still dealing with some of those who are very, just sure the world has come to an end for them. But I know if it wasn't Three Mile Island something else would make them feel that way. I think it is a personality thing.

INT: Anything else?

NAR: That’s all.

INT: What did I miss?

NAR: I don’t know. That’s very thorough interview.