SYSTEM REVIEW

of the

PALO VERDE NUCLEAR GENERATING STATION

EQUIPMENT QUALIFICATION

Before the

EQUIPMENT QUALIFICATION REVIEW BOARD

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Nuclear Projects Management
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Arizona Public Service Company

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Nuclear Engineering Manager
Arizona Public Service Company

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Arizona Public Service Company

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Arizona Public Service Company

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Arizona Public Service Company

NORMAN L. HOEFERT
PVNGS Operations Engineering Supervisor
Arizona Public Service Company

ROGER W. CLARK
Supervisor of Electrical Design
Generation Engineering Department
Arizona Public Service Company

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Arizona Public Service Company

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Bechtel Power Corporation

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Instrumentation and Control
Engineering Department
Combustion Engineering, Inc.

PAUL WOLFE
PVNGS Assistant Project Manager
Combustion Engineering, Inc.

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Equipment Qualification Owners Group
Electric Power Research Institute

VINCENT S. NOONAN
Assistant Director for Materials
and Qualification Engineering
Division of Engineering
Nuclear Regulatory Commission

DR. ZOLTAN R. ROSZTOCZY
Chief, Environmental Qualification Branch
Nuclear Regulatory Commission

PARTICIPANTS

WILLIAM G. BINGHAM
PVNGS Project Engineering Manager
Bechtel Power Corporation

DENNIS KEITH
PVNGS Assistant Project Engineer
Bechtel Power Corporation

GERALD KOPCHINSKI
PVNGS Nuclear Group Supervisor
Bechtel Power Corporation

ROBERT CARSON
Electrical Staff Engineer
Bechtel Power Corporation

BRUCE LINDERMAN
Bechtel Civil/Structural Staff
Seismic Qualification Working Group Leader
Bechtel Power Corporation

KENNETH SCHECHTER
Deputy Group Supervisor
PVNGS Civil/Structural Group
Bechtel Power Corporation

ROBERT STIENS
PVNGS Assistant Project Engineer
Bechtel Power Corporation

TERRY F. QUAN
Licensing Engineer
Arizona Public Service Company

J. PATRICK SHREWSBERRY
Licensing Engineer
Arizona Public Service Company

EDWARD J. GOUVIER
Electrical Engineer
Arizona Public Service Company

MARTIN L. RAINES
Electrical Engineer
Arizona Public Service Company

MARK L. HYPSE
Electrical Engineer
Arizona Public Service Company

LEONARD A. YORK
PVNGS Operations-Technical Engineer
Arizona Public Service Company

SARJAPUR M. JAYADEV
PVNGS Operations Electrical Engineer
Arizona Public Service Company

JANE A. BRAND
Manager of Community Relations
Arizona Public Service Company

DR. HAROLD R. DENTON
Director, Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission

RICHARD A. VOLLMER
Director, Division of Engineering
Nuclear Regulatory Commission

JANIS D. KERRIGAN
PVNGS Project Manager
Licensing Branch #3
Division of Licensing
Nuclear Regulatory Commission

JOHN BERGGREN
CESSAR Project Manager
Standardization and Special
Projects Branch
Division of Licensing
Nuclear Regulatory Commission

HERMAN E. LaGOW
Systems Consultant
Nuclear Regulatory Commission

ARTHUR C. GEHR
Attorney at Law
Snell & Wilmer

CHARLES A. BISCHOFF
Attorney at Law
Snell & Wilmer

OBSERVERS

KENNETH COOK
Washington Public Power
Supply System

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Public Service Company of Oklahoma

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The Equipment Qualification Review Board of the Palo Verde Nuclear Generating Station convened in Pizarro Room C, Del Webb's Townehouse Hotel, Phoenix, Arizona, on the 25th day of September, 1980, Mr. Edwin E. Van Brunt, Jr., Vice-President, Nuclear Projects Management, Arizona Public Service Company, Presiding.

MR. VAN BRUNT: My name is Ed Van Brunt. I am Vice-President, Nuclear Projects Management for Arizona Public Service Company, and I am the officer responsible on a full-time basis for the engineering, design, construction, and quality assurance for the Palo Verde Nuclear Generating Station.

The purpose of today's meeting is to perform a system review of the Palo Verde Nuclear Generating Station Equipment Qualification Program. The concept of performing system reviews was developed in a number of meetings which we had with Dr. Denton. With this concept, the design of a specific plant system or the structure of a specific program is thoroughly reviewed for adequacy of design and compliance with regulations by Bechtel project personnel in the technical disciplines that are encompassed by the particular system or program in question. Bechtel Power Corporation, as I am sure most of you are aware, is the architect, engineer, and construction manager for the Palo Verde Plant. The system

review is then formally presented by the Bechtel project staff to a review board of technical experts for concurrence. Participation by Nuclear Regulatory Commission personnel in this presentation is encouraged and should aid their understanding of the system design bases or criteria, detailed design, construction, program philosophy, review procedures, and system operation, thereby minimizing, if not eliminating, the review manhours required for that particular system or program.

As a result of the discussions that I have had with Dr. Denton on this subject, APS to date has performed several system reviews. They include the DC and AC Class IE Power Systems and the Auxiliary Feedwater System. The first system review of the DC Power System was performed here in Phoenix. The second review of the AC Power System was done in the Nuclear Regulatory Commission offices in Bethesda, Maryland, to provide an opportunity for greater participation and observation by NRC management and staff. The latest review was of the Auxiliary Feedwater System and was held here in Phoenix late last month. Figure 1 provides the current status of ongoing activities for these past system reviews and also indicates the reviews that we have planned at least through January or February of next year. You can see at the top that the DC Power System review is just about complete and we are in the process of getting ready to submit the final

information to the NRC staff. The AC Power System review has been completed, the transcript has been sent to NRC, and we are in the process right now of resolving outstanding items, which will then be ultimately sent to the staff. The Aux Feedwater System, which was done a couple of weeks ago, is at the stage of review of the transcript to correct errors, and as soon as that is completed, we will be sending that to the staff and then proceeding with the rest of the activities. The Equipment Qualification, of course, will be started here today, and we have scheduled in the month of October balance of plant instrumentation and control systems. Then we have in early December fire protection, and then after the first of the year, we are looking at the control room design. Depending on the outcome of further discussions with the staff, we may have some additional reviews to cover other systems or other parts of our application. That is kind of the status.

We did a little research. We went back and looked at how long it took us to do the DC Power System review at construction permit time using what I would call the 20-questions type of approach. Surprisingly enough, it took us about eight months, and if you look here from start to finish on this, assuming that there won't be any further questions, it has only taken about six months, so there is a saving in time involved in proceeding this way which I thought was of some interest.

As I indicated, today we will be performing a review of the Equipment Qualification Program for the safety-related balance of plant equipment, particularly as it relates to compliance with NUREG-0588 for electrical equipment and applicable IEEE Standards. To explain what I mean by balance of plant, I would like to mention that Palo Verde is a standardized plant with a separate Final Safety Analysis Report for the Nuclear Steam Supply System portion of plant. The Combustion Engineering Standard Safety Analysis Report Final is referred to extensively in the Palo Verde Final Safety Analysis Report whenever information concerning the Nuclear Steam Supply System is needed. The balance of plant for this project is the equipment not within the Combustion Engineering scope of supply. The CE scope of supply includes the standard Nuclear Steam Supply plant plus various other options that APS has purchased from Combustion Engineering. The responsibility for the adequacy of the qualification of equipment supplied by Combustion Engineering is clearly the ultimate responsibility of the applicant referencing the Combustion Engineering Safety Analysis Report; in this particular case, Arizona Public Service Company. However, the details of this information is addressed using topical reports CENPD-255 and CENPD-182 for Instrumentation and Control Equipment and by CESSAR for other equipment in Combustion

Engineering's scope.

We had planned to review this information as a part of the review of CESSAR and have not prepared any specific presentations today for that part of the equipment qualification. However, in some discussions we had here earlier, we have been requested to at least indicate how we plan to handle the equipment qualification for CESSAR. We will do that today and we will try and provide some other information and respond to any questions anybody has to the best of our ability. We do not really have the appropriate people from Combustion Engineering here today to make a detailed presentation.

The Bechtel project staff has prepared the Balance of Plant Equipment Qualification Review, and it will cover the following general areas: Qualification Criteria, review procedures, specific examples, and difficult qualification areas.

Bechtel will prepare formal responses to any open issues defined by the Review Board during this review. These responses will be reviewed by the Review Board for concurrence. Final resolution of these items will be provided to the Nuclear Regulatory Commission.

For today's review, we have assembled a review board with a varied background due to the complexity of the program being reviewed. Since the responsibility for an adequate

review lies with the applicant, that is, Arizona Public Service Company, the board's basic formation starts with selected APS technical personnel complemented with personnel from other groups who have expertise and experience not necessarily available within the Arizona Public Service Company organization. Prior to this meeting, board members were provided with appropriate sections of several documents to familiarize them with the Palo Verde Equipment Qualification Program. These included sections from the Palo Verde Final Safety Analysis Report, various IEEE Standards, related NUREG documents including NUREG-0588, the Palo Verde Nuclear Services Project Procedures Manual, and the Standard Review Plan. At this time, I would like to introduce the members of the board and say a few things about their responsibilities in their various organizations.

John Roedel is the APS Nuclear Quality Assurance Manager and reports directly to me. John is responsible for development and compliance with the Corporate Quality Assurance Program for Arizona Public Service Company. John Allen, sitting here to my left, is one of two APS Nuclear Engineering Managers who report directly to me. John is responsible for the areas of electrical engineering, instrumentation and control, licensing, and health physics and has the primary responsibility for equipment qualification at Arizona Public Service Company. He is also responsible for

our records management section, which will be the ultimate resting place for all of these records. Carter Rogers is the other APS Nuclear Engineering Manager who reports directly to me. Carter has responsibilities for mechanical engineering, chemical engineering, civil engineering, nuclear fuel, and other nuclear-related items. Bill Quinn is the Supervising Licensing Engineer. Bill reports to John Allen and has responsibility for all licensing matters and coordinating the day-to-day interface with the Nuclear Regulatory Commission assigned project manager in such matters. John Barrow is a Supervising Electrical Engineer who reports to John Allen. He is responsible for the review of the Palo Verde electrical systems for APS and the day-to-day interface with Bechtel and Combustion Engineering personnel in these areas. He also has the responsibility of coordinating the APS effort for Equipment Qualification. Ed Sterling is a Supervising Instrumentation and Control Engineer who also reports to John Allen. He is responsible for the review of the Palo Verde instrumentation and control systems and the day-to-day interface with Bechtel and Combustion Engineering on these systems. Norm Hoefert is the Operations Engineering Supervisor at the Palo Verde Plant and is responsible to the Engineering and Technical Services Superintendent for mechanical and electrical engineering support, including monitoring station performance and the in-service inspection program.

We have also asked Roger Clark, Supervisor of Electrical Design with the Arizona Public Service Company's Generation Engineering Department, to participate as an independent member from APS on this board. Roger is not directly involved in the Palo Verde Project, although from time to time, he has been utilized as a consultant in various areas. Roger has been with APS for nine years and has been involved in electrical system design for APS' fossil power plants. Prior to APS, he was with Stone and Webster for ten years as an electrical engineer and for four of those years worked on nuclear projects, namely Surry 1 and 2 and North Anna 1.

Two review board members are from the Bechtel Engineering staff. These representatives are Karl Kreutziger, Chief Electrical Engineer, and Dr. Sheldon Freid, Nuclear Staff Group Leader. They are not directly involved in the design of the Palo Verde Project; however, they may be used as consultants to the Bechtel Palo Verde Project Group as required.

Representing Combustion Engineering on the review board are Paul Wolfe, Palo Verde Assistant Project Manager, and Pete Newcomb, Supervisor of Equipment Qualification, Instrumentation and Controls Engineering. Paul reports directly to the CE Project Manager and is responsible for the

CE interface with APS, specifically the Palo Verde Project Nuclear Steam Supply System equipment qualification and the generic equipment qualification for all the System 80 projects. He is also responsible for providing licensing support, technical support, and liaison with the CE plant engineering staff. Pete works in the Instrumentation and Controls Engineering group and does not report to the CE Palo Verde Project Manager. However, he is responsible for all CE Nuclear Steam Supply System Instrumentation and Controls equipment qualification. Combustion Engineering, the Palo Verde Nuclear Steam Supplier, is involved in this review only to deal with the BOP-Nuclear Steam Supply System interface requirements and, as I indicated previously, it had been our plan to discuss in a separate meeting the equipment qualification for the CE equipment for Palo Verde and to clearly define at that time the utility's supervision and responsibilities in that program. We will try and deal with some of that here today as we can.

To provide added expertise on the board in the relatively new area of equipment qualification, APS has asked Dr. George Sliter, of the Electric Power Research Institute, to participate on this board. George is the coordinator of the EPRI/Utility Equipment Qualification Owner's Group. He is also the EPRI Project Manager for the Equipment Qualification Data Bank.

The NRC has sent a number of representatives, as Janis Kerrigan has introduced, to participate in this system review and we welcome their full participation.

We will provide a transcript of this review to the Nuclear Regulatory Commission as soon as we have received and proofed it from the court reporter. For the benefit of the court reporter, I would ask that the review board members or anyone else, for that matter, please identify themselves before making any statements, and I would appreciate if you would not make any statements or anything else until you are recognized by the Chair so we can at least have a little order out of chaos. We encourage the NRC representatives present to participate in this review as well. As indicated by Janis, we will not entertain questions from the public during the review. However, members of my staff and members of the Commission will be available following the meeting to answer any questions that members of the general public might have relative to this interchange of information that is going to go on here today. At the completion of the review, any open items which have been identified will be reviewed and, when agreement on their scope has been reached, Bechtel or other responsible organizations assigned for response will be designated to prepare appropriate responses, which will be sent to the members of the board for their review, comments, and ultimate concurrence. Upon complete board concurrence with

the responses, these will then be formally sent to the Nuclear Regulatory Commission for their review. In this connection, I would ask Terry Quan, from my staff, and Gerry Kopchinski, of Bechtel's project staff, to keep independent notes of open items and then we will kind of back through them and backcheck when the meeting is completed.

Bill Bingham, who leads the Bechtel group, will indicate how they are going to make their presentation, and I would request in that context, Bill, that, at the appropriate points in your presentation, the board be given opportunity to ask questions.

Incidentally, as a side issue, I will be leaving the meeting at about 11:30 to accompany Dr. Denton on a tour of the Palo Verde construction site, and at that time I will turn coordination of the meeting over to John Allen and he will complete the activities for the day.

With that, if there are no questions from the board members or anyone in the audience, Bill, I would like to turn it over to you and ask you to introduce your representatives that are here and then we'll go from there.

MR. NOONAN: Before we start into discussion with the balance of plant, could you give me some indication as to the percentages of the scope of review for the CE scope of review versus the balance of plant scope of review.

MR. VAN BRUNT: I am not sure I understand what you mean by percentages.

MR. NOONAN: Well, amount of equipment. In other words, is 50% of the equipment under the CE scope of review and 50% under balance of plant, or is it 60-40? Can you just give me rough numbers?

MR. VAN BRUNT: I would guess it is about a 50-50 proposition. It is kind of hard to measure. If you are looking at physical size, certainly the largest pieces equipment coming from Combustion Engineering are the steam generators and reactor vessel. If you are looking at numbers of pieces of equipment, electrical equipment, I think 50-50 might be that order. It certainly wouldn't be any more than that in my view.

MR. NOONAN: Would most of the equipment inside the containment be related to Combustion Engineering or would they be split pretty evenly?

MR. VAN BRUNT: The majority of it would be, yes, sir. Not all, but the majority.

MR. NOONAN: The majority would be Combustion?

MR. VAN BRUNT: That's correct.

MR. NOONAN: You indicated right now that we made a request earlier that we have some Combustion people here to talk about their scope of review. Can I get your views on that right now?

MR. VAN BRUNT: Well, we have talked to the CE

representatives here and we'll see what we can do. We will try and deal as much as we can with that. We will certainly tell you what our participation with CE will be and we will try and do as much as we can with the CE program in the limited time. As I indicated in my opening remarks, we had really not intended to deal with that particular area today. We understand our responsibilities relative to that equipment and plan to carry them out to the full extent, but we had intended to deal with that particular aspect of the balance of plant in a separate meeting.

MR. NOONAN: I guess, speaking for the NRC people here, that we can make ourselves available to accommodate the Combustion people whenever they can get here.

MR. VAN BRUNT: We'll see what we can do. We have talked to the CE people here and we'll see what arrangements we can make.

MR. NOONAN: Thank you.

DR. ROSZTOCZY: Did I understand this correctly that you completed your part of the presentation and you are planning to hand it over now to Bechtel? Is there any other presentation from Arizona Public Service?

MR. VAN BRUNT: Not a formal presentation by APS. Mr. Bingham will be making a presentation and many of the things that are incorporated in his presentation are relative to things that Arizona Public Service Company does in this

particular program. We will be pursuing the program that has been developed jointly by APS and Bechtel. They are implementing the program, if you like. We are working with them, and I think it will become clear from Mr. Bingham's presentation what our role is in that particular program. My remarks were basically intended to set the stage for the meeting, to have everyone understand who is here, what the players are, and how the meeting will be performed.

DR. ROSZTOCZY: I have a few questions which relate to Arizona Public Service's role in the equipment qualification. Is this the appropriate time to ask those or should I wait for some time later?

MR. VAN BRUNT: I would suggest that you wait until Mr. Bingham presents at least the first part of his presentation. I have not seen his presentation, so I am just speculating on what he is going to present. After he makes at least the first part of his presentation, then if you have questions that relate to APS' participation, ask those at that time and I am sure that we can answer those questions for you.

DR. ROSZTOCZY: Thank you.

MR. VAN BRUNT: Are there any other questions?

Okay, Bill, I would like to turn it over to you.

MR. BINGHAM: Thank you.

My name is Bill Bingham. I am the Project Engineering

Manager for Bechtel. As Ed indicated, we are here today to present equipment qualification at the fourth formal meeting of the PVNGS Systems Review Board. I have with me today from the project Dennis Keith and Bob Stiens, who are Assistant Project Engineers, also Gerry Kopchinski, the Engineering Group Supervisor for the nuclear discipline, and Ken Schechter, Deputy Civil/Structural Group Supervisor. I also have with me Bob Carson, Bechtel Electrical staff, who is responsible for environmental qualification for our Los Angeles Power Division, and Bruce Linderman, Bechtel Civil/Structural staff, who is responsible for seismic qualification for the Los Angeles Power Division.

As Ed indicated, our agenda today will include the background of the PVNGS qualification program and a review of our intended compliance with the various design critiera. The design criteria will consist of an overview, environmental qualification criteria, and seismic qualification criteria. I think it is important to mention for the board that during the presentation today, you may have the impression that all of this work, from the manner in which it is presented, is in order. I want to indicate to the board that, while we are very sure of what we have to do, not all is going well with the various suppliers that we are working with, and we will try the best we can to point this out during the meeting.

By the way, if you cannot hear, please put your

hand up in the back so we can be sure to speak a little bit louder, and I also might indicate that, Ed, there are some spaces on the side for those people way in the back. If they would like to move their chairs up, this might be an appropriate time to do that.

(Thereupon a brief off-the-record discussion ensued, after which proceedings were resumed as follows:)

MR. BINGHAM: After the background that I will go through in just a few minutes, we have set up the presentation to look at an overview of the design criteria, a review of environmental qualification criteria, and then we will have the seismic qualification criteria separately. There are several subheadings, as you have seen, and, based upon the length of the presentation, I will entertain questions at the end of the various subheadings.

We will talk about the equipment qualification process. I think this is important for the board to understand and it will give you an overview of how APS has set up their review team and how Bechtel supports them. We will also talk a little bit about the reviews of the group, and, finally, will get into the qualification plans, the checklists, the auditing procedures, and how APS and Bechtel assure that what is done in the work is correct and meets the established criteria. Finally, we will go through documentation, and then we have some examples that we would like to present for

the board's information. We do understand that some background material is necessary and we will spend a little time on that. Then, finally, for the board's information, we will present some of the major problem areas that we are having today with the various equipment suppliers.

Ed, I would also like to request that, as we have at the past meetings, all questions be directed to me and I will assure that the appropriate person answers the question.

MR. VAN BRUNT: Okay, fine.

MR. BINGHAM: With that, I would like to get on to the presentation.

MR. VAN BRUNT: Excuse me, Bill.

Dr. Rosztoczy, I think that the time for your question is when we are talking about how the whole program works. Then you can pursue the issue of how Arizona Public Service Company is involved. I think it will become more obvious then and you may get your questions answered or it would be a better time to ask those particular questions.

Does anybody on the board have any other questions at this point?

If not, Bill, go ahead and proceed with your presentation.

MR. BINGHAM: Thanks, Ed.

Figure 2 shows the PVNGS design development. That is a slide that we have put up before for the board. However,

as Ed mentioned, the membership of the board has changed. There are other utilities and observers here and I will spend a few minutes going through the design development on Palo Verde.

As you see on Figure 2, the hub of the work is called the Design Criteria. This is the basic document that is used, reviewed, and sets the criteria for the project. It consist of three volumes, which I have shown here, that list all the criteria for all of the systems as well as the environmental work, qualifications, seismic criteria in the book. It is a very dynamic document. It is kept up-to-date and is revised as appropriate during the life of the plant.

From this document, we then go to the development of our design. From the design, we develop our procurement specifications, system descriptions, schedules, construction specifications, test specifications, and station manual. At the same time, we set up the plant arrangement and from that feed back to the development of our design. As I have indicated before, this is one of the projects that has a very large-scale design model. Our model is three-quarters inch to the foot, and on that we show in detail all of the piping, equipment, electrical conduit, and trays in order to assure that the design does not have inconsistencies in it and we can review it for system applications or in many cases for our

separation reviews and assurance that the design does meet the established criteria. From that, we develop our detailed construction drawings and our planning photographs.

As input to the design criteria come our standard criteria, our basic P&ID's, and information from the NSSS vendor, in this case Combustion Engineering.

Figure 3 indicates how the design criteria for equipment qualification are implemented. I think it is important for the board to understand that equipment qualification is not a system, but it is a necessary part of the overall program to have qualified equipment for use in safety systems, so we are organized a little bit in this area. There are other areas in this control room design and in our overall environmental concerns where we handle specific issues a little bit different than the review process, which many of the members on the board have heard before. I would like to indicate that when we talk about environmental qualification for a piece of equipment, we are talking about a substantial amount of paper. This (indicating) happens to be for one piece of equipment and represents the documentation just for environmental qualification. As the board knows, there are other qualifications that certification documentation is required that make up a substantial package to assure that the equipment does meet the established criteria. APS has set up an environmental qualification team. This team is headed

by John Barrow, who Ed mentioned earlier, and Bechtel supports this team for all of the work that is involved with the environmental qualifications. The design criteria is input to the specifications. These go to the supplier. The supplier then prepares the qualification plans and the reports. There is a qualifications summary that goes into the FSAR and it also indicates that records will be availble for all the equipment. It has become necessary to establish this independent APS/Bechtel sponsored qualifications program for what we call our recalcitrant vendors and suppliers to assure that we do have compliance with our criteria. You will be hearing more in detail later on about the problem areas that we are having and specifically how they relate to meeting the intended criteria that we have established.

Figure 4 indicates the scope of the PVNGS qualification program.

DR. DENTON: Ed --

MR. VAN BRUNT: Yes, Harold.

DR. DENTON: Could I go back to the previous slide a moment?

MR. BINGHAM: Certainly.

DR. DENTON: Could you tell me a bit about the basis of the review team and the resources that you have actually put there? Is it a one-man office or a 100-man office or something in between?

MR. BINGHAM: Overall size, there are about, I would guess, four or five people from APS that are involved. In the Bechtel organization, we have four or five people that focus particularly on equipment qualification. They are supported by individuals in the various disciplines on the project. The way we are set up, Dr. Denton, is that on our team of some 300 engineers and designers, we have responsible engineers that look after various purchase orders or various pieces of equipment with the vendors and their responsibility is essentially to follow that piece of equipment from the specification through the evaluation to receiving the vendor information and its application into the total system. We have in the neighborhood of 50 responsible engineers on this project and the team then would be the five or so APS individuals monitoring, reviewing our work, and on the Bechtel side, there would be five people coordinating the efforts, assuring that the information comes at a proper time and that the reviews are conducted properly, and then some 50 people below that that look at the individual equipment. We also have people that assist and review not only balance of plant suppliers, but, as Ed probably mentioned, we do assist him in the review of the NSSS suppliers as well.

MR. NOONAN: I would like to ask a question back on Figure 2 a little bit, if you could go back to that one. It showed the utility as giving you specific requirements and

there is a design criteria then evidently established, and that design criteria is established by Bechtel, is that correct?

MR. BINGHAM: Well, the design criteria is drafted by Bechtel based upon inputs from the utility. The utility then reviews and approves the design criteria for application for this particular project.

MR. NOONAN: The utility then does actually approve the design criteria?

MR. BINGHAM: This is the document that they approve, that's correct.

MR. NOONAN: How is the interface then carried on with your NSSS vendor as far as this design criteria being compatible with their part of it where your interfaces come together? How is that handled?

MR. BINGHAM: I will touch on that a little bit later, Vince, but let me just give an overview. The way that we operate with Combustion Engineering is through a formal system of sending the information, for example, the design criteria, to them for review to assure from their viewpoint that the criteria really reflect the interface requirements that they have. There are subsequent things that go on. That information is documented. It is fed into the licensing documents. The licensing documents then are again reviewed in what we call our four-party review where all of the participants are together. The review is documented and signed

off by all the parties involved, APS, Bechtel, Combustion Engineering, and perhaps some other consultant that may be there at the time for a particular section. Then during the course of the work, all of the criteria that are given to Bechtel either through what Combustion calls their IR documents, which indicate criteria that we must meet, or through letters and correspondence, we then incorporate that information into drawings and specs and into our design criteria. We have a procedure that we use to send back this document to Combustion. Combustion reviews it, and then they respond in writing either it is satisfactory or you didn't interpret it properly, please correct this. This is the flow of how we handle the interfaces to assure ourselves that Combustion Engineering in this case has made a review of our interpretation of their requirements to assure that we have interpreted and applied it properly.

MR. NOONAN: Then does APS act in a role as an overall coordinator between the NSSS and the balance of plant to make sure that these requirements are all meshed together properly?

MR. BINGHAM: Ed.

MR. VAN BRUNT: The way we are set up, Arizona Public Service Company has contracted with Combustion Engineering to provide the Nuclear Steam Supply System, and that contract is directly with Arizona Public Service Company, as are our contracts for all of our equipment. We have also contracted with Bechtel to be our engineer/constructor. As I indicated in my opening remarks, Bechtel has been delegated the responsibility to administer, at least as far as the technical aspects are concerned, the Combustion contract. Basically, the information that Bill has been talking about goes back and forth between Combustion and Bechtel. However, copies of all of that information are sent to us and, in parallel with the review that Bechtel is doing of those documents, we are reviewing them as well. This is a matter of expediency, so it doesn't go from one person to another and back, it is a parallel review, and we concur in parallel with the activities that are going on with Combustion or Bechtel. If we have a problem, we raise the issue. So we in house, through our own procedures setup; within my organization review the same documents and look at the things that Bechtel's people are doing and things that Combustion are doing.

Might I say for convenience of getting the meeting done more expeditiously Bill is going to leave points after various segments of his presentation for questions and I think the presentation would go along a little faster if we would hold our questions until that point in time unless you've got some clarification or something that you need from something he has said. Then we will let all the questions be asked at one time. Otherwise, it kind of gets disjointed,

and I think with some of the flow of the presentation, we get lost. So if I could ask that everybody would hold their questions until the end of each segment of the presentation, I would appreciate it. Each segment is normally broken down into pieces that are not so large that you lose your train of thought.

MR. BINGHAM: Thank you, Ed. I believe we are on Figure 4, which indicates the scope of the Palo Verde qualification program. As we have discussed, it is broken up between the Combustion Engineering equipment and the Bechtel equipment. Under Combustion, there is instrumentation and control equipment and non-NSSS instrumentation and control equipment, so we have essentially split the two, and, of course, we have the same under the Bechtel scope.

Looking further at the figure, for the information of the board, I have tried to indicate where this information is covered. Of course, for the Bechtel information, this is in the PVNGS FSAR. The instrumentation and control equipment is covered by Combustion Engineering under their two topicals, CENPD 255 and CENPD 182. The balance of the equipment supplied by Combustion Engineering is covered in CESSAR-F in Sections 3.10 and 3.11.

Further, we have depicted some examples for the board's information. Under Combustion Engineering, you will find the plant protective system, in-containment sensors and

transmitters, and supplementary protection system. Under the non-instrumentation control, you will see the LPSI pump, the high pressure safety injection pump, and valves. These are examples. It is not an inclusive list.

For Bechtel, you will see the balance of plant ESFAS, the battery charger, and BOP instrumentation; under non-electrical equipment, diesel generator, auxiliary feed-water system, and essential spray pond pumps.

Figure 5 shows the relationship of the PVNGS project milestones to the various qualification requirements. We put this together to give the board an idea of the time frame, because, as you know, this project started back in 1973 and I think the keys that we want to focus in on are the construction permit in May of 1976, the applicable qualification standards committed to at that time, the IEEE 323-1974, IEEE 344-1975, and Reg Guide 1.89. You can see from Figure 5 long lead items occurred from 1975 through early '77. This includes the safety injection pumps, pressurizer valves, solenoid valves, charging pumps, equipment of that nature. The major BOP purchase orders started about the beginning of 1976 and are essentially complete at the end of 1978 except for some small items. The FSAR then was docketed in 1980. The bulletins and guides that we will be talking about, NUREG 0588, IE Bulletin 79-01B, IEEE Standard 627, and Commission Order CLI 80-21, have fallen substantially after

we have completed the procurement of the equipment. I indicated earlier to the board that we are attempting to assure that our criteria, which you will hear about in a little while, is reflected in our purchase orders that were placed some two to three, in some cases four, years ago.

Figure 6 shows our qualification program development, and we have separated for understanding by the board the qualification of IE components, that is, electrical components, and qualification of other safety-related components. We have split the presentation into two parts for ease of understanding. We will look at the environmental conditions, that is, temperature, pressure, radiation, chemical, and then we will look at the seismic issues separately today. The major qualifications for the IE equipment fall under NUREG 0588, and you will hear more about that a little later, IEEE 323-1974 and IEEE 344-1975. For our non-IE components, our other safety-related components, we will be looking at IEEE 627-1980 and IEEE 344-1975.

Table 1 is a brief summary of the equipment qualification methods from our design criteria. Basically, what it depicts for various safety-related categories are the qualification methods and it gives some examples of the type of equipment that fall within those categories. We are looking at four categories, A, B, C, and D, on Table 1, in-containment equipment, outside containment - possible harsh environment,

outside containment - non-harsh environment, outside containment - no age-sensitive components, but physical integrity required.

We have listed five methods of qualification. Method 1 is type testing, Method 2 documented analysis, Method 3 documented operating experience, Method 4 ongoing qualification program; then we have a last method, which is allowable by the codes, which is a combination of the other methods. As you can see under qualification methods, we have all the methods and we have noted that type testing is our preferred method. Items that fall in this category for balance of plant are wire and cable and valves. In Category B, outside containment - possible harsh environment, again we treat this in the same manner. In this particular case, we are looking at motor control centers and valves and valve operators. For outside containment - non-harsh environment, which is Category C, again we do prefer to have type testing. Some of the examples are the diesel generator and the control panels for the balance of plant. Our final category, Category D, we are looking at Methods 2, 3, and 4, or a combination. Examples there are things like Q cooling coils and the control room ceiling.

Figure 7 is a simplified indication of the qualification process. It shows the interfaces between APS/Bechtel qualification team and the equipment suppliers. I did discuss

a little bit earlier on the question from Vince Noonan some of these principles, but I would like to spend just a moment and go through this slide for the board. Figure 7 is essentially split in two, the APS/Bechtel side over here (indicating), Equipment Suppliers on this side (indicating), and I am focusing now on the balance of plant equipment suppliers. We started with the design criteria. Of course, that goes into the specifications. The specifications indicate inspection, hold, and witness points for the equipment. That goes to the supplier, who performs the design, manufactures the equipment, developes qualification plans and procedures as we are depicting focusing on the equipment qualification issue. This information flows to the qualification team for review, again is reviewed in APS, goes to Bechtel for review, down to the 50 responsible engineers that we discussed earlier. Input is given to the equipment supplier, comments are made, and we follow up to assure that the qualification plans and procedures of the equipment supplier reflect our criteria. From that point, the supplier then goes through the qualification program. It may be testing, analysis, or combinations. We have an audit of testing programs. I would indicate to the board at this point that we have not yet conducted an audit of the testing program. Our first one will be coming up with some of our electrical equipment toward the end of this year. From this then is a supplier qualification report, the reports I showed you earlier, which is the document like this (indicating). That goes to the qualification team for review, input back and forth to assure that everything is acceptable and complete. Data then is summarized and, at the appropriate time, submitted in summary form in the FSAR. The qualification report and other qualification documentation is sent to Palo Verde for retention.

Figure 8 is the PVNGS schedule for equipment qualification. From the slide, you note that we have the balance of plant equipment on the bottom part of the slide and the CE equipment on the top. I will just spend a minute, since there is interest in the schedule. CENPD 182, which is the seismic qualification for the equipment, as I explained before, was submitted in May, 1977. CENPD 255 environmental qualification was submitted in July of 1980. Let me make a note. This shows in May, but we will correct this for the record, Ed. It should be July. They are presently in the process of review. There will be documentation prepared and information submitted on the same schedule as the balance of plant information.

Looking at the balance of plant, we have about 44 different suppliers for this equipment. We have been holding qualification review meetings with all of them, meetings to assure that the programs are going to meet the established criteria, and have been reviewing and validating in some cases our review of the qualification plans and information that has been submitted to us for review. This, of course, has all been in preparation for submittal of the final information for our operating license.

I do show here, the milestone, Equipment Qualification Review Board. That is us today. We intend to have two submittals, the first submittal in November of 1981, which will encompass about 70% of the information. Summaries will be submitted to the licensing documents and the records will be available with APS. The final submittal is scheduled for April of '82. Again, information for the licensing documents, and the records then will become available. Finally, at that time, presently scheduled is the SER Supplement, and the Unit 1 fuel load date on that schedule shows November, 1982.

Figure 9 is a summary of the BOP equipment qualification status. Of the 59 purchase orders requiring qualification, you can see how they are split amongst the various disciplines. Our purchase orders with qualifications completed prior to NUREG 0588 come out with 15. We have re-reviewed these and find that we have one that is now complete in accordance with that document. We are going to be discussing the details later on in the presentation of this particular area and the comparison, so I won't spend more time than that on that at this time, Ed.

With that, I would like to ask if there are questions from the board.

MR. VAN BRUNT: I have a couple myself, but I will let the board go first. Anyone want to raise any particular point? Carter.

MR. ROGERS: Bill, I would like to go back to Figure 2, if I could. I would like to continue along the line of Vince Noonan's questioning and try to further understand Figure 2. Figure 2 shows at the top of the figure Utility Applicant Specific Requirements inputting into the design criteria and you mentioned, Bill, that the design criteria is a rather dynamic document. It does vary from time to time; it is kept up to date. Can you tell me how APS ensures that its criteria requirements are met throughout the plant design looking at all of the other peripheral parts of the design criteria? What procedures does the utility or does APS use to ensure that its requirements which are found in the design criteria are met?

MR. BINGHAM: I think, Ed, that that is really a question the utility should answer.

MR. VAN BRUNT: I think, if I can rephrase his question for him, he would like to understand the interfaces and where the utility interacts with Bechtel.

MR. ROGERS: That's right.

MR. VAN BRUNT: I agree with you that that is probably

a question that either Carter or I should answer.

MR. BINGHAM: We do have several meetings with APS over the course of the design. Generally, we meet and have met since the beginning of the project about once a month. At those meetings, we review the status of the project from the design, and I think it is that review that is documented, that is followed up, that APS uses for part of the assurance that goes on. I will discuss the process. I guess that is what Carter is asking for. I did discuss it a little bit when we were dealing with Vince Noonan's question, but, in addition to that, of course, there is information that comes out of those meetings. As far as interfaces, Bechtel will make statements about what they are doing, and that has follow-on audits by APS and our own house. Maybe one example I could mention came from our review last month on the auxiliary feedwater system where there was a concern about whether Bechtel had indeed been diligent in assuring that Combustion Engineering's interface requirements were incorporated in the design and was it documented. APS held an audit just recently to assure themselves that things were in order. So there are checks and balances that go on. The process basically is one of assuring that we work together with the utility. We have documented procedures that we use on the project to assure that we have made sure that interfaces are put into the design properly, and from my experience at

least on this project, we have had a tremendous amount of encouragement from APS to focus on this particular issue, because later on it becomes very difficult to backfit criteria in the particular plant. So the process is something like this: A piece of information will come in, it is reviewed by Bechtel at the proper levels, the information also goes to APS, we incorporate it in the design, we get together and review the design, particular problem areas, set between us the course of action that we wish, make any modifications as appropriate to the design criteria, then we incorporate it in the drawings. The drawings then come back to APS for review. APS as well as the other suppliers, in the case we were talking earlier Combustion Engineering, will send back their comments. We incorporate the comments, and many times we have to have special meetings to resolve particular issues. Once those are incorporated, the final review is done and the drawings are released for construction. That is generally the overall program.

MR. ROGERS: Let me make it a little easier. On Figure 2, we see that the utility applicant specific requirements go to design criteria. An arrow comes out of there over to development of standard design and then down on the right-hand side of Figure 2 to procurement specifications, system descriptions, engineering schedule, construction specifications, and so on. I don't see an arrow going back

to the utility. Is there indeed such an arrow going back? Does the utility receive copies of procurement specifications? What happens there so that the utility might review those, for instance?

MR. BINGHAM: Yes, they do, Carter. All the key documents are reviewed and approved by the utility and all the documents go to the utility for comments. It doesn't show on this particular slide, because I was trying to portray the overall process and not all of the detailed flow of information on the project.

MR. ROGERS: Now let me see if I can word this second one so you can answer it. How does Bechtel interface with APS with regard to the CE interface specifically?

MR. BINGHAM: As Ed mentioned earlier, Carter, Bechtel has been asked to administer technically, at least, the contract with Combustion Engineering, so we support the review of the contract as well as all of the interface information. We have people that are assigned to devote their time fully to looking at the Combustion Engineering interfaces and information that comes to us to assure that it is provided in the proper time frame for the project. We have design review meetings with Combustion at which APS is a participant periodically. During the formative stages of this project, we were meeting every two months or so back at Combustion in Windsor. We now have meetings on the order of every three

to four months, because most of the design information is available. We have focused our attention then on meeting with Combustion in the field looking at the interfaces and the requirements that come up in the field as they pertain to the engineer and the requirements the engineer has. Those are held about every six weeks.

MR. VAN BRUNT: Carter, excuse me, let's go to Shelly.

MR. FREID: On Figure 7, I have two questions. As you go through the information flow, you get down to the point where qualification is done by testing or analysis, and my question is who makes that decision on how a particular piece of equipment is in fact qualified, whether it is done by testing or analysis, because on Table 1, there are several options given. One is preferable, but who does in fact make the decision? Does the vendor or the equipment qualification team people?

MR. BINGHAM: Well, the vendor would make the decision based on the particular piece of equipment. The review team may not agree with that decision, and from there you would develop into a final acceptable way of testing your particular equipment. For example, if it was just impractical to run a test, you would accept some other acceptable method.

MR. FREID: So it is basically the vendor who has the initial cut?

MR. BINGHAM: The first shot at it, yes.

MR. FREID: The second part of that question, if you take the arrow going to the left, you order the testing, which is relatively simple, it is a go or no-go decision, I presume, do you also audit the analysis if it was done by analysis rather than testing or if it is done by a combination of methods.

MR. BINGHAM: I suppose you could call it a form of auditing. Actually, we review the calculations. For example, in seismic areas, Bruce Linderman will do a detailed review of the work that comes in to us.

MR. FREID: So then auditing is done on both testing and analysis?

MR. BINGHAM: In that context, yes.

MR. VAN BRUNT: I would like to follow up on Shelly's question, Bill. You indicate that the vendor makes the choice. Specifically, what do the specifications say to the vendor? Does it give him three or four options, tell him that he has to comply with IEEE 323 or whatever it is, and then he takes his best shot at what he thinks he can do? Is that the way it works, or do you indicate in the specs that you prefer type testing?

MR. BINGHAM: Ed, as I indicated before, the specifications were written long, long ago.

MR. VAN BRUNT: I understand.

MR. BINGHAM: What we are doing today is somewhat

different than what we did before. We did rely on IEEE 323-74, which has a statement in it that type testing is preferred, so the specifications in the early days didn't give the kind of guidance that we might give in a set of specifications today if we were to go out to a particular vendor.

MR. VAN BRUNT: Harold, you would like to ask a question?

DR. DENTON: I have a follow-up question to the one the panel just raised. When you mentioned you audit the supplier, could you describe the nature and depth of that audit? I am interested in how complete do you audit. Do you look at their results of tests on every piece of equipment or every tenth piece, or how do you decide the scope of your audit of that?

MR. BINGHAM: Let me focus on the auditing for equipment qualification, because we do audit for compliance to the specifications in other areas. The point that we are trying to focus on is when a testing lab says, "Here's your report," signs it off, gives it to you; the equipment is qualified. How do you really know that that is the case? Did they run the test at the proper cycles? Did they have the proper measurement of temperature or pressure or whatever parameter we are looking at? Did they record the information properly and analyze it properly? Now, there really aren't too many testing labs, I think as we all know, and some of them are

getting very busy right now, so I think it is even more important for us to audit to the extent that we feel necessary. First, is the testing group applying the principles that they should properly, are they using the right equipment, has it been calibrated so that the results that we get are proper, and has the information been interpreted properly? We will probably not do every one, but, as I indicated in the presentation, we are focusing now on that particular issue, and if it so comes out when we review a particular supplier that things are not like we had hoped, then we will review more until we are satisfied that the reports that we get do reflect what we are told.

DR. DENTON: I guess I would phrase that one a bit finer, if I might. Does this mean that you audit each supplier at least once on each piece of equipment as opposed to auditing the same piece of equipment several times? I guess I am interested are there laboratories testing equipment for you that you don't audit at all? I am trying to get you to define in more detail the nature and scope of the audits that you do so I can get a feel for what competence should be placed in the word "audit."

MR. BINGHAM: I indicated that for equipment qualification, we have yet to conduct one of our audits and that our first audit would be toward the end of this year. We will probably be looking in great detail at everything that goes

on. I might indicate for the board's benefit that that testing will be on a piece of electrical equipment and it will be conducted at Wyle's Norco Laboratory. We will be looking in great detail at all the various aspects, because we really haven't to date taken a look at, for example, what has been done at Huntsville, except I might mention that the engineers do witness from time to time particular seismic tests to make sure that things are reflected. That is about all we have done to date. We are going to focus more diligently on the programs, and one of the things that worries us is that when testing labs become overloaded, as they might, that there might be a tendency to not focus attention on the particular issues necessary, so we probably will have a little more diligence on that equipment.

You asked a question about would we look at each piece of equipment or would we look at selected equipment. As the board knows, we have three identical units and some of the equipment has already been shipped in order to maintain our construction schedule and we have deemed it appropriate to qualify equipment for Unit 2 or Unit 3 and to have that qualification complete prior to the operating license or prior to submitting the information for review by NRC. I would guess when it comes to valves and valve operators, for example, the Limitorque operators that we have, that that would cover a broad spectrum. There has been a substantial

amount of work in the industry to assure that that particular qualification is satisfactory, and I would expect that we wouldn't spend as much time on that as perhaps we would on qualification of some of the diesel generators where there really haven't been extensive testing programs or extensive work on some of the components such as the governors and control systems, and it would be my expectation that we would focus our attention on those particular areas during the next several months.

MR. VAN BRUNT: Bill, if I can interrupt.

Harold, just to follow up on Bill's comments, as the applicant is the person that is ultimately responsible for the adequacy of all this equipment, we are going to be looking very carefully at the testing laboratories to assure ourselves that they are in fact doing the things we want them to do, and, through our own quality assurance activities, we will be auditing these facilities either with our own forces or through the Bechtel QA organization, which we utilize to do audits, and we will be setting up these programs to audit the same as we do any other vendors to assure outselves that their programs are adequate. So independent of how much auditing Bechtel may think is appropriate, we will be doing that which we believe is necessary to assure that the equipment is appropriate.

John.

MR. ROEDEL: Bill, you spoke of equipment qualification. I would like to focus on commodity qualification to get a little clarification and more explanation of what the word "audit" means. For instance, what has been the involvement in Bechtel, Bechtel Engineering, or Bechtel supplier quality representatives in the qualification of Rockbestos cable? Were they not present, were they not witnessing some of the tests in the qualification of that material?

MR. BINGHAM: The answer to your question is yes, we did, John. The area that I was trying to focus on was equipment qualification and indicate to the members here that we are just getting into the swing of our audits on that particular type of equipment, that particular area, and I am sure we will use all the elements that we use in our other audits of equipment. I also tried to indicate to Dr. Denton that we believe there is even more emphasis in this particular area that must be put on certain aspects of our review. I did not indicate earlier that the engineers responsible for the inspection plans, and our inspection plans are being updated to include these elements. We set the criteria from an engineering viewpoint and then we have individuals in our auditing department, procurement department, that go out and actually look and assure that our requirements are met. Then we as an engineer might be there, also, as a follow-on, if you will, the second layer.

MR. ROEDEL: That is why I brought up the difference between the equipment qualification versus material qualification, which we are now engaged in, and have been for some time, so that we could qualify the material for installation in containment. I just asked that question because I wanted to make that clear.

MR. VAN BRUNT: Ed Sterling.

MR. STERLING: I want to follow up on Dr. Denton's question. In your plan for audit, would you say that the plan would be to take a look at procedures that a lab might use? For example, if they make certain assumptions when running an analysis, then that particular assumption or analysis would be applicable to more than one piece of equipment if they used it over and over again, are you satisfied through an audit that it was a satisfactory way to proceed? The same thing with the type of test procedures that they might use.

MR. BINGHAM: That's correct.

MR. VAN BRUNT: Are there other questions in this particular area? Norm.

MR. HOEFERT: On Figure 7, I have a question. The end of Figure 7 is qualification documentation, which then goes to the PVNGS site records. There is going to be a large quantity of qualification documentation, many reports, and so forth. How are all the various tasks which have to be

performed throughout the life of the plant to maintain qualification being identified and tabulated so that all these tasks can be performed or will be performed in the future.

MR. BINGHAM: Are you talking about once the equipment becomes under the jurisdiction of APS operations? Is that what you are focusing on?

MR. ALLEN: No. I think I can expand on his question a little bit, Bill. Norm is talking about a requirement which comes out of a qualification program that operations has to check a breaker every 1,000 cycles. How is that information going to be compiled and sent to operations so they can put it in their maintenance procedures. Right, Norm?

MR. HOEFERT: That's right, that type of thing, and I am particularly concerned is this going to be picked up in the FSAR or tech spec or separate document. Just how will this all get together?

MR. BINGHAM: Yes, it will probably be in several different places. All the information will be compiled and be given to APS engineering by us and that will be implemented into the various procedures or tech specs, if that is the case, or test specifications or maintenance documents.

MR. HOEFERT: Has it really been decided yet where this information is going to go?

MR. BINGHAM: Again, I believe that I would have to

ask Ed for information from APS, but it is my understanding that the principles are established, but perhaps the details aren't yet totally worked out.

MR. ALLEN: That's correct. As far as specific maintenance procedures, that will be taken out of the tech manuals both by Bechtel and APS nuclear engineering and identified to operations. As far as tech spec requirements, we haven't gotten into the tech spec requirements on this yet. We don't know exactly which portion of it will be tech spec requirements and which won't.

MR. VAN BRUNT: Other questions? Dr. Rosztoczy.

DR. ROSZTOCZY: I have a few questions which relate to some of the presentation and some of the answers to questions, and then I would like to come back to some of the basics. For details of the record, let me ask them one by one and I would like to get them answered.

MR. VAN BRUNT: Sure, go right ahead.

DR. ROSZTOCZY: First, from one of your answers to one of the questions, I understood that the environmental specifications are being prepared by the contractors, Bechtel or Combustion Engineering, then they are submitted to APS for approval and APS approves them, so if we are going to audit, let's say, a year or two years from now your files, then we would find in each file environmental specifications that the contractor prepared on a piece of paper that shows that APS reviewed these and approved them, is this correct?

MR. BINGHAM: That is correct.

DR. ROSZTOCZY: The second question relates as a follow-up on an earlier question. The question was asked who makes the decision on what type of qualification is going to be performed, whether it is going to be testing or something else instead. Did I understand it correctly that the vendor or supplier of the equipment makes a recommendation of how he is planning to test this equipment and then this recommendation is reviewed by the equipment qualification team and it is approved by the equipment qualification team, so again the files would have a piece of paper indicating that the team reviewed this and made the decision that it is appropriate to go with analysis, for example, instead of testing?

MR. BINGHAM: There will be approval of the test plan, that's correct.

DR. ROSZTOCZY: There is an approval for the test plan for each piece of each type of equipment?

MR. BINGHAM: For each piece. Excuse me, the qualification plan. The qualification plan may be test, analysis, combination, whatever is appropriate for the particular piece of equipment.

DR: ROSZTOCZY: Yes, and there will be an approval for the selected approach, which might be a combination of these.

MR. BINGHAM: Yes.

DR. ROSZTOCZY: The third one is maybe a follow-up on Dr. Denton's question. You indicated that you are going to audit this. I didn't get the clear answer whether you are going to audit every type of equipment qualification or, instead, you are going to audit only selected ones. For example, if the vendor is going to go for qualification for 25 different types of equipment that are going into this plant, then is it your intent to audit each of those or are you going to pick only some selected ones? If you are going with the selected equipment approach, then do you have a plan how you make your selection? Have you already made those? Do you know which one you are going to follow?

MR. BINGHAM: It has been pointed out to me there may be a bit of confusion. We do review every report in detail to make sure that it meets the established criteria, every plan, every report that comes in from all of the vendors. We probably will be selective in the audit. That is, we will pick the equipment that we would expect a testing lab to have difficulty with or we have heard from the industry or NRC in some cases that there has been difficulty in qualifying. When I responded to Dr. Denton, I was trying to portray that we are in the early stages of really what should be considered for a large nuclear project that is in our time frame, and if that turns out to be that one needs to audit all of the

equipment, then we will audit all of the equipment. We suspect from our review and our discussions with APS that probably will not be necessary, and I cited one example that I believe was a Limitorque motor operator, where we felt that perhaps everything might be in order on that particular one. I am sure that, as Ed indicated, APS will assure themselves by asking appropriate questions of us that we have done our job and that if we don't audit all of them, there will be well documented reasons for not doing that.

DR. ROSZTOCZY: So the answer to my question is that you don't have at this time a plan which will tell you exactly which ones you are going to audit, you are developing this as you go along, and you will assure that appropriate amounts will be audited.

MR. BINGHAM: That's correct.

DR. ROSZTOCZY: Let me go now to another set of questions, which are kind of basic and I think they kind of relate to the beginning of your presentation. Could we have Figure 2 up for a second? Figure 2 is a very general portrayal for design criteria and it is not specific to equipment qualification. It shows one line which indicates that certain information is flowing into the design criteria from the utility. Now let's go to Figure 3. When we go to Figure 3, then the equivalent of this is not shown. I don't see a clear block which would tell me that certain information

had been given to the environmental qualification team. My questions relate to certain information which I think this team should have, whether it has already been given to them and in what form has it been given to them. The first question is: Before you can start to go ahead with a program qualifying the equipment, you have to know what equipment needs to be qualified, so has APS prepared a list of safety-related systems which need to be environmentally qualified and has that list been supplied to all the appropriate people like Bechtel, Combustion, and the team mentioned there?

MR. BINGHAM: Ed, maybe I should make a comment here. First, the answer to your question is yes. The rest of the presentation is structured to present the details of the working of the organization, particularly Section IV, and I wonder if maybe you might want Dr. Rosztoczy to indicate his questions at this time and then as we go through the presentation, those that remain unanswered we can deal with when we go into Section IV.

MR. VAN BRUNT: Dr. Rosztoczy, this isn't the first one of these that we have done and we have learned a little bit as to the most expeditious way of getting from here to the end. What I would suggest is that as you ask your questions such as this one that if Bill knows that somewhere along later in his presentation he is going to deal specifically with that subject, he will identify that to you, and when he

comes to it, he will try and note it or certainly you will note that you either got your answer satisfactorily or that you did not rather than try and take it out of context. It is the same reason I tried to hold the questions until the end of a particular area. If that is agreeable to you, I would like to proceed that way. We have found that that is probably the most expeditious way of getting from one point to another and it makes a little more orderly presentation.

DR. ROSZTOCZY: Yes, I think that would be fine.

So you say that yes, such a list has been prepared. The next question is are we going to get a copy of that list today?

MR. BINGHAM: I had not planned to give you a copy of that list today, but I am sure that Ed and his people can make it available.

MR. VAN BRUNT: We will send you a copy of the list.

DR. ROSZTOCZY: It is my observation from some of the reviews that we are conducting for other plants that the lists the different utilities are using are not uniform. Certain systems are included on one utility's list and other utilities are not including them. I think it will be for the benefit of you as well as everybody else, including us, if there would be an early agreement on that list that that list is complete and nothing has been left off from it.

MR. BINGHAM: I think I can respond to that part of the question. All of the equipment that we are talking about is equipment that is flagged in the FSAR as safety-related and the list of equipment is noted in Appendix 3E of the FSAR, so that equipment has been listed and it ties back to our basic qualification table. There is a meshing of the two to make sure that we have covered it all.

DR. ROSZTOCZY: These lists have undergone certain developments of Three Mile Island, and so on, so I would like to have a clear understanding today of what it is exactly that you are working with so we can take a look at that list, and if we have any comments, we would feed it back to you in a relatively short turn around so we could have an early agreement on that list.

MR. VAN BRUNT: Bill, let me ask Terry and Gerry both to put on the list -- I am aware of the list you are speaking of and we will submit that list to you, but prior to submitting it to you, we will review and be sure that it complies with the present-day requirements or any new requirements that have come up since we submitted it the first time.

DR. ROSZTOCZY: I think what I am asking for is not that this list be necessarily submitted to NRC, but to present it to this board so the members of this board can see it and kind of pass a judgment, including NRC representatives.

MR. VAN BRUNT: Let me deal with that part of the question. Dr. Rosztoczy, the mechanics of what happens is

that this will be an open item for the board and that will be a question that will be dealt with, and as a part of the responses to that will be this particular list and that will become a part of the overall documentation of this particular meeting. So, in essence, in kind of a round about way, the same thing that you have been asking will be accomplished.

DR. ROSZTOCZY: Thank you. That will be fine.

The second question is again along these lines and the question is has APS prepared a list of environmental parameters, various things like temperature, pressure, that has to be considered in the qualification of the various equipment? In some cases, of course, some are not applicable, but they have to be considered, and are we going to receive a copy of that list today?

MR. BINGHAM: The answer is yes. That is Item B.9. of your agenda.

DR. ROSZTOCZY: Under Item B.9., we will see a copy?

MR. BINGHAM: We will see a copy of that.

DR. ROSZTOCZY: The third question is has APS identified environmental zones for the plant? Have you divided the plant into environmental zones and then established the numberical values or time functions of these environmental parameters for each of those time zones? Have you provided this information to the contractors who are writing the specifications for the various equipment?

MR. BINGHAM: Again let me respond. The answer is yes, we have established them. You will hear them today under Section B.9. One point that I tried to make earlier was that we are in the process in some cases of backfitting the requirements to have a complete understanding with some of the very early suppliers where we might have had general or envelope criteria. You are going to hear all about that today when we get into the environmental qualification criteria.

MR. VAN BRUNT: Dr. Rosztoczy, I would like to interrupt for just a second just to clarify something. You are directing your questions to APS, and that is perfectly fine and I or my staff could answer these questions just as well as Mr. Bingham could. However, we work so closely together in our organizations the way that we have structured these proceedings, at least as far as the interface workings between our two organizations, Bill is prepared to answer those questions. If you wish to ask APS a question about how we process something within our organization, we will directly answer that. In these areas where things are going between us and Bechtel, Bill we have just designated as a matter of convenience, since he is up here, to answer those kinds of questions. I didn't want you to feel that we could not answer these questions if we so desired.

DR. ROSZTOCZY: My main concern is whether these things

have been established and have been provided to all parties involved, for example, Combustion Engineering or a third party or fourth party involved, and have they received this information.

MR. VAN BRUNT: All things that go through the interface Bill is perfectly capable of answering, as we are, but as a convenience, he will be answering. If you want to get into the specifics that occur within the Arizona Public Service Company organization itself, then one of my staff or myself will be very happy to answer those questions.

MR. BINGHAM: In your handout, as you get back to them, you will see the qualifications and the zones and everything, so the material is your handout. We will get into that.

DR. ROSZTOCZY: Let me then see those in the presentation. If I have anything more, I will ask it at that time.

MR. VAN BRUNT: Do you have any more questions?

DR. ROSZTOCZY: No. Thank you.

MR. NOONAN: I would like to go back to your earlier statement of the purchase orders and I would like to ask Bechtel as to given a particular piece of equipment that will interface with your NSSS vendor, how are his requirements integrated into your purchase order and what procedure is followed.

MR. BINGHAM: If it is an interface, the criteria are put in the purchase order. A draft is sent to Combustion Engineering for review. They comment and send us back a formal letter indicating their comments and acceptance or request that we make some modifications and finally will accept that we have interpreted the information and included them properly. So there is a formal system that we have in our house that not only covers the original requirements, but any revisions that may happen thereto during the course of the design.

MR. NOONAN: In this interchange of information, is APS then kept informed of what is being done between Bechtel and the NSSS vendor?

MR. BINGHAM: Yes, they are part of the process.

MR. NOONAN: They are part of the process. Okay. If I could go to Figure 6, this is a question on the service conditions. I notice you list temperature, pressure, radiation, and chemical. I don't see aging. Is that to be discussed?

MR. BINGHAM: Yes, it will. This was just to present an overview for the board's information of generally how the program works. When we get into the detailed discussions, we will be covering in particular the aging requirements.

MR. NOONAN: All right. I have a few more questions. On Table 1, I look at the various safety-related equipment categories, A, B, C, D, and particularly the one I am most concerned about is the in-containment - possible harsh environment. You indicated that you would allow Method 3 to be used to qualify equipment. Can you tell me where you have documented operating experience for equipment exposed to harsh environments.

MR. BINGHAM: We haven't done that yet, but we are prepared to discuss that in detail later on, so if you could hold that question until that time, I think we will cover it properly.

MR. NOONAN: If I can go to Figure 7, I have two questions. The first question is in this qualification team review, I suspect that that team is to look at -- maybe it is in the next block where you do the audit of testing, I am not sure where, but, anyway, given that you have some anomalies that occur during a test, how are those anomalies resolved and, if they impact the NSSS supplier, how are they resolved with him?

MR. BINGHAM: First of all, we will cover the process in detail under Section IV later on. We resolve them in the same manner as we resolve all of our problems with APS, very carefully. Your question about Combustion Engineering, in other areas, of course, we have extensive meetings and reviews to resolve the particular issues.

I think, Ed, that you may want to respond on the plans for Combustion Engineering in this particular case.

MR. ALLEN: Regarding how we handle Combustion

Engineering?

MR. BINGHAM: If there is an anomaly in what Combustion is doing for testing as far as it relates to equipment qualification, as I understand.

MR. ALLEN: So far as Combustion Engineering, we work with Combustion Engineering very closely, as we do with Bechtel. For example, we have seen some of their qualification programs, we have commented on them, we have received Bechtel's comments on some of their qualification programs and some of our concerns, and then we transmit these to Combustion Engineering and we periodically have meetings with Combustion Engineering trying to resolve our differences, very similar to how we handle them with Bechtel.

MR. NOONAN: So APS takes that function to make sure that any anomalies that occur on either side in the testing of equipment, that those anomalies are not detrimental to safe shutdown of the plant?

MR. VAN BRUNT: Right. Mr. Noonan, there is no question that we are ultimately responsible and we are going to take what action is necessary, be it with Bechtel or be it with Combustion or be it with any sub-vendor, to assure ourselves that any anomalies are resolved to our satisfaction. As far as Combustion is concerned, we work very closely with Bechtel in reviewing those matters and then, of course, with the Bechtel sub-suppliers, we are working very closely with

Bechtel to resolve those matters.

MR. NOONAN: I guess one of the things I am thinking about is particularly on some of your seismic testing where you might be testing a piece of equipment and you get some spurious signals out of that equipment. Those signals might be very minor and be very short-time based and a judgment made on Bechtel's part that these would not cause any detrimental effects as far as that equipment is concerned, but these types of signals could be fed into an NSSS piece of equipment that could cause detrimental effects, and that is what I am looking for, given you get these types of anomalies, to make sure that this is integrated into the NSSS side to assure that you are not going to have some malfunction occur with some other piece of safety-related equipment.

MR. VAN BRUNT: Bill, let John make a comment.

MR. ALLEN: I would like to respond to that a little bit about differences of opinion between us and Bechtel and Combustion. Many times we have had and we have requested that an outside consultant be brought in, an independent consultant, to help us resolve problems. So if we have gotten to where we couldn't come to an agreement, we request an outside consultant come in for a third opinion.

MR. VAN BRUNT: This is exactly what we have done recently. You heard before Mr. Roedel mention a specific problem we have had with Rockbestos. We bought some

10 CFR 50-55(e) type material and what we did was bring in an outside consultant, an expert in that area, to review the whole matter and make recommendations to us as to what we should do about these particular problems. So in our function as the applicant and having the ultimate responsibility for this plant, we will be assuring ourselves, be it through Combustion or our own forces or through the Bechtel staff, that anomalies such as you speak of or any other matters that may be a problem with equipment qualification or any other darn thing in the plant will in fact be resolved satisfactorily.

MR. ALLEN: In addition, I might say that in this case with the Rockbestos, within APS, not necessarily inside the nuclear engineering organization, we have Roger Clark's people in generation engineering we want to help us out on this problem. In addition to that, we have a cable expert that we went to. So we have quite a large resource in that area to help us resolve our problems.

MR. VAN BRUNT: I don't think there is any particular cookbook method that I can outline to you as to how we could take care of an anomaly. Each anomaly will have to be dealt with as a particular problem and handled as appropriate for that particular situation.

MR. NOONAN: I just wanted to be sure that it is handled properly.

MR. VAN BRUNT: I assure you that it is.

MR. NOONAN: I have one last question, or I want to comment. On Figure 7, I find it very difficult where you leave the decision to test or do analysis up to your suppliers or your vendors. In some cases, I guess the supplier maybe has the capability of making that type of determination, but there are probably some small type suppliers that really would not have engineering capabilities of making these determinations whether this equipment should be tested or should be analyzed, and I don't understand that process at all. It seems to me that Bechtel should have that responsibility of determining whether the equipment should be tested or analyzed.

MR. BINGHAM: We share your concern, Mr. Noonan. I think that probably the best thing to do is to listen to the rest of the presentation, and at that time, let's have a discussion on this particular issue so that we can portray exactly how we are handling this and how the team is assuring that the proper decision is made, because it is something that we don't treat lightly.

MR. NOONAN: Then later on in your presentation, you are going to talk about pieces of equipment. One thing I would like you to address is how you handle the testing of relays, since relays have been a problem not only in this industry, but many other industries, and they are a constant source of trouble, particularly under vibratory dynamic loads. I would like to see later on a discussion on that.

MR. BINGHAM: We will do that. We will be pleased to do that.

MR. VAN BRUNT: Do you have any other questions, Mr. Noonan?

Any other board members have any questions at this time?

DR. ROSZTOCZY: Mr. Chairman, going back to my previous statement, I do have one question.

MR. VAN BRUNT: We'll let you get away with it.

DR. ROSZTOCZY: In the presentation, you have indicated that for certain types of equipment, you have a preferred mode of qualification. The preferred mode for many of them was testing. Do you have a list of those cases where you have decided not to follow the preferred mode of qualification and are those cases and their reasons going to be discussed here today?

MR. BINGHAM: Yes. In general, most of our in-containment and perhaps all of our in-containment has type testing in some form, and even equipment in Category B, which is outside-possible harsh environment. Our biggest problem is that the vendors are coming to us and saying that, for various reasons, it can't be done, or it is not practical, or something else of that nature. You will be hearing later when we get into the problem areas the process that we have amongst us wrestling with this particular problem. To date, we have

not backed down. If you could at the time that we get through the presentation ask the questions what about this equipment, what about that supplier, we would be more than pleased to bring the board up to date on where we stand and tell you how we are talking and what we hope the outcome will be.

DR. ROSZTOCZY: What I am asking for, are you keeping a list of those items where you are not following the preferred one?

MR. BINGHAM: Yes.

DR. ROSZTOCZY: In other words, this is exceptional items. This is supposed to be the short list rather than the one where you follow it, and are you going to discuss the reasons why did you decide not to perform testing for those cases.

MR. BINGHAM: We don't believe that we are in the position yet where we have had to accept other than what we wanted, and that is the area that we will discuss with our problem vendors. I think it is Section VIII of our agenda. I guess what I am saying is the bottom line to you, Dr. Rosztoczy, is that we don't give up easy, and we will give the board a perspective of where we stand. I'm sorry, I am corrected. It is in Section VII, Qualification Problem Areas. We do not and we don't intend to give in on a type testing unless it is demonstrated to be impractical.

DR. ROSZTOCZY: Then the answer is that up to date, you have not given in on any of them?

MR. BINGHAM: To my knowledge, we have not. When we get into the details, if there is one in there, we will make sure that we flag it this afternoon.

DR. ROSZTOCZY: So it is a nice short list.

MR. VAN BRUNT: How many more questions have we got? Karl, you've got one. Bill, you've got one. Carter's got one. Why don't we take about a 15-minute break at this point. We will get back here at about 25 after.

(Thereupon a brief recess was taken, after which proceedings were resumed as follows:)

MR. VAN BRUNT: Bill, let me say a word before you proceed.

As I indicated earlier in my opening remarks, I have to leave and go out to Palo Verde, so I am going to turn the Chair over to Mr. Allen. He will be handling the meeting from now until the completion. So, John, if you would pick up.

MR. ALLEN: Bill, I think some other people have some questions. Bill Quinn.

MR. QUINN: On Figure 3, you indicated a box which shows independent qualification programs that you are doing for your recalcitrant suppliers. I am sure you are going to touch on that later.

MR. BINGHAM: That's correct.

MR. QUINN: Can you just tell me, have all those recalcitrant suppliers been identified to date?

MR. BINGHAM: Not completely.

MR. QUINN: Have the ones identified to date been factored into your schedule on Figure 8?

MR. BINGHAM: We are including that in our schedule.

I think, John, before we go on with more questions, there were a couple of clarifications I wanted to make. One of these figures, Figure 7, says "Qualification Test Review." That should be "Qualification Team Review." We will correct that.

MR. ALLEN: Then that will become part of the record.

MR. BINGHAM: Yes. The second is that it has come to my attention that there may be some misunderstanding on exactly what we are doing with regard to type testing, and we will make sure that we clarify that during the presentation so you know exactly what is done with the various pieces of equipment.

Are there any other questions from the board?

MR. ALLEN: Go ahead, Karl.

MR. KREUTZIGER: I have three questions which we might cover later, so I will just state the questions. The first question on Table 1 is the definition of harsh or possible harsh environment. I would like to have a little explanation

either now or later, because I see a piece of electrical equipment, a motor control center, listed in the examples and I was wondering whether or not a possible harsh environment was limited to such events as high energy line breaks or whether the harsh environment included other parameters.

MR. BINGHAM: Fine. We will answer that later on.

MR. KREUTZIGER: The second question I have refers to Figure 6. In Figure 6, there is a qualification of IE components on the left and qualification of other safety-related components on the right. On a previous slide on Figure 4, the examples of non-electrical equipment, the word there is "non-electrical equipment." Where do such items as valves fall with respect to qualifications of items like limit switches or other items that might be considered electrical in nature and, therefore, require to be qualified to 323? Specifically, to clarify my question, as I see that on the right-hand column on Figure 6, the only document that you have for environmental qualification is IEEE 627-1980. Was there or has there been any qualification of equipment, since you indicated that most all of the equipment has been purchased as to environmental qualification criteria for non-class IE equipment.

MR. BINGHAM: We will be responding to that.

MR. KREUTZIGER: The last question I have is the role of the qualification review team. My understanding is that the number of people is comprised of five APS people approximately and five Bechtel people doing coordination. What is the definition and role of the individuals and how does this team function with respect to their review?

MR. BINGHAM: We will cover that under Section IV.

MR. ALLEN: Are there any more questions? George.

MR. SLITER: With regard to Figure 5, your Qualification Requirements Time Line, is it your intention to revise the FSAR to eventually reflect the degree of compliance to NUREG 0588?

MR. BINGHAM: I think I would have to refer that one to APS.

MR. ALLEN: What was the question again?

MR. SLITER: Would you eventually revise your FSAR, that's why I asked the question of Bechtel, to reflect the degree of compliance with 0588?

MR. ALLEN: That's correct.

Any further questions on this before Bill moves on to the next subject? Ed.

MR. STERLING: On Figure 8 at the bottom line, you have these qualification review meetings with the 44 PO vendors. Are you going to cover the scope of what you accomplish with that later on?

MR. BINGHAM: Yes.

MR. STERLING: I will defer my questions, then.

MR. ALLEN: Go ahead, Bill, to the next subject.

MR. BINGHAM: With that lengthy introduction and background, I would like to ask Bob Carson to continue the presentation. There is a considerable amount of detail that we will cover in the presentation. Generally what we will do is break for questions at the end of III. A., Overview of Design Criteria, and then when he gets into Section B., Environmental Qualification Criteria, we will break at the end of each of those subheadings.

MR. ALLEN: Bill, if I may say something, lunch is scheduled for 12:30. How is that going to fit into that presentation? We have to eat right at 12:30.

MR. BINGHAM: Well, why don't we stop at 5 or 10 minutes prior to that time for our presentation. You can ask questions until that time, break for lunch, and then continue.

MR. ALLEN: Okay, fine.

MR. CARSON: Exhibit IIIA-1 is an overview of the design criteria having to do with environmental qualification. First of all, a few definitions. Safety-related equipment as it applies to the nuclear station is any item of equipment which is necessary to mitigate the consequences of a design basis accident and to allow the station to be brought to a safe shutdown condition. This equipment is identified by system and by item of equipment in the plant and the appropriate qualifications are applied. Qualification is a demonstration

that the safety-related equipment items will perform properly at the times when they are called upon to perform and mitigate consequences of the accident and to allow the plant to be brought to a safe shutdown. It is also a demonstration that this performance can be accomplished at the times necessary and under the conditions which prevail at the time of the operation, and that would be normal operation, abnormal conditions, design basis accident conditions, post-design basis accident conditions, and in-service tests. Any time the equipment is called upon to operate, that is demonstrated by some qualification method. In answer to one of Dr. Rosztoczy's questions, service conditions are determined for each piece of equipment at its location in the plant. Environmental zones are set down in this project by building, and the environmental conditions which accrue at those locations are determined by reference to information supplied by engineering; for instance, by calculations made by the project staff having to do with pressure and temperature and radiation releases due to the design basis accidents.

Safety-related operational requirements have to do with when the equipment is called upon to operate, what it has to do, and methods for showing that this is proper. Various criteria are involved having to do with the operational requirements. Some are NRC requirements as listed in General Design Criteria 1, 2, 4, and 23 of Appendix A, and Sections

III and XI of Appendix B to 10 CFR Part 50. IEEE Standard 323-1974 is the basic document having to do with acceptable methods and criteria and procedures to follow for qualifying primarily electrical or Class IE safety-related equipment, but, as will be shown later, the principles and criteria of that particular document are general enough and generic enough that their application applies to all sorts of safety-related equipment. A rather recent document, IEEE 627-1980, which has been in preparation for several years, really involves the principles of qualification for all types of safety-related equipment and will be acting as an umbrella document for qualification with reference to IEEE 323-74 as the specific document for safety-related electrical equipment. The principles and criteria contained in 627 are very, very similar to 323, but their application is across the board for safety-related equipment. Other requirements for qualification appear in the several NRC regulatory guides, which are interpretations and possibly modified requirements having to do with IEEE documents having to do with qualification. The indicated word here, "daughter" documents, is against 323. There are a whole series of IEEE standards which have been and are being developed which apply to specific items of electrical equipment, and we will talk about those a little bit later, but they cover particular items and the methods in the individual IEEE standards all are aimed at providing successful qualification

in accordance with the basic 323 document.

This is Exhibit IIIA-2. The purpose of establishing a qualified life for a safety-related piece of equipment. Qualified life, first of all, is a time period based in years or portions of years during which the equipment can perform its safety-related function. Qualified life is that time period after which it has experienced the rigors of all the environmental parameters and is still able to do its job when called upon when subjected to a design basis accident. It may not be able to continue for a longer period of time under normal operation, but it is demonstrated that it will do its job for that length of time and still be able to perform its function under a design basis accident or any other condition accruing from a design basis accident at that time. To establish an assumed end-of-life condition by artificially or naturally aging the piece of equipment is a part of the qualification process. There are accepted aging mechanisms and methods which are used for equipment to put it in an assumed end-of-life condition. The qualified life that is always looked for hopefully is the life of the plant, which is based on a 40-year life. We would always like to have equipment of a 40-year qualified life. Sometimes that is not possible. We age the equipment artificially or naturally to that qualified life period, then subject it to seismic events and design basis accident events

to show that it will still do its job.

Information required for each safety-related equipment item. Again in answer to one of Dr. Rosztoczy's questions, identification of the equipment and its safety-related function, all safety-related systems and all items within the system are identified and pieces of equipment are indicated in the FSAR. The safety-related functions are determined for each piece of equipment under the conditions of the design basis events during which it must operate to mitigate various consequences of those events. The operability requirements are determined: When does it have to operate, for how long does it have to operate, under what conditions does it have to operate, and what does it do when it operates? The range of service conditions during normal, abnormal, design basis event, post-design basis accident, and test conditions, all these service conditions are evaluated and determined for that particular piece of equipment in its location. Only a few were indicated on one of the previous slides having to do with temperature, pressure, radiation. The whole gamut of operating requirements has to be determined for that location. If an item, for instance, is subjected to flooding or submergence or if it has a dust problem involved in it during any one of its operating modes, that is determined, it is indicated in the specification for the equipment, and those things are taken account of during the

qualification process. The identification of components and/or modules of equipment which must be subjected to aging deterioration. Not everything in every piece of equipment ages at the same rate and not every item of the equipment in fact ages. You could have equipment, for instance, such as metallic items which don't age on a time basis or through temperature or through exposure to some of the conditions in the plant. Metals, of course, rust if exposed to some conditions. Allowances are made for this in the design of the metallic items. Those items which age primarily due to temperature or radiation would be organic materials such as electrical insulation or plastics or other materials which are used as portions of equipment. Those materials are determined and, as a part of qualification, certain requirements will be attached to them. Certain methods will be used to artificially age them as a portion of the qualification process.

Exhibit IIIA-3. Documentation as to the methods used for qualification must be provided and it must be provided in an auditable form. Mr. Bingham indicated that documents similar to this (indicating) and in many cases considerably fatter items of documentation are involved in a qualification program. Those documents include information of what types of qualification methods are used, as agreed upon by the vendor and Bechtel and APS, the procedures on how

the qualification is to be accomplished, reports of the qualification process, the data that is taken, the use of the data, and the reduction of the data into usable reports. This information is all in auditable form; that is, it can be looked at at any time by NRC personnel or others who have the need to know, and it is kept by APS at various locations. Documentation by vendors which is used to supplement the qualification effort or which may be proprietary to that vendor which he feels it is not in his best interest to allow in public records is also available at the vendor's location and in many cases at APS' location if that can be arranged. The material in terms of the documentation has to be available for the life of the plant. If the vendor chooses to say something is proprietary and it will not be made available as a portion of the program, it must be specifically identified, its location has to be identified, and assurance given that that documentation will be available for audit for the life of the plant, the assumed 40-year period.

As mentioned, IEEE 323-1974 is the basic document having to do with qualification of electrical safety-related equipment, the so-called Class IE equipment. Other safety-related equipment is covered under the general principles and methods and criteria contained in that document as indicated in NRC's Standard Review Plan Section 3.11, Revision 1. The application of the 627 document, which is a very new one, and in fact is not even available at this point for official distribution but is available to the industry, has to do with all types of safety-related equipment. It contains in general the same principles, the same criteria for qualification of safety-related equipment -- identification of the equipment, identification of the modes of operation, documentation, and such as that, as are in IEEE-323.

Exhibit IIIA-4 has to do with standardized environmental and seismic qualification specification appendices. The information to the vendor having to do with qualification indicating what needs to be qualified and how it is to be qualified is presented in regard to the several specifications by these standard appendices which are attached. You will notice there is quite a variety of these covering various types of equipment.

Exhibit IIIA-5 is additional appendices having to do with particular pieces of equipment. Down to Appendix 4U cover various seismic qualifications. Appendices 4V and 4Y have specifically to do with the Class IE electrical equipment and the safety-related control and instrumentation devices. In these, reference is made to the IEEE Standard 323 as to the basic general requirements for qualification, and if there are any other special requirements or a particular method which is mandatory for that piece of equipment, this would be specified in the appendix or in the specification for the

individual item of equipment.

MR. BINGHAM: Are there any questions?

MR. ALLEN: George.

MR. SLITER: On your No. 3) on Item III.A-2 is the expression "Establish an assumed end-of-life condition." Could you please elaborate on what you mean by the word "assumed" here in this context?

MR. CARSON: Well, the end-of-life condition is determined by the aging. The methods of aging we will discuss a little bit later, but, for instance, in terms of organic materials or electrical insulation, the Arrhenius method is used extensively to determine by accelerated methods a life that can be expected at an operating temperature. By using the Arrhenius method, we could, for instance, say that an electrical insulation system, when operated at a 90-degree C ambient, will last for 50 years or more, or 40 years, or 20 years, depending upon the components and constituents used in that system. The vendor when aging will use the appropriate method to provide the aging and he will, of course, try to get the longest age or the longest life that he can. Some materials under the conditions existing in the plant won't indicate a 40-year life, but the aging mechanisms have to be determined, the aging methods used, to give what is the assumed end of life, because we can't determine the actual end of life. We are trying to demonstrate that this

equipment, based on its components, its constituents, under the conditions when it has to operate would operate for that period determined by the accelerated aging methods.

MR. ALLEN: Since we are on that slide, Bob, that last bullet down there, Identification of Components and/or Modules of the Equipment Which Are Subject to Aging Deterioration, what is the basis of determining whether they are subject to aging deterioration or not? What is your criterion for that?

MR. CARSON: The criterion for that is primarily based on, first of all, determining whether the component, the module, or the individual item is in fact safety related, does that particular thing have to operate in order to mitigate the consequences of the accident or have to operate to allow the entire piece of equipment to function properly. Once you determine that a piece of equipment, a module within it, or an individual item within it has to operate, you then have to determine whether that item has some aging mechanism. I mentioned metals. Metals, for instance, don't age significantly. They don't age at all, really, in regard to temperature or in terms of radiation for most of the magnetic materials that are used, so you would say that metallic items can be disregarded in terms of age deterioration mechanisms for the parameters that we are worried about. But if you look at organic material, plastics, electric cable insulation,

things like that, those are known to deteriorate due to the effects of temperature, due to the effects of radiation, possibly moisture in the humidity situation, and you need to determine the materials, the components that age, and once you determine what ages, you have to figure out the mechanisms by which they age, determine the characteristics of that material that you are looking for, and make a test, make an analysis, or an analysis backed up by some testing in order to determine what the aging is under the conditions in which you are operating. That is the whole point of the accelerated aging.

MR. BINGHAM: Any other questions?

MR. STERLING: Just to respond a second on what John had indicated, who sets that criteria? Do you ask the vendor to qualify his equipment and then he comes back with a list of what he thinks ages or doesn't age with an analysis, or do you or do APS and Bechtel set the criteria about what they must test to or not?

MR. BINGHAM: John, again, some of these questions would be more appropriate to answer at a later time, because we will be hitting these issues during the next part of the review, and I think I would ask to let us present some of our material in this area and then we will, I am sure, answer those particular questions.

MR. STERLING: I have another question, if I may, on

Exhibit IIIA-3. If you are going to hit this later, let me know. You are calling for the supplier to maintain some documentation. How do you plan to handle the supplier who is going out of business or a loss of that documentation because it is not in the utility?

MR. CARSON: We cover that in a later portion of the presentation.

MR. STERLING: On the next page, IIIA-4, could you clarify the difference between active and nonactive equipment that are in the various appendices, the titles?

MR. CARSON: I would like to have Ken Schechter answer that particular question, since those are involved with seismic definitions.

MR. SCHECHTER: I will cover that later on in my presentation.

MR. BINGHAM: We are covering that later on, also.

MR. ALLEN: Shelly, did you have a question?

MR. FREID: Yes. This rather extensive list of appendices cover most of the principles brought forth, but several times we refer to IEEE 627, which covers nonelectrical equipment, and I don't see an appendix that covers the environmental qualification of nonelectrical equipment. Are you in the process of developing an appendix to cover those areas?

MR. CARSON: Not specifically. As indicated, the 627

document is very new, 1980, but the principles of 627 read very, very similarly to 323. It is an umbrella document having to do with qualification. As well, I will indicate a little bit later when we discuss the Standard Review Plan, the principles of 323 have been asked for and have been made requirements for the several vendors of nonelectrical equipment specifically. We are asking them to use the principals of 323 and apply them to those pieces of equipment which are not specifically electrical.

MR. FREID: My question is how do you in your specifications make that clear. In all of these others, it is obvious you append an appendix that defines exactly what they are to do in these areas. In the case of nonelectrical equipment, how do you let the supplier know what you intend him to do?

MR. CARSON: Previous to recently, within the past year, vendors were not specifically advised that other than electrical equipment was to be addressed in more detail than to address the seismic problems. During the past year, we have been in contact with all of our vendors and have requested them and are requiring them to address their pieces of equipment, no matter what they are, in regard to the principles and criteria of the 323 document. Bill Bingham mentioned earlier that we are having meetings with these 44 different vendors that we have involving these 59 different purchase orders that are involved. We are meeting

with each of these vendors. We are asking them to look at their programs, identify those pieces of nonelectrical equipment that have aging mechanisms that are safety related, and give us information about the qualification status of those items, give us aging mechanisms, deterioration modes, look at these things so that we will have this information, which is now being called for in the 627 document, but we have looked at it and are looking at it in relation to the principles of the 323 document.

MR. BINGHAM: Further questions, John?

MR. NOONAN: On Exhibit IIIA-2 under Paragraph 4), you have a bullet there called Determination of Operability Requirements. I mentioned this earlier, but it was brought out during the break that maybe I was not being specific enough to get my concern across. When Bechtel makes this determination of operability requirements and looks back at their test results to see whether or not they have passed these test results, I was talking about anomalies and how these anomalies are fed back to the utility or to the NSSS supplier. I would like to give a specific example to show my concern. Recently there was a test by another NSSS vendor regarding a piece of electrical equipment. That electrical equipment was monitored for output. Its output was monitored to see whether or not it met the requirements of what it was supposed to do under seismic environment. In

doing so, they found small type spurious signals coming out of the piece of equipment that were not supposed to be there. These were signals that were in duration about one millisecond, but you would get a number of these occurring say within a period of about a 100 millisecond duration. After investigation, it was found out that, while this was not particularly detrimental to the piece of equipment that the NSSS supplier was providing, these signals did perform an adverse function on a piece of balance of plant equipment. That is what I am trying to get across. When you look at the determination of operability requirements, do you consider those requirements as to how they relate back to the NSSS people?

MR. CARSON: In the specification for the particular equipment item, we will indicate the acceptance criteria for that particular piece of equipment, what does it have to do under what conditions, and we hope that we have determined everything involved in the operability that might cause a problem. If during the testing some anomaly such as you mention does come up and is identified, we would go back to the responsible engineer and identify those anomalies. We would go back into an analysis of the system in which this piece of equipment operates to see whether it can be determined whether such an anomaly would cause a problem. If it is analyzed and determination is made that such a thing is

indicated as not causing a problem, then that would be accepted. If it is determined that that would cause a problem, we then will go back to the vendor and try to eliminate that or possibly have a redesign of the equipment to eliminate such anomaly that would cause detrimental effects.

MR. NOONAN: That procedure is in place between you and the utility and the NSSS vendor? That's what I am looking for, to make sure that procedure is in place.

MR. BINGHAM: Vince, that's true for everything that we do. We use the same procedure. We have to do that in order to assure that there is feedback in design. I think what Mr. Carson said is once it is flagged, we don't neglect it, we follow through, and we can cite other examples in the balance of plant design.

MR. NOONAN: I would like to ask one other additional question, or two additional questions, really. I am not sure what paragraph this would fit under, but I think it would fit under Paragraph 4) on the same slide. As you all know, we have an IE Bulletin Statement 79-14, which for the public is referred to as the as-built conditions. I see nothing in here that shows me that when the plant is being built and modifications are made out in the field, whether those modifications are a change in mounting or change in location, how that is fed back into the qualification of that equipment and how are records kept of that so that those

things are noted, if they affect the qualification of the equipment, it is so noted and something can be done about it.

MR. BINGHAM: We can respond to that. What I would like to do is to respond a little later, if I could, John.

MR. ALLEN: Okay. Gerry, do you want to make a note of that?

MR. BINGHAM: Make a note of that.

MR. ALLEN: You want to make a phone call over lunch?

MR. BINGHAM: Yes.

MR. NOONAN: The final question would be on the next page, IIIA-3 slide, on No. 5) where you talk about documentation. Recently, there has been a Commission interim order to staff on equipment qualification dated May 23. In that Commission order, it directs the staff to make sure that adequate documentation is being maintained at a central location. The supplier in my estimation does not conform to that requirement of keeping documentation in a central location, and I guess I would like Dr. Rosztoczy to address that in detail as to what we at NRC expect on that particular issue.

MR. BINGHAM: We would like to hear.

DR. ROSZTOCZY: The required documentation is that it has to be maintained at a central location and it is the responsibility of the licensee. Those are the two important parts, the central location and the licensee. There are also

some clearly defined words which I believe permit, for example, maintenance possibly at two places. One may be at the utility's location for most of the plant documentation and then the nuclear part at the Nuclear Steam Supply System vendor location. Nevertheless, even in that case, the responsibility for the maintenance of both of these files rests with the licensee.

MR. BINGHAM: I think that is very helpful, John.

MR. NOONAN: One other point on the same thing. We would like to discuss maybe very briefly here the subject of replacement parts. Replacement parts documentation also has to get into this package. I think you ought to address how you are going to handle replacement parts, how you are going to maintain documentation to assure us that if you go out and replace a part with a different part that it has met all of the qualification requirements of the previous part.

MR. BINGHAM: John, I think that probably falls more within the APS area, the replacement parts.

MR. ALLEN: That's correct. Presently Bruce Kaplan, of John Roedel's department, is coming up with a corporate QA manual which this type of issue is covered in, so maybe I could ask John Roedel to comment a little bit about that and then possibly Norm Hoefert, from operations.

MR. ROEDEL: To answer your question, we are developing a system of purchasing that is based on the safety-related aspect of that item and what is necessary to inform us to

assure that that item meets those requirements, so the procurement activity will be directly associated with what is necessary to assure us that the technical requirements are met. If we can buy that as an off-shelf item and still verify that the technical requirements are met, we will do it. I am sure that if it is qualified electrical equipment, most of it won't be bought that way, but some of it could be as long as we can still verify its technical requirements and the previous requirements as expressed in the purchase order for its original purchase.

MR. NOONAN: And the documentation of the qualification of that replacement part will be kept where?

MR. ROEDEL: Well, that will be available at the plant site. We are documenting all our documents on a microfilm system so that it will be available at different readouts in the various parts of the plant or wherever the procurement activity begins.

MR. ALLEN: I might clarify that, Vince, a little bit. We intend to film every piece of documentation that we get especially related to safety-related components and there will be records kept both in the central engineering office and the power plant, so it will be in two different locations, identical records.

MR. NOONAN: So when your IE inspector comes out to the site, he would have a set of records to look at?

MR. ALLEN: Right, or if he happens to be at the engineering office, he will have the same records there.

Norm, would you like to respond on your procurement of parts at all?

MR. HOEFERT: What specific area?

MR. ALLEN: On the procedures you have developed on how you handle spare parts, or do you think John Roedel covered it satisfactorily?

MR. HOEFERT: I think generally John covered it as far as we will have documentation at the site of any quality assurance requirements that are needed for each particular part that is purchased.

MR. ALLEN: Any further questions?

DR. ROSZTOCZY: I have one question. In your presentation, you gave a verbal definition of safety-related equipment and you tied it to the design basis accident. I hope that was an oversight and what you really mean is all transients and accidents that the plant might be exposed to.

MR. CARSON: Yes. As I indicated, the equipment must operate whenever it is called upon to operate during any period; normal, abnormal, design basis event, post-design basis event, test, whatever. Any time period during the operation of the plant during its life, under any conditions that accrue at its location, for any operational mode of the plant, that equipment must operate and has to be demonstrated during the qualification phase that it will operate.

DR. ROSZTOCZY: Thank you.

MR. ALLEN: Any further questions? Carter.

MR. ROGERS: I would like to take Vince Noonan's first question and turn it around just a little bit. Let's say that we have a relay, for instance, that we are purchasing through the balance of plant and that relay is tied to Combustion Engineering's qualified equipment. The relay is tested and it comes up with an anomaly. Are there procedures in place which would ensure that Combustion Engineering is notified of that anomaly and has a chance to review it for acceptability or not?

MR. BINGHAM: Yes, there are.

MR. ALLEN: Any further questions? If not, Bill, why don't you proceed.

MR. BINGHAM: Because of the time, I think probably we would only be able to go through the first part of the next section, which is III. B. Environmental Qualification Criteria, Item 1, Standard Review Plan, and if we have time after that, John, we will try to do the Design Criteria. Section 3 is a very lengthy presentation, so I think that would be best to hold until after lunch.

MR. CARSON: Figure 11 indicates the environmental qualification criteria having to do with safety-related equipment which would be applicable in the environmental qualification program for the project. As we have indicated earlier, we define Class IE or electrical safety-related equipment and we identify other safety-related components or nonelectrical equipment and indicate the principal sources of qualification requirements for those types of equipment. The box area here (indicating) represents the NRC's Standard Review Plan for Qualification of Safety-Related Equipment Section 3.11, Revision 1. All of these items within the box are specifically referenced in the Standard Review Plan as being applicable to qualification of equipment.

Exhibit IIIB-1, Section 3.11 of the Standard Review Plan. For the following presentations where we talk about these several items, we have only extracted certain portions of these, those items that bear specifically on qualification. I have not reproduced the entire document. The Standard Review Plan indicates the same sorts of things that we have talked about earlier. Safety-related equipment has to be identified, its operational requirements determined. Environmental design related mechanical and electrical equipment has to be shown to meet all of its requirements.

Exhibit IIIB-2. The Standard Review Plan calls for the applicability of 323-1974 and it indicates that, even though 323 was specifically designed and put together for electrical safety-related equipment, the criteria, the methods, the sequential testing, the aging in that document

have to do generically with all types of safety-related equipment.

On Exhibit IIIB-3 are various requirements having to do with the application of 323 in regard to specific types of electrical equipment called out in the daughter documents to that standard having to do with electrical penetrations IEEE 317, 334 for motors, 382 for valve operators, 383 for wire and cable. As indicated, there are a number of other specific IEEE documents either in place or being prepared now covering other items of electrical equipment.

Exhibit IIIB-4. In regard to the environment, one of the parameters is chemical spray primarily involved with in-containment chemicals during a design basis event. The equipment has to be qualified for operation in that chemical environment, and then the chemical requirement has to be that which will accrue in the specific plant.

Radiation is also involved with the design basis events. The equipment must be shown to be operable in the radiation environment under any circumstances that will accrue at its location.

Exhibit IIIB-5. Another one of the specific items called out in the Standard Review Plan is General Design Criterion No. 1 of 10 CFR 50, Appendix A, quality standards having to do with structures, systems and components related to safety or safety-related items. The project maintains quality assurance requirements in accordance with Appendix B of the 10 CFR 50 document.

Exhibit IIB-6, General Design Criterion No. 2, design bases for protection against natural phenomena. All safety-related equipment is designed and qualified to withstand the effects of natural phenomena if such accrue at its location.

Exhibit IIIB-7, General Design Criterion No. 4, environmental and missile design bases. Again, safety-related structures, systems and components must be designed so that any environmental or missile conditions that accrue at the location are taken care of. In addition, physical independence and redundant equipment is provided throughout the plant so that a single item of safety-related equipment if it is somehow disabled will not prevent the safety function from being performed.

Exhibit IIIB-8, General Design Criterion No. 23, protection system failure modes. Safety-related equipment has to be designed and qualified so that it will fail in a safe manner. In the single failure criterion, one piece of equipment failing will not prevent the safety function from being performed through the multiplicity of equipment provided.

MR. BINGHAM: I think, John, let's entertain questions at this time for Sections 1 and 2.

MR. ALLEN: Any questions from the board?

DR. ROSZTOCZY: The last few slides that you presented had a separate column for the Palo Verde position and there were certain words indicated there. Maybe we can have the first one up, which was IIIB-1. In the right-hand column, there are words saying that that is in compliance. At the present stage of your work, most of them have not yet been tested, so you are obviously in no position to make any conclusion that it is in compliance. You hope that by what you are going to do in the next few months or the next year that by the end of that work, you will arrive at this conclusion. I think the slide in its present form is grossly misleading and those words should be modified or eliminated from them.

MR. BINGHAM: You are absolutely right. In my opening remarks, I indicated that you might get that impression from what we were presenting that we were in compliance with the principles of the documents, and I had hoped that that clarification would help. But that is true.

DR. ROSZTOCZY: Probably you should use words like you intend to comply with this rule, something like that.

MR. CARSON: What we are really indicating is that we are in agreement with the positions stated in the documents and we are applying them to our qualification programs. We are asking our vendors to provide qualification programs which

meet these criteria, and when we get all done with the total programs, our qualifications will be in compliance with all of the documents that we are discussing.

DR. ROSZTOCZY: Those words would be much better on the slide, also.

MR. BINGHAM: John, we have followed the format of the last two or three boards of review by using this presentation. It apparently is confusing, and we can either qualify it for the record that that is the case, as we have done, or if the board would desire, we can modify the slides for the record to make that statement.

MR. ALLEN: I think, like the slide indicates, it is our intent to comply and we are not where we can say we comply 100%. I think as long as that is in the record, that should be satisfactory.

MR. BARROW: I think, though, that it ought to be explained, because, as his question suggests, quite a bit of our testing might be still yet to come, or the vast majority of our testing. It might be pointed out the percentage of our equipment that has already undergone some or all of its testing by the vendors. Could Bechtel indicate that?

MR. CARSON: Are you indicating environmental or seismic, or both?

MR. BARROW: Environmental and/or seismic.

MR. CARSON: As I indicated, a great amount of the

equipment has had some qualification testing, analysis, or combination programs performed on it. The earlier table indicated that 15 programs had been considered complete prior to the issuance of the 0588 document and only one now is considered complete. Those programs that had been considered complete are being reevaluated on the basis of the more recent requirements. Those programs which are in process, the new requirements are being applied to them. So they will all eventually comply with all of these requirements that we are talking about today. But, yes, a great number of items have had some testing, analysis, or some qualification applied to them.

MR. BARROW: In addition, isn't it true that the balance, the other ones besides the 15, probably the majority of them have had some testing done?

MR. CARSON: Yes, they are in process. As Bill indicated, only a few items have not at this date been purchased and these programs have been in operation and in the testing and qualification process over the past years. They are all at some state, but most of them are not fully complete.

MR. BARROW: Thank you.

MR. ALLEN: John.

MR. ROEDEL: May I ask a question that maybe can clarify these various slide presentations to me? Is not the

column on the left-hand side the acceptance/rejection criteria for the various activities that are needed for either a system or the testing of an article and the right-hand column is a statement that this project is going to meet that requirement, that was the acceptance or rejection criteria, and that the implementation of the acceptance criteria has not been accomplished yet? Is not that what you are saying?

MR. BINGHAM: John, that's true. This is a format that we have adopted for this particular board of review to not only state what we are doing, but to compare it with the standard review plans and indicate where we stand as far as the key elements in those standard review plans. An issue in earlier boards of review that has come up is well, that's all very nice; now we know what you are doing. The board has wanted to know how does that compare with the regulations or the criteria. The intent here is a little bit more difficult for the board, I am sure, to understand, because it is not a system like the aux feedwater system or the power system that we have done. We have tried to take the same format, because you are used to seeing it, and essentially put the key elements on the left column and then indicate more importantly those areas where we have exceptions or areas that are just not practical as far as the regulations to comply with on the right column.

MR. ALLEN: Do you have a better understanding of that now or do you still have a problem with it?

DR. ROSZTOCZY: I think I understand it and I understood it from the beginning, but I think the wording on the slides is not consistent with the present state. I just intended to bring attention to that.

MR. ALLEN: Carter, did you have a question?

MR. ROGERS: John Roedel pretty well summarized what I was thinking. Actually, maybe this is a poor example, but it would be very difficult in my mind to say that there are three criteria that are there and all must be met, and when reading those criteria, I think that I would have difficulty finding an acceptable exception to those whether it has been tested or not, and I would think that equipment would meet this position even after they are tested or otherwise they are not acceptable. Maybe we've got a little time element question here, but our position as I read this, and in my mind, too, sitting on the safety board, is that we should be in compliance with those three elements that are listed on this slide.

MR. ALLEN: Pete.

MR. NEWCOMB: I have two questions related to Exhibit IIIB-7. Under the Palo Verde position statement, you state that systems and components outside containment important to safety are provided with redundancy. First of all, would you explain why outside was chosen and what is done for inside containment.

MR. CARSON: We are talking primarily here, as Mr. Bingham indicated earlier, of the balance of plant equipment, which is primarily located outside of the containment. Certainly all equipment having to do with safety-related functions is provided where necessary in redundancy both inside and outside. CE provides redundant equipment. Balance of plant equipment is provided in redundancy. What we are addressing here primarily is the balance of plant equipment. That is why the distinction was made outside the containment.

MR. NEWCOMB: So the Palo Verde position is in fact both inside and outside?

MR. CARSON: Absolutely.

MR. NEWCOMB: Bechtel is primarily affected on the outside containment.

MR. CARSON: That's right.

MR. NEWCOMB: The second question I have is you were relating redundancy as a means evidently of meeting some of the requirements of environmental effects. Could you explain the basis for that? In other words, I read Criterion No. 4 to state that you must accommodate the effects of environmental conditions. Where does redundancy relate to that requirement?

MR. CARSON: Well, what we are indicating here is that the redundant equipment is provided and if, due to some environmental action, a piece of safety-related equipment is

disabled, the arrangement is such that a single environmental occurrence would not be involved with more than one piece of equipment, so the other equipments which are redundant and perform the same function would not be affected by a single environmental occurrence.

MR. NEWCOMB: What you are saying then is that the redundancy is also combined with physical independence or positional independence?

MR. CARSON: Yes, the physical independence of the equipment. The walls around the rooms in which the equipment is located segregate one piece of equipment from another piece of redundant equipment so that only one can be damaged possibly in a given incident.

MR. BINGHAM: John, it is 12:30.

MR. ALLEN: I think we had better postpone any further questions until after lunch, because they did ask that we have lunch at exactly 12:30. Why don't we adjourn the meeting and come back at 1:30.

(Thereupon the meeting was at recess.)

September 25, 1980
1:30 p.m.

MR. ALLEN: Bill, were you able to get any resolution to any of those items?

MR. BINGHAM: Yes, we have some resolution and, as I remember, before we broke, there was a question before the board on how they wished us to respond to the modification of the examples on the use of the words "in compliance."

MR. ALLEN: What I would like to find out from the board is would anybody be opposed to changing that to wording that would be more acceptable to Zoltan such as "intended compliance," or do you have some words you would like?

MR. ROSZTOCZY: A number of different wordings have been mentioned here. I think any of those would be fine. My only concern was that the present wording kind of expressed a past tense type of thing, that it already has been established to be in compliance, and it is more like the future.

MR. ALLEN: "Future compliance," would that --

MR. BARROW: John, I suggest "in the process of compliance" or to show that we are actually energetically endeavoring to comply.

DR. ROSZTOCZY: I'm not sure if it is necessary to pick the words right here. I think you've probably got the message from the comments, and why don't we just leave it to you to correct the words to whatever is appropriate.

MR. ALLEN: Bill Bingham, could I ask you then to go back and correct those slides with some wording to show that it is our intent to comply or some other words like that.

MR. BINGHAM: All right, we will correct them.

MR. KOPCHINSKI: All of them, I presume?

MR. BINGHAM: All of them.

MR. CLARK: Bill, I have a question concerning equipment that meets the qualifications and then say ten years down the road or five years or x years, is there anything that states anywhere that you would require a requalification and, if so, how is it documented or spelled out to Operations?

MR. BINGHAM: As I recall, John Allen touched on that earlier. If there is a qualified life less than 40 years, let's say 20 years or 10 years, that will be so noted and, as John mentioned, it will become part of the maintenance procedures to replace it. Generally that is how it is handled.

MR. CLARK: Maybe a restatement of that is if we do have equipment that has been qualified for 40 years life and say it has operated 10 years, how do we prove that it still has 30 years life left on that piece of equipment? Mainly rotating machinery.

MR. BINGHAM: Well, I think the concept is that you demonstrate prior to that that its qualified life is 40 years. Of course, there will be periodic testing of all safety equipment as required in the Tech Specs to assure that it is still performing its function monthly or some other period as determined by the Technical Specifications.

MR. ALLEN: Any further questions? Shelly.

MR. FREID: Could we go to Exhibit IIIB-8, please? It doesn't seem that the PVNGS position addresses the Design Criterion No. 23 for equipment qualification. It addresses the position, but in particular for equipment qualification, we qualify the system that it would not fail under adverse conditions, postulated adverse environments, but more so don't we qualify that the component if it fails will fail as the design intends? What I mean is a valve is designed to fail either closed or fail open or to fail as is and the qualification program assures that it fails in that mode.

MR. BINGHAM: Yes, that's correct.

MR. ALLEN: Ed, did you have a question, or does George?

MR. SLITER: I think that brings up a more general question about again your statement of position. You said earlier, Mr. Bingham, that this was meant to mean not so much in compliance, but in agreement, but this would be the location in which you may bring up any exceptions to the requirement. There may be an implication then that if the words "in compliance" or "in agreement" are not here that there may be an implied exception. I will assume in what I have heard so far that in anything you have said, you have not come up with any exceptions, and can I also assume that if you had any exceptions, in future proceedings you would be explicit about calling them exceptions?

MR. BINGHAM: That's correct, George. Our intent is to

inform the board exactly where we stand and it is our intent to delineate all exclusions, all exceptions.

MR. SLITER: And there are none.

MR. BINGHAM: Only as indicated, that's right, and again I must indicate to you this is our intent. If we run up against a vendor that we have extreme difficulty with, there may have to be some compromises, and, of course, NRC and APS and all parties would have to be a party to that particular compromise. But we really intended not to hide anything or imply that anything is hidden in our presentation today.

MR. ALLEN: Any further questions? Yes, sir.

MR. VOLLMER: I have a question on safety-related equipment. Your definition "would prevent or mitigate the consequences of an accident and provide for a cold shutdown," is that right?

MR. CARSON: To mitigate the consequences of an accident and allow safe shutdown of the plant.

MR. VOLLMER: That is cold shutdown?

MR. BINGHAM: Yes.

MR. VOLLMER: Further, how do you intend to deal with two things: One, the changing requirements in the action plan which are identifying equipment that will be in the future categorized as safety related and may not necessarily currently be in your QA as safety related, and, also, the

changing requirements such as use of different source materials on your balance of plant equipment, that is, higher radioactivity content of fluid than you probably now normally assume? I am wondering how the program deals with this and, also, if you are dealing with in any way what are categorized as systems and components that are not necessarily safety related by the true definition, but are important to safety in the context of the TMI lessons learned.

MR. BINGHAM: We are considering all those points and will be discussing some of them, for example, the radiation, and there are other points that you didn't mention. We know that there are changes that are coming, or at least potential, that we must consider. We work very close with APS with input from meetings like this and other discussions we have with NRC or other utilities. When we go through the details, there will be appropriate places where we can respond to how we are tackling what I might call escalation of present criteria, at least as we know them. So if we have missed a point, maybe at that time I would suggest to the board that that be brought up so that we are sure to clarify it. The overall response to your question is yes, we are aware of them and we have them as part of our program and they would be handled in the proper manner; that is, if they come in as a requirement, they will be reviewed with the utility, become part of the criteria, and be implemented in the plan.

MR. ALLEN: Any further questions before we move along? Yes, sir.

DR. ROSZTOCZY: I am not sure if I get the gist as it relates to single failure. On the left-hand side of the slide, the question is what happens if it fails because of some environmental condition. This would be kind of a systematic failure. If you have four channels that have safety components in them and if one of those components in each of the channels fails because of environment, then the indication is they do fail in the safe mode. On the right-hand side, your position doesn't address this question.

MR. BINGHAM: Help me with the question again. I thought we did cover it.

DR. ROSZTOCZY: The requirement quoted on the left-hand side indicates that should there be a failure because of environmental conditions, then that should be in the safe state, to be given in such a way so that it falls into the safe state. The right-hand side kind of ignores this problem and instead talks about single failure. Environmental failures typically are not single failures, but they are multiple failures.

MR. CARSON: Dr. Rosztoczy, I think you are asking what if the piece of qualified equipment experiences a failure due to an environmental parameter?

DR. ROSZTOCZY: Right.

MR. CARSON: What we are indicating is that we determine what environmental designator it is in and what the range of those environmental parameters are for those locations and we test all items or otherwise test the equipment for that complete range of parameters, and we would not anticipate that an item would fail because of some environmental parameter, as you indicate, a common mode failure. We are taking account of the total range of parameters.

DR. ROSZTOCZY: That's correct, and that meets an earlier requirement which is not shown on this slide. This requirement quoted on this slide goes a step further and it says that, for example, you didn't predict the environment or an unexpected environment somehow happens and should we fail, then it should be designed to fail in the safe mode.

MR. CARSON: This is correct.

DR. ROSZTOCZY: The right-hand side does not address this question. The right-hand side should say yes, you are going to see to that, that if they fail because of high temperature or because of something, that it falls into the safe mode.

MR. CARSON: This is right, yes.

MR. BINGHAM: Yes, we meet that.

DR. ROSZTOCZY: Let me go back to the previous slide, which is IIIB-7. Somebody asked some questions on this just before lunch. I am not sure if I followed all the answers

to that. I might be somewhat repetitive, but let me try it anyway. Here again the left-hand side emphasizes that the equipment has to be designed to accommodate the environmental conditions, and on the right-hand side, there is no answer to that.

MR. CARSON: Again, as we have indicated, we design the equipment and qualify the equipment for all of these conditions. This is a further explanation. In addition to qualifying it for the range of environmental conditions, we also take these precautions to further prevent any problems.

MR. BINGHAM: We agree with you this response is a little confusing, and I think what I would offer is that we clarify it in the record, John.

MR. ALLEN: Okay, if someone would mark that down as an open item then to be clarified, Exhibit IIIB-7.

DR. ROSZTOCZY: Is it your intention then to design to meet the environmental conditions?

MR. BINGHAM: Yes.

MR. ALLEN: Any further questions on this? If not, proceed with your presentation.

MR. BINGHAM: Before you start, I think there are two things that we had left. The others we will discuss after the break, John. First of all, with respect to Mr. Vollmer's question on the qualification of perhaps not safety-related equipment, we are not now looking at that in our present

plan, but we are aware of that potential.

The second thing is I wanted to make sure that we had made the point that the positions on qualifications today represent a project qualification in our work not only in this area, but in all areas. We have positions that we do present to our customers to start with and they may or may not follow that particular position. So I wanted to make clear that what you are seeing here today is a position that is for the Palo Verde Project and you might see some different positions on other jobs where Bechtel is involved.

With that, let's start into this next presentation, John. This is a fairly long presentation. I just tell the board that it will take somewhere in the neighborhood of a half hour to 35 minutes, and, if you deem appropriate, we can break in the middle, or if everybody is wide awake, we can go on.

MR. ALLEN: I suggest that we hold the questions until the end of the presentation to help us move along.

MR. CARSON: Exhibit IIIB-9 has to do with requirements set forth in IEEE 279-1971, criteria for protection systems having to do with test data and the range of transient conditions which the equipment must operate under, and we are in agreement with these positions in terms of the qualifying program.

Exhibit IIIB-10, further on IEEE 279. Minimum

performance requirements to be documented. We are in agreement with that requirement.

Exhibit IIIB-11, having to do with IEEE Standard 308, which has to do with the Class IE power systems which are installed in the plant, the AC system, the DC system, and vital instrumentation and control power systems. The project provides such systems and those safety-related items in the systems are qualified for use in the environments in which they must operate.

Exhibit IIB-12, having to do with IEEE 317-1976 covering electrical penetrations. The penetration assembly is a device whereby electrical circuits are passed through the containment and provide for the safe and continued passage of electric circuits for Class IE circuitry and also serves as a pressure boundary for the container.

Exhibit IIIB-13. Design qualifications for the penetrations have to be verified by material testing and other methods to show that they are compatible with their use. For the project, our specification EM035A requires qualification of penetrations under all postulated operating conditions. Margins are to be applied as indicated and as suggested by the IEEE 323 document. The project is in agreement with the use or margins in qualification programs.

Exhibit IIIB-14 continues indication of margins and the fact that conductors used in the penetrations must

meet the requirements of IEEE 383 having to do in part with flame tests. The project is in agreement with that requirement.

Exhibit IIIB-15, having to do with the basic qualification document, IEEE 323-1974, the capability of Class IE equipment in regard to requirements that we have previously mentioned. The equipment must be qualified to operate under all conditions and allowances made for the known potential failure modes. We agree with that position.

Exhibit IIIB-16, having to do with one method of qualification under 323, ongoing qualification tests and documentation for such testing. The project position is that an ongoing qualification program as such is not encouraged. We discourage such programs. We would like to have specific qualified life established.

Exhibit IIIB-17, continuing on IEEE 323. There are several methods, as we have indicated, for qualification and, as Mr. Bingham indicated earlier in the discussion of Table 1, the methods of testing, documented analysis, documented operating experience, combination of methods are agreed with. As indicated, Class IE equipment is identified.

Exhibit IIIB-18, methods of qualification, we have discussed previously. Operating experience is one method. In Exhibit IIIB-18, the document indicates that type testing is preferred for Class IE items in containment and other harsh environments. Later in our presentation, we will further

describe what the harsh environments are in this plant.

Exhibit IIIB-19. Operating experience when successfully documented can be used as a method of qualification. The project discourages the use of operating experience alone as a method of qualification.

Exhibit IIIB-20. Analysis is another method which can be used. The project discourages use of analysis alone, but it is definitely of use in conjunction with type testing or documented operating experience.

Exhibit IIIB-21. Ongoing qualification methods, as indicated, are not encouraged as such, but if they are used, we will only entertain programs which make use of equipment which has some demonstrated qualified life, which is then extended on a periodic basis through one of the methods indicated, either removing portions of such equipment from the main equipment periodically and retesting it under the proper conditions or by installing completely redundant equipment and removing it periodically for testing.

Exhibit IIIB-22, other methods, the combination of any of the previous methods indicated. The project will allow combination methods.

Exhibit IIIB-23, documentation having to do with any qualification method must be complete, must be supplied, and be in auditable form. The project agrees with that position, but there is some problem with certain vendors who

refuse to provide on a regular basis what they consider to be proprietary information, and we require that such information be maintained at the supplier's or another facility in auditable form for the life of the plant.

Exhibit IIIB-24 has to do with requirements of IEEE 323 having to do with aging, sets forward the principle of aging to put the equipment in the end-of-life condition prior to exposing it to the design basis event. Aging has to do with mechanisms of temperature, radiation, humidity, seismic vibration, whatever would affect the equipment and might cause it or some of its components to fail. The project position is that aging must be considered no matter what method of qualification is chosen and agreed upon.

Exhibit IIIB-25, talking about aging, is an illustration having to do with organic materials, specifically electric insulation materials, and the regression line method or the Arrhenius methodology. If the so-called Arrhenius methodology is used, the project position is that the Arrhenius methodology is considered acceptable as a method of addressing accelerated aging and that supporting data must be provided to demonstrate that the Arrhenius plots are in fact applicable to the materials being investigated.

Exhibit IIIB-26. 323-1974 sets down a specific sequence in which the equipment is to be tested if the qualification is achieved by type testing or the sequence that

should be considered if you are using analysis supported by type testing or considering some other qualification method. The project position is that type testing should be done in the sequence as indicated and should be done on equipment that is either identical or very, very similar to the equipment being supplied for use in the plant. The first step in the sequence is to inspect the item for form, fit and function prior to doing the testing.

Exhibit IIIB-27, continuing the sequence, operate the equipment under normal conditions to establish baseline data, operate it under all of the extremes to find whether it will do its job under extreme conditions in the plant. The project is in agreement with the sequence of testing.

Exhibit IIIB-28. Equipment is to be aged prior to exposing it to the design basis event. We concur with the aging of the equipment.

Exhibit IIIB-29. The aged equipment is to be exposed to mechanical vibration and seismic events that would accrue in its lifetime in its position, and then is to be operated while being exposed to radiation as part of the aging. The project position is that aging and vibration are to be incorporated in the qualification program and that existing results that exist for such equipment can be used to qualify equipment for the APS project.

Exhibit IIIB-30. The operated equipment is to be

exposed and operated during design basis event, after which it is to be disassembled to inspect for any possible damage to make sure that it is in fact capable of doing its job. The project is in agreement with these requirements.

Exhibit IIIB-31. Margins are to be incorporated. Margins take care of possible difficulties in establishing exactly the parameters of the environment and take care of manufacturing tolerances and other things. We want to make sure that everything is going to operate over the range of the parameters in the plant. Margins are to be included in all programs.

Exhibit IIIB-32 gives some indication of the margins that are suggested for test programs. The project concurs with those margins.

Exhibit IIIB-33 gives additional margins and, as indicated and in accordance with one of Dr. Rosztoczy's questions, environmental transients are to be accounted for during the qualification program. The project position is that we will use plant specific profiles and environmental conditions, and our profiles contain a single peak for transients, not a double peak.

Exhibit IIIB-34, margin for vibration and the fact that negative margins, if they are more severe, should be included in the program. The project agrees with this position.

Exhibit IIIB-35 has to do with another daughter document for a specific item of electrical equipment, electric motors, specifically continuous duty motors used in the plant. The 1971 version of this document is included in the Standard Review Plan. The 1971 version was specific in that it related only to continuous duty motors inside the containment. In that regard, the project notes that there are no continuous duty BOP type motors which are provided. We are also in agreement that the methods of 334 can be used to qualify other continuous duty motors in the plant.

Exhibit IIIB-36 has to do with IEEE 379-1972, the application of the single-failure criterion to the plant. Single failure types are defined and our project position is that other approaches are applicable, the things that we have just talked about, making sure that common mode failures due to environmental parameters are not going to affect the equipment, the equipment will fail in a safe direction, and that we are qualifying the equipment to all known environmental parameters to preclude common mode failures.

Exhibit IIIB-37, continuing the definition of failures and the definition of a common mode failure.

Exhibit IIIB-38, having to do with IEEE 382-1972, the daughter standard having to do with valve operators, safety-related valve operators, and indicating that a test should be used to demonstrate compliance with the qualification.

The project is in agreement with this system and we note that there is a recent version of IEEE 382 which will be evaluated and recommendations made to the project.

Exhibit IIIB-39, additional requirements having to do with qualification of valve operators corresponding to the requirements in IEEE 323. The project is in agreement with these requirements.

Exhibit IIIB-40, having to do with IEEE 383, the daughter document specifying qualification methods for electric wire and cable to be used in safety-related systems, including field splices and connections, and requirements for such qualification programs. The project position is that we agree with these requirements and, in addition, factory repairs or manufacturing type splices must also be qualified in addition to the long runs of cable. Flame tests are to be accomplished in accordance with Section 2.5, the gas burner method, rather than using the alternative method. The burners must have at least 70,000 Btu input.

Exhibit IIIB-41 indicates the requirements for testing field splices and for documentation in accordance with 323, and the project is in agreement with the requirements. All of these things have to do with methods of providing qualification in accordance with the general requirements of 323.

Exhibit IIIB-42, another daughter document, this

time having to do with diesel generator equipment, the diesel generator equipment as applied to the supply of power for safety-related equipment. The items included are on Figure 387-1 and include the total. scope of supply of the engine, the generator, the auxiliary systems having to do with the engine and generator and control system, and only exclude the interfaces having to do with oil and water, electric power necessary to flash the generator, or supply interfaces. The project concurs with the scope of supply. The equipment is rated either on a continuous or short-time basis.

Exhibit IIIB-43 calls for type qualification of the equipment, and this is one type of equipment which has been indicated as being impractical to provide complete type testing for qualification. Therefore, qualification is done by analysis and analysis based on type testing, some reference made to operating experience well documented, and the combination method of qualification. Tests will be performed in the manufacturer's facility on the assembled engine generator to make sure that it operates properly. There is a specific number of tests, start tests, load tests, load rejection tests, voltage tests, having to do with this equipment, which are all provided prior to its delivery to the site.

Exhibit IIIB-44 indicates again type testing and qualification tests to be accomplished on the diesel generator

equipment and, following the successful completion, the equipment is to be inspected and documentation provided. The project is in agreement with all of these requirements. There is a recent document, a version of 387, Draft 4, of July 1, 1980, that has been proposed, which brings together in one section of that document more specific requirements for qualification based on 323. This document will be reviewed and recommendations made to the project.

Exhibit IIIB-45 covers IEEE 535-1979 having to do with qualification requirements for lead acid batteries of the type used in the plant. The project is in concurrence that the principles of 323 are to be concurred with.

Exhibit IIIB-36, again, talking about the principles of qualification and indicating that the batteries and the battery racks are to be qualified for use in the plant. Type testing is to be used in regard to the batteries primarily because analysis is extremely difficult. It is essentially impossible to set up a realistic mathematical model of such a piece of equipment. The project is in agreement with these requirements.

Exhibit IIIB-47. Operating experience can be used or previous qualification can be used in conformance with this document. The project is in agreement with this position.

Exhibit IIIB-48. As indicated, analysis would really not be justified for examination of such equipment.

Exhibit IIIB-49 indicates the accelerated aging as set forth for the lead calcium type batteries being used in this plant, and the vendor is currently embarked on an accelerated aging program in which ten days of operation at a temperature of 160 degress F is equivalent to one year of operation at the normal temperatures. The project is in agreement with this testing program with the provision that a specific differential voltage be maintained in regard to the positive plate to electrolyte potential between the normal operating condition and the accelerated aging temperature condition to prevent mossing of the plates. The accelerated aging test is much more severe than actual operation at the normal temperatures and the test has to take this into account to provide an acceptable method.

Exhibit IIIB-50. Documentation must be provided and the user is to maintain the documentation file. The project is in agreement with these requirements.

Exhibit IIIB-51. The recent document IEEE 627 having to do with general qualification requirements for safety-related or safety systems equipment contains information and criteria and requirements very, very similar to IEEE 323. The project is in agreement with the requirements of this document.

Exhibit IIIB-52. It shall be demonstrated that the equipment is to operate under all conditions. The project is

in agreement.

Exhibit IIIB-53, approaches to qualification. Very similar to the requirements in IEEE 323. The project is in agreement.

Exhibit IIIB-54. The pressure containment and passive structures are to be handled in regard to various ASME, AISC, or ACI codes to provide for their design. The project is in agreement. Documentation is to be maintained. The project is in agreement with this requirement.

Exhibit IIIB-55.having to do with IEEE 650-1979 describes methods for compliance with IEEE 323 aimed at static battery chargers and inverters and contains methods for qualification. The project is in agreement with use of such methods and also feels that the 650 document is a reasonable method for providing qualification of other types of equipment or portions of equipment which contain solid state electronic components and other electronic components.

Exhibit IIIB-56. The effect of aging is indicated as being insignificant in the 40-year life of a plant for certain types of electronic equipment. The project is in agreement with this position, but requires that stress calculations be provided showing that all such equipment is used well within the manufacturer's ratings and that types of equipment used are either Mil. Spec components or the commercial equivalent of Mil. Spec components using the same

materials and processes in manufacture.

MR. BINGHAM: Are there any questions?

MR. ALLEN: Shelly.

MR. FREID: Yes, a few. If we go back to IIIB-19, 24, and 51 through 54, basically the question relates to aging. On 19, you indicate that use of experience alone is discouraged, on 24 you indicate aging must be considered regardless of the qualification method used, and in the discussion on 627, you ignore the test for significance that is in 627 on aging. I guess my question is are you going to do aging on everything or are you going to use the test for aging that is in 627, which for a great number of mechanical components will make aging a nonessential component of the equipment qualification program.

MR. CARSON: Aging always must be addressed. It might be that when you address the aging, you find out that it is insignificant, that the material, the piece of equipment, the component does not age under the environmental parameters that exist at its location, and, therefore, even though you have addressed the aging, you found out that it doesn't matter. But aging always must be addressed.

With regard to operating experience, we have indicated that operating experience by itself is not considered a reasonable method for qualification primarily on the basis that documentation of operating experience is essentially

nonexistent. Very few people have reasonable records and accurate records which will show that the equipment has operated under certain conditions for certain periods of its life which can be applied to the parameters under which we are supposed to qualify this equipment. If someone has minute-by-minute records over a 10, 20, 30, 40-year period which would equal or be more severe than the requirements that we have for a piece of equipment, that documentation when verified could certainly be used as a basis for a qualification program, but we have not seen anything like that.

MR. ALLEN: Carter.

MR. ROGERS: On Exhibit IIIB-12, when you were reading the definition, you indicated that the electrical penetrations were those that passed IE cables only, and I am not sure that you intended to do that.

MR. CARSON: No, that is not correct. The penetrations pass all electric circuits through the containment wall. Some contain Class IE circuitry, some do not contain Class IE circuitry, but in any case, each of the penetrations, no matter what kind of circuitry it contains, must maintain pressure integrity in the containment vessel.

MR. ROGERS: So all electrical containment penetrations are subject to these criteria?

MR. CARSON: Oh, absolutely. All penetrations must be qualified.

MR. ROGERS: Then on Exhibit IIIB-49, there is a figure there that shows accelerated aging and you indicate in that figure a certain number of test days at 160 degrees Fahrenheit is equivalent to one year at 25 degrees centigrade or 77 degrees Fahrenheit.

MR. CARSON: Yes.

MR. ROGERS: In our program, do we correct the temperature, the 25 degrees centigrade or 77 degress Fahrenheit, to the expected temperature that the component is going to see in the plant.

MR. CARSON: We maintain the temperature in the battery rooms in the range which we will show a little bit later in the discussion having to do with environmental parameters in the plant, and this is a method that has been agreed upon as being a method for showing that this equipment will operate for the time period indicated by the qualified life. A margin is applied. Currently, for instance, the vendor who is doing this qualification program for the Palo Verde batteries is using 11 days at 160 degrees of temperature to equal one year rather than 10 days to account for such things as the temperature not being exactly at the 77-degree level or for errors or inaccuracies in measurements, or whatever, having to do with the program.

MR. ROGERS: I understand you to say then that for these particular batteries, it is expected that the temperature

for aging would be at around 77 degrees Fahrenheit.

MR. CARSON: Not for aging. Temperature in normal operation.

MR. ROGERS: For normal operation for 40 years?

MR. CARSON: It would be close in that range, yes, and we will indicate the parameter on a later slide.

MR. ROGERS: Thank you.

MR. ALLEN: I have one. Bob, isn't it true in our specifications on wire and cable on our flame test requirements that we exceed 383 requirements?

MR. CARSON: For the bulk of the electric cables used in the plant, a requirement of 210,000 Btu input, or three times the minimum required by the specifications, is included. For certain types of cable where it is not possible to obtain such a requirement such as a coaxial cable, those are tested to the 70,000 Btu input.

MR. ALLEN: Any further questions? George.

MR. SLITER: On Exhibit IIIB-13, you say that electric penetration assemblies are now in progress of being tested. Are these penetrations aged and, in the aging program, are they thermally cycled before type testing, and I mean thermally cycled with respect to operational and abnormal conditions.

MR. CARSON: Yes. The vendor for these particular types is the Conax Corporation, which supplies penetrations for a number of nuclear power plant applications. They have a continuing qualification program in which they have qualified portions at earlier times, have made modifications to their penetrations for additional requirements for specific plants, they requalify on these bases. They have performed all sorts of type testing having to do with temperature, temperature excursions, short circuit, all of the operational requirements of the penetration, and aging is considered for all the materials used in the penetration.

MR. SLITER: So can I take it from your response that this would be one of the types of equipment for which so much has been done in the way of aging and testing that you perhaps would not audit their actual tests for your equipment?

MR. CARSON: The equipment qualification programs to be audited have not yet been determined.

MR. SLITER: My next question has to do with Exhibit IIIB-21. In terms of using ongoing qualification programs, could you elaborate on the expression "having an identified qualified life," that is, this identical equipment would have an identified qualified life, and also what types of equipment in the balance of plant have you already identified as having a probable qualified life less than 40 years, some examples of that, please.

MR. CARSON: For an ongoing qualification program, an identified qualified life would be, for instance, something

that had either been type tested or it had been naturally aged, had been used in a certain application equal or more severe as in the project to a known life. For instance, Foxboro Corporation has embarked on a program of using naturally aged equipment of exactly the same type as will be used for Palo Verde. They have had this equipment in operation in their factories under conditions which are equal or more severe than the project conditions for a period of four years. They have used that equipment, tested it to the various other requirements as applicable to this project, and on that basis have established the qualified life of four years and are currently extending that life to 10 years by additional testing. There are a number of items which have qualified lives indicated by tests of less than 40 years and those equipments will be identified and, as John Allen indicated, provisions made in the maintenance procedures to replace them as required.

MR. SLITER: From what you know today, could you give me some more examples of equipment that fall in that category?

MR. CARSON: At the present time, batteries, for instance, are indicating a qualified life at the present moment of eight years or so. The testing process is in progress right now. Various gasket or seal materials on certain mechanical equipments have been indicated as having lives of four, five, ten years and would require periodic

replacement.

MR. SLITER: Another question has to do with Exhibit IIIB-26. Could you explain, please, what you mean by the expression "type testing should be done in sequence on the same item except if impractical?" Under what circumstances would this be impractical?

MR. CARSON: The sequence indicated is to inspect, operate at normal conditions, age, operate under vibration, and such. If the piece of equipment, for instance, is so very large that it is difficult to move it from this location where it has been operated under normal conditions to a testing laboratory to be operated under seismic conditions, we may very well call for it to be operated under normal conditions, aged, apply the DBA to it, and then seismically test it and analyze the situation to show that the aging would not be affected by the DBA or seismic, so that there would be no necessity to do it strictly in the sequence indicated.

MR. SLITER: So you are indicating the sequence might change, but it would be on the same item. Maybe the "except as impractical" goes with a given sequence and not with the same item. My point is that the type testing should indeed always be done on the same item so that you would have a cumulative effect, is that not true?

MR. CARSON: That may not be the case for certain pieces of equipment. For instance, some manufacturers of electrical equipment such as transformers or relays or circuit breakers with repetitive manufacture of equipment have done type testing on blocks of items and have done aging tests on this group of items and they have done mechanical wear tests on this group of items and they have done various other tests on other groups of items of the same variety and materials, and in that case, they have not specifically done the whole series of tests on exactly the same piece of equipment, but they have done tests on representative samples of that equipment and have taken account of the total testing program.

MR. SLITER: In terms of sequence of environments, in the aging process and in the DBA, there are existing various sequences of imposing radiation aging and thermal aging and then thermal and radiation for your design basis accidents. Are you aware of the latest thoughts on the correct sequence of these environments such that it would most closely represent the actual end point of the equipment?

MR. CARSON: The normal sequence that we have seen is that equipment has been thermally aged and then has been radiation aged either for a 40-year life period or for 40 years plus DBA radiation all at one time prior to vibration, mechanical aging, seismic, and then the application of the actual design basis event.

MR. SLITER: I would like to point out for your

information that a recent study at Sandia in their qualification testing evaluation program has uncovered some new data on certain materials that point to the fact that the sequence of environments is important and that for certain materials you may want to alter your test plans based on their findings on which sequence to put radiation and then thermal aging.

MR. CARSON: That will certainly be investigated.

MR. BINGHAM: Could we ask that that document be made available, John?

MR. ALLEN: Certainly. Let's put that down as an open item. We'll get that document.

MR. SLITER: That is the document that we discussed back at the last EPRI meeting. It is one of the many documents discussed. If you don't have it, I can make it available.

MR. ALLEN: Any more questions? I think, Ed, you had one.

MR. STERLING: No, George asked my question, but I did want to elaborate on just one point. On synergism, how are we handling synergism in this sequence of events?

MR. CARSON: Synergistic effects as far as we know received very little play in the testing programs principally because it is so extremely difficult to apply temperature, radiation, humidity, and all these other things at exactly the same time except for certain items like electric cable.

MR. STERLING: I know there is some feeling that that

is an important point. Are we going to have an analysis that would show that there is no effect of synergism or how are we going to deal with a resolution of the matter as far as synergistic discounting.

MR. CARSON: Synergistic effects will be investigated.

MR. ALLEN: Is that all you had on that, Ed?

MR. STERLING: Yes.

MR. ALLEN: Norm.

MR. HOEFERT: I would like to know how the beginning of a qualified life is determined for the different equipment: If it is qualified for 40 years, when does the clock start for that piece of equipment? When it is manufactured, when it is installed, or when it is put in service?

MR. CARSON: The clock would start when the equipment is installed as long as the storage prior to installation has been in accordance with the manufacturer's recommendations and the storage temperatures and other environmental conditions are shown to not be detrimental to the equipment; that is, not age the equipment unduly during that storage period.

MR. HOEFERT: Is that being done? Are there documents from vendors which say that it is being stored under certain conditions that don't affect its life?

MR. CARSON: Specifications for each item of equipment require that the vendor specify storage condition for short term up to six-month and for long-term more than six-month

periods and they must specify to us any special storage conditions that must apply, humidity, temperature, whatever.

MR. HOEFERT: Would this apply to spare parts as well? I am thinking of things that may be in the warehouse for many years.

MR. CARSON: Yes, spare parts storage conditions are required to be specified.

MR. ALLEN: John Barrow.

MR. BARROW: If the qualification period is considered to start at the time of installation and the equipment is installed a year and one-half before the unit goes into commercial operation, does that mean that the equipment is only qualified for 38½ years of plant operation?

MR. BINGHAM: The answer to your question is it is qualified for 38 years of commercial operation.

MR. BARROW: Then at the end of that 38 years, you would have to consider requalifying it for several years?

MR. BINGHAM: Perhaps.

MR. BARROW: The reason I asked the question was it is conceivable that the equipment could be installed prior to commercial operation but energized only sporadically and at very low energy levels or something so that it would not see its normal operating parameters until such time as it went commercial. For the most part, it would be shut down except during testing intervals and, consequently, you could make the

qualification interval not start until commercial operation.

MR. ALLEN: I had one question. We indicated that IEEE 627 is just now being looked at. However, my memory serves me that in the pump and valve operability tests, some of those requirements are very similar and that was already placed into the specifications. Isn't that correct?

MR. CARSON: That's correct.

MR. ALLEN: So, in a way, we have already imposed some of those requirements of 627 in our early specifications.

MR. CARSON: That's correct, and, as indicated earlier in regard to the Standard Review Plan that the principles and criteria of 323 were applicable to all types of safety-related equipment, all of the vendors for equipment for this project have been contacted and asked to respond in regard to the methods and criteria of 323, and, as indicated, that is the basis of a series of meetings that have been held and are being held with the several vendors to obtain such information.

MR. ALLEN: John.

MR. ROEDEL: Could I go back to the storage requirements that we requested from the vendors for electrical equipment? Do you feel that these storage requirements have in fact considered environmental requirements relative to aging in all cases or do we need to go back and look at some of the equipment that has been on site for some time to assure ourselves that the storage requirements we have from that vendor in fact do address those items because we have had those on the site for some time when we hadn't even started the testing for qualification.

MR. BINGHAM: That's a good point, John. We have been aware of that for not only this type of equipment, but other equipment because of warranty problems that we see. I think in general we are in relatively good shape. Of course, we do recognize that we need to take a look at some of the equipment to make sure that storage was adequate.

MR. ALLEN: Any questions? Karl.

MR. KREUTZIGER: With relationship to the storage or qualified life again of equipment that has been installed in the plant for a period of years prior to operation, is not the qualification program based on design conditions which far exceed that of normal operation? For example, electrical insulation material is based upon an aging process of 90 degrees C conductor temperature for the duration of the plant's life. Other insulation materials are the same. Is this not considered as a method in which to extend qualification beyond the original qualified life and are there any plans to monitor the environment in the Palo Verde Power Plant over the 35 or 40-year life in order to see that there are design margins or actual conditions are considerably less than the design basis conditions as a method to extend some of this qualified life for whatever the additional storage years might be.

MR. CARSON: In regard to installation of equipment and temperatures, we are aware of some plants in which continuous monitoring equipment will be installed in various areas where safety-related equipment is in place and the time duration of temperatures will be used either to extend or reduce qualified life. That method will be investigated with APS.

MR. ALLEN: Shelly, did you have your hand up?

MR. FREID: Karl essentially asked my question, but I would like to carry it a little further. In general, most equipment does not operate at a design condition. There is an operating condition which is generally much less than the design condition. Inherently, you would expect that what you would consider a qualified life in terms of that type of aging has got to be very conservative and have lots of margin in it. It seems to me that it would be intuitively obvious in almost all cases that -- You know, the difference between 38½ years and 40 years is insignificant.

MR. BINGHAM: We agree, Shelly, that that is the case. However, we are trying to respond to particular questions. You are quite right, there is conservatism in it, and I am sure that that is what will be used at the time you intend to extend the life of the equipment, but at the present time, what we are trying to do is to start with a qualified life, whatever it might be, and then to indicate the parameters on

which it is based, and then I am sure there will be subsequent programs that will be developed by APS to monitor in order to assess how they might extend the qualified life at a later date.

MR. KREUTZIGER: I would like to also add that I think that I heard you say the reason the ongoing qualification was discouraged was because of lack of documentation. I thought, also, I heard -- this was something which kind of surprised me -- that there was no minute-by-minute recording of conditions. I would think that for the long term, if that is the project's position, that it would be almost imperative to provide in some areas temperature monitoring where there might be a question about extending qualified life. A program that determines what are your basic measurements would be useful if that is the criterion that prevents you from using operating experience.

MR. BINGHAM: John, we are going to be considering that point in our reviews with APS and I would expect that you want to have that as an issue to respond to to the board.

MR. ALLEN: That's correct. I think it also was an open issue that was addressed at the PVNGS Units 4 and 5 hearings, too, regarding monitoring.

MR. BINGHAM: That's right.

MR. ALLEN: So if we could ask Terry to record that.

MR. QUAN: Could we have that rephrased by Karl so we could get it down?

MR. KREUTZIGER: My concern was the utilization of the method of ongoing qualification and the fact that the project has discouraged as a general criterion its use. The basis was the lack of documented evidence of what the prior environmental conditions were, and the question was I would take those two statements and conclude that in order to look at this plant operating many years in the future it would be advisable to seriously consider an environmental monitoring system so that 10 or 15 or 20 years down the road you are not faced with the dilemma of looking at something and saying, "I do not know what the environment has been over this period of time."

MR. QUAN: Okay, fine.

MR. ALLEN: Pete, I think you had a question.

MR. NEWCOMB: You have discussed impacts in some detail as regards thermal and radiation aging. Could you discuss your position regarding the effects long term of either high or low humidity, or both, on the equipment under discussion.

MR. ALLEN: Off the record for a second. Why don't we take a break.

MR. BINGHAM: Could I get that question repeated again, I want to make sure we respond to it correctly, before you go off the record?

MR. ALLEN: Do you want to repeat the question, please?

MR. NEWCOMB: The question is how do you, if at all, respond to the conditions of long term high or low humidity, or both, on the equipment that you are talking about here, the long term aging effects due to humidity.

MR. ALLEN: Why don't we take about a 15-minute break.

(Thereupon a brief recess was taken, after which proceedings were resumed as follows:)

MR. ALLEN: Are there any more questions on the last subject matter before we proceed?

MR. STERLING: We haven't got the answer.

MR. BINGHAM: Humidity I believe was the question.

MR. ALLEN: That's right, back to humidity.

MR. CARSON: In regard to humidity, humidity certainly is considered in the design of all these equipments. Environmental parameters provided in the specification for each item of equipment indicate the range of humidity under which it is to operate and the vendors take this into account in their design, and we make sure that items of equipment or specifically materials that would be hydroscopic are not included and that equipment that might be susceptible to failure due to humidity or tracking due to moisture on surfaces, terminal block spacing, electrical equipment spacing, or terminal spacing within the equipment, is such that humidity would not be a problem.

MR. NEWCOMB: One more follow-up. How does that address the question more specifically of humidity aging as in

thermal aging?

MR. CARSON: We know of no method to do humidity aging other than such things as spray tests or maintaining a pool of water in the bottom of a test chamber when something is being tested for temperature effects where the humidity would be very high in that area.

MR. BINGHAM: John, are there any other questions?

MR. SLITER: On Exhibit IIIB-25, the Palo Verde position is that Arrhenius methodology is considered an acceptable method of addressing accelerated aging, but other methods are possible. What are some of these other methods and is the 10-degree-C rule, for example, one of these methods and would consider that acceptable?

MR. CARSON: The project endorses the Arrhenius methodology in conjunction with the NRC's endorsement of the same methodology as indicated in NUREG 0588. The 10-degree rule as such was and is a primary electrical industry use of an Arrhenius type methodology, and the project position is that the indiscriminate use of that 10-degree-C rule of thumb is not accepted without justification that in fact the equipment does exhibit a 10-degree rule as indicated by an Arrhenius plot.

MR. SLITER: Then other methods?

MR. CARSON: Other methods which might be acceptable would be the TGA method or others that have been discussed,

but we have not as yet seen any vendor who has suggested other methods than Arrhenius.

MR. SLITER: Thank you.

MR. ALLEN: Bob, as a follow-up on that, how about Mil. Handbook 217? What is the project's position on the use of it and its data?

MR. CARSON: Mil. Handbook 217 has to do primarily with electronic type components and has been put together through extensive data gathering by military systems oriented companies, NASA, the Air Force, Bell Laboratories, various other people, and has to do with factors of stress and derating factors for various types of electronic components. As indicated in the discussion of IEEE 650, the project's position is that data from Mil. Handbook 217 would be applicable to discussions of electronic equipment as long as the equipment items used are in fact identical to those for which the data in the handbook has been prepared or, as indicated in the 650 document, are the commercial equivalent of such Mil. standard components using the same materials and the same manufacturing processes.

MR. ALLEN: Are there further questions by the board?

DR. ROSZTOCZY: Could we have Exhibit IIIB-13? We have criticized various things here today and I think we ought to give credit when it is appropriate. If you look at this slide, the right-hand side, the position side, of this

slide is one of the better ones in the whole package. It gives certain information to the reader. If I take Item 2) as an example, then there are two pieces of information that one learns from this. One of them is how it is going to be enforced by saying you are going to enforce it through your specifications. Every possible requirement we will have in the specifications. The second piece of information given there is where you stand right now as the testing is in progress. In the cases where you are going to revise the entries in this column, you can probably use this as an example, and if you would provide the equivalent of these two pieces of information, namely, how do you enforce it and where do you stand with it, I think it will be very useful.

MR. CARSON: That information can be provided.

MR. ALLEN: Could I just ask could that be an item to provide that information?

MR. QUAN: It would be part of the previous item. We had an item to correct the slides which state "in compliance" to wording which is appropriate.

MR. ALLEN: We will just add to use IIIB-13 as a guide.

MR. QUAN: As a guide, right.

MR. ALLEN: Do you have another question?

DR. ROSZTOCZY: Yes. Exhibit IIIB-23. In the right-hand side column, there is a statement which says, "Proprietary data may require audit in supplier's facility." I am aware of

this type of problems in the past and I was under the impression that most of those have been resolved. There is maybe one possibly outstanding at the present time, but that would not affect you because of your water reactors. What is the purpose for the sentence here? Do you have any problems of this sort at the present time? Do you have any supplier who is not willing to give you the proprietary reports or test reports or whatever it is?

MR. CARSON: We are going to be covering that particular item in our discussion of problems later in the presentation, but, yes, we have had and are having problems with vendors who refuse to supply data but will allow us to audit. One case in point is the General Electric Company, of San Jose, in qualification of motors. They have refused to provide us with the specific data on which their qualification is based. We know what the data is. It has been identified for us specifically and we have audited that data at their facility to determine that the data was in fact applicable to the qualification and did correctly reflect the positions taken in their qualification documents, but we are not able to get that data. GE is not the only vendor for which that situation exists.

DR. ROSZTOCZY: You do have other vendors, also?

MR. CARSON: Yes.

DR. ROSZTOCZY: GE is the one that I was formerly aware of. I didn't know that you had components from them, so that's why I said --

MR. CARSON: Westinghouse is another one.

DR. ROSZTOCZY: I suppose that has been resolved and now they are complying.

MR. CARSON: We have had no such indication. We are constantly asking them to provide this information. We have had meetings with the vendors and they have flatly refused in many cases to provide the data, and we have in fact asked them to specifically identify the data so that it can be audited by the NRC or by others who have a need to know.

MR. ALLEN: Do you have a further question?

DR. ROSZTOCZY: Yes. Exhibit IIIB-36. The requirement talks about the single-failure criterion. The single-failure criterion in itself is very complex. It is very complex because it requires that you consider that, depending on what is the purpose of your evaluation, the first single failure is different. For example, if you are looking at the consequences of a condenser cooler accident and if you are concerned about the containment overpressurization, then you find the certain single failure that gave you the worst or the highest containment pressure. If you are dealing with the very same accident, but you ask the question whether the core is protected, then you find that another failure is limiting in that sense that gives the worst condition in terms of water level in the core

or whatever you are interested in. When we get to equipment qualification, it becomes a lot more complex. There are many different equipments and those equipments are being used for different cases. Could you describe for me at least briefly how do you use the single failure criterion for equipment qualification? Could you explain it through an example? For example, how did you select the single failure for limiting the chemical environment and what single failure you ended up with, which other ones did you consider?

MR. BINGHAM: John, we seem to have not quite a unanimous approach on the answer that we want to give, so what I would request is that at the next break, we will caucus and come back with a correct example responding to the particular question you had.

MR. ALLEN: Do you have that down, Terry?

MR. QUAN: Dr. Rosztoczy, could you repeat that question?

DR. ROSZTOCZY: Let me just phrase the question in brief terms and ask an explanation for it. I would like to know how do you apply the single-failure criterion for equipment qualification in general terms and then I would like you to take an example and illustrate through this example the application of the single-failure criterion. I am suggesting as an example the selection of the single failure for predicting the chemical environment. What failures did you consider to predict what kind of chemicals could come into the plant through the spray system or by other means?

MR. ALLEN: Do you have additional questions?

DR. ROSZTOCZY: Yes. Exhibit IIIB-43. At the time when this slide was presented, it was mentioned that this is a case which will be done by the combination method. Earlier today when I asked the question if there is any case where you have already decided to use anything but the preferred mode, which was type testing, the answer was you haven't arrived at such a decision yet. If this is being done by combination, then those two answers don't completely jibe, so somewhere along the line, I would like to have an explanation.

MR. BINGHAM: Okay, we will provide that.

MR. ALLEN: I believe that is coming up in your presentation.

MR. BINGHAM: Yes.

DR. ROSZTOCZY: That was my last question.

MR. ALLEN: Vince, I think you raised your hand a while ago. You had a question?

MR. NOONAN: He already covered it.

MR. ALLEN: Are there further questions?

I have one question regarding qualification programs. I think I know the answer before I ask the question, but I'll ask it anyway. It is not project policy to accept

certification of qualification data, is that correct? In other words, a vendor cannot send us a certification that says, "I certify that this is qualified to your spec."

MR. CARSON: A certificate of certification by itself is not acceptable. We require that the actual documentation be provided.

MR. ALLEN: If no further questions, you can continue, Bill.

MR. BINGHAM: We will now present Section B.4., equipment environmental qualifications, regulatory guides.

MR. CARSON: Another set of criteria having to do with qualification, as indicated in the Standard Review Plan, has to do with several NRC Regulatory Guides which provide interpretation of various IEEE standards. Exhibit IIIB-57 has to do with Reg. Guide 1.32 in relation to IEEE 308 having to do with Class IE electric systems for the plant. The project concurs with the requirements of Reg. Guide 1.32 and the equipment is qualified for the operational requirements indicated.

Exhibit IIIB-58. Reg. Guide 1.40 has to do with IEEE 334-1971, specifically for continuous duty motors inside the containment. This Reg. Guide is not applicable for BOP equipment, since no safety-related BOP machines are provided inside the containment.

Exhibit IIIB-59, Reg. Guide 1.53, application of single-failure criterion. Qualification requirements of IEEE 379-1972 to be met. The project is in agreement with that requirement.

Exhibit IIIB-60, Reg. Guide 1.63 having to do with IEEE 317 covering electrical penetrations. The Reg. Guide gives some guidance in terms of certain tests and values which are to be used in the qualification program. The project is in agreement with these requirements.

Exhibit IIIB-61, additional requirements for electric penetrations. The project is in agreement. There is an open item having to do with electric penetrations which came up at the AC system review which is being studied and response will be made at a later date.

Exhibit IIIB-62, Reg. Guide 1.73 having to do with IEEE 382 covering electric valve operators used for valve and various other equipment indicating that the auxiliary equipment having to do with the valve is also to be qualified. The project is in agreement with this requirement and equipment suppliers are being required to qualify the entire equipment for its use. Test sequence is to be used. The position stated the project agrees with.

Exhibit IIIB-63 continues the discussion of Reg. Guide 1.73 having to do with testing of valve operators and the radiological source term which is to be used in accordance with Reg. Guide 1.7. The project is in agreement with these

positions and the effect of Beta radiations is under review for organic materials.

Exhibit IIIB-64, Reg. Guide 1.89, clarification of Reg. Guide 323-1974 having to do with radiological source terms and applicability of IEEE Standard 344 for seismic testing. The equipment is being qualified in accordance with the requirements of 1.89 with the exception that equipment that had been seismically qualified prior to aging on some of the older programs is being reevaluated to see that aging will not cause a problem or will not have problems caused by subsequent application of seismic events. This may require some retesting.

Exhibit IIIB-65, again on Reg. Guide 1.89. The use of thermal and vibrational techniques are difficult to apply and are not valid or practical for many type tests. The project agrees with the requirements of 1.89.

Exhibit IIIB-66, Reg. Guide 1.131 having to do with IEEE Standard 383 for electric wire and cables. All design basis events are to be considered, environmental service conditions are to envelope plant specific conditions, and ongoing qualification programs are to be used as a possibility for qualification. The project is in agreement with the requirements and, as indicated before, use of an ongoing program is discouraged. All electric cable used in the project has been qualified by type testing.

MR. BINGHAM: Are there any questions on the Reg. Guides?

MR. ALLEN: Ed Sterling.

MR. STERLING: On Exhibit IIIB-64, and maybe Vince can help me out on this, at the regional meeting in Dallas on qualification, a question was raised by a gentleman from SMUD that the source term calculations that were addressed in 0588 were in conflict with the source term calculations called for on the TMI lessons learned, and I guess my question is what source terms are we using for Palo Verde, and I don't have the answer to that question that the SMUD gentleman asked.

Vince, you said you had those lists of questions. If it has been determined, maybe you can shed some light on what source terms were the ones that were applicable or the most severe.

MR. NOONAN: I have a list of the questions, but I think Dr. Rosztoczy can answer it very clearly.

DR. ROSZTOCZY: Basically, the question was raised what are the requirements for the use of source terms to predict how much radiation a certain equipment is exposed to. The basic ground rule is very simple. When you start to apply it, it becomes a little bit more complex. The ground rule is that following an accident, there are two possibilities. One possibility is that you blow almost everything from the

primary system out into the containment, and in that case, the activity is mainly in the containment. Another possibility is that you have some core damage, but you terminate the blow damage to the containment, so most of the activity stays in the water in the coolant system and is being recirculated in the system. The basic ground rule is you have to be covered for both of these events, so when you look at a given piece of equipment, then you have to ask the question how much radiation would this equipment have if the activity was blowninto the containment and you have to ask the question how much radiation would this equipment have if the activity stayed within the coolant loops, including the RHR system. Whichever gives the higher result, you have to qualify to that value. Normally, the equipment within the containment gets the higher dose if the activity was blown into the containment. There could be some exceptions. If some equipment is installed on the coolant loops or is very close to it, it might get the higher dose when the activity stays in. When you are talking about the equipment that is outside containment, then normally the second one is more limiting; namely, the proximity of the coolant loop is what determines the radiation rather than what is in the containment. You have to be covered for both cases. The question then is have you done this and, if you haven't, then we certainly would like to bring it to your attention to do it.

There was some reference here or questions asked at the regional meeting and responses to them. At the time of the regional meetings, we promised that these would be provided to all parties involved, including the utilities, in written form. We have written up some of the most important questions, we have provided written answers for them, and those are presently being mailed out. I believe they started to mail them out today. Somewhere in the very near future, you are going to receive them in written form. This was one of the questions and, basically, the same answer what I gave you is in written form in that package.

MR. ALLEN: Additional questions?

MR. NOONAN: Yes.

MR. STERLING: We didn't get an answer.

MR. ALLEN: Bill, anything else to add to it?

MR. BINGHAM: As I understand, the question was have we considered it. We are considering it. We have had discussions with Dr. Rosztoczy on this very point and we are looking at it to make sure that we have used the correct dose for the limits.

MR. ALLEN: Anything else?

MR. NOONAN: On the same exhibit, IIIB-64, Part A here, I wonder if you could walk me through that. I am not quite sure what you are telling me here regarding the aging and the seismic qualification question. Could you just briefly describe your answer on Part A, just what you are talking about.

MR. CARSON: We are addressing equipment that may have been seismically qualified prior to an aging mechanism being applied and indicating that for such equipment, aging is to be considered to determine by analysis, if possible, that the aging would not have resulted in a failure of such equipment in the event that the aging had been accomplished prior to seismic events. If no successful analysis can be made in that regard, that is, if aging cannot be shown to be non-existent or insignificant and, therefore, not affected by seismic activity, as indicated, some additional supplemental tests may be required.

MR. NOONAN: I guess as a personal opinion if you could show that aging has no effect on equipment, then you are probably in pretty good shape. If you cannot show that, then I don't see how you can possibly do anything by analysis.

MR. CARSON: That is what we are indicating. If it cannot be shown that aging is nonexistent for the material, we would require additional testing to confirm the qualification of the equipment.

MR. NOONAN: Okay, I understand. Thank you.

MR. ALLEN: Any further questions?

Seeing none, would you like to continue, Bill?

MR. BINGHAM: We next would like to cover under Section B, Environmental Qualification Criteria, Items 5, 6,

7, and 8. That would be on Enclosure ii, Item 5, NUREG 0588, Item 6, Commission Order CLI 80-21, Item 7, IE Bulletin 79-01B, Item 8, 10CFR50 Appendix B. At that time, we will entertain questions, John.

MR. CARSON: Exhibit IIIB-68 has to do with NRC NUREG 0588, which was issued earlier in 1980, and covers positions which are involved with safety-related electrical equipment specifically. The positions are applicable to plants in the operating license stage, which is the PVNGS situation, and indicates that the requirements set forth must comply with one of two versions of 323, either the '71 or '74 version. Because of the date of the construction permit for this project in 1976, the requirements of 323-74 must be handled, and those are covered in Category 1 of the NUREG. As indicated, TMI type recommendations have not been addressed in this document. The positions provide guidance for use in determining service conditions for qualification. Seismic qualification is not covered. Equipment refers to safety-related electrical equipment only. As indicated, PVNGS must conform with Category 1 having to do with Item 323-74. As indicated earlier, that is the basic document for qualification on this project.

Exhibit IIIB-69. Calculations having to do with temperature and pressure should use one of the computer codes indicated. The project uses the COPATTA Code. Main steam line breaks are to be calculated from plant specific model. Plant specific parameters have been used. Chemical sprays are to be addressed inside containment. The project addresses chemical sprays in qualification of balance of plant equipment located in the containment. Radiation environment should be based on normal environment plus that associated with the accident, and the project complies. As Dr. Rosztoczy just mentioned, there is further guidance being indicated as to source terms to be used.

Exhibit IIIB-70. Type testing is preferred and it is indicated that type testing is essentially the only method of qualification which will be accepted for any equipment inside containment. The project is in agreement with this method of qualification for in-containment equipment. Temperatures are to be defined on or very near the surface of the equipment being qualified by use of thermocouples, The project indicates that separation precludes the failure of redundant equipment, and the determination of temperature on the surface of equipment is under study at this time. Equipment that is required to operate within seconds or minutes of the imposition of a design basis event, is called to operate for at least one hour in addition to the actual operating time. That requirement is under review. Aging effects are to be considered. All of the qualification programs for the project consider aging. The Arrhenius methodology is considered an acceptable method of addressing aging. The project agrees with that provision.

This is Exhibit IIIB-71. Periodic surveillance testing under normal service conditions for ongoing qualification, as indicated earlier, is discouraged as a principal or prime method of qualification and, if used, is only endorsed on the project using equipment which has some previously demonstrated qualified life. Documentation requirements of 323-1974 are considered adequate. Documentation in accordance with that standard is required for all programs. The additional information required from Appendix E of the 0588 document has been worked into Table 3E-2 of the FSAR and will be presented in a later amendment to that document.

Exhibit IIIB-72. Commission Order CLI-80-21 was issued in late May of 1980 and has to do with operating plants. At the workshops which were mentioned earlier by Mr. Noonan and Dr. Rosztoczy, certain information having to do with operating licensed plants, primarily the timetable for review of qualification information, was given. The project is using the requirements of 0588 in terms of qualification programs and will follow the guidance of Category I of that 0588 document.

Exhibit IIIB-73. IE Bulletin 79-01B was issued in early 1980 and has to do specifically with qualification of the electrical safety-related equipment in operating

plants. It indicates that 0588 is to be used for operating plants. It is indicated, also, for plants in the OL stages. The FSAR service conditions are to be reviewed. The project has reviewed all design basis accident conditions and these are stated for equipment qualification programs. Beta and Gamma radiation are to be considered and the 79-01B document indicates that Beta doses less than 10% of Gamma doses need not be further considered. Gamma doses are being investigated and, as indicated, the FSAR reflects the TID 14844 sources.

Exhibit IIIB-74. Beta doses have not yet been included in the FSAR. Effects of Betas are being reviewed in relation to organic materials. Submergence is to be addressed in regard to safety-related electrical equipment. In the project, all safety-related electrical equipment has been located such that it is not subjected to submergence. Spray chemistry is to be addressed. Spray chemistry is addressed in the design basis accident parameters.

Exhibit IIIB-75 having to do with 10 CFR 50 Appendix B, quality assurance criteria. The project maintains a quality assurance program and fully meets the requirements of Appendix B.

MR. BINGHAM: Are there any questions, John, at this time?

MR. ALLEN: Ed Sterling.

MR. STERLING: Back on Exhibit IIIB-69, the radiation

environment. Part of that was the 10 to the fourth cutoff limit for neglect of radiation. How has that been addressed?

MR. CARSON: We have indicated in the environmental designators for the plant areas which are reflected in the specifications the anticipated and calculated radiation dosage for the areas in which the equipment is located. If the area indicates doses less than 10 to the fourth, that is indicated to the vendor and the vendor must respond to whatever doses are indicated in the specifications.

MR. STERLING: So you are not neglecting them?

MR. CARSON: We are not neglecting radiation. The vendor may tell us that for materials in his equipment that 10 to the fourth or some other value of radiation is no problem, but he must address the radiation specified.

MR. STERLING: Another question on the next exhibit, IIIB-70, the second item. You talk about the temperature of the thermocouple readings on or near the equipment surface, and I have gone back. As you did in the previous exhibits, this separation precludes failure. If you are qualifying to have equipment not fail at all, not necessarily have one fail and then, because another one is not in the same environment, it would continue operating, you still have not protected that piece of equipment from failure due to the localized environment.

MR. CARSON: As we indicated, we are reinvestigating

temperatures to see if the programs that have been completed or are in process can provide us with information specifically on surface temperature and the type of equipment is being analyzed on the basis of thermal mass and temperature gradient to see if high temperatures for short periods of time will affect such equipment.

MR. STERLING: I have one more question on Exhibit IIIB-74 on submergence. You have indicated that you are going to locate electrical equipment above the flood level. Have you also looked into localized submergence, something that is not below the flood level, but due to sprayage might be covered.

MR. BINGHAM: I think we will have Dennis Keith respond to that particular question.

MR. KEITH: Let me just tie this in with the previous question, also. Let me just add a little bit on that, because it is my understanding that the concern about having the thermocouples reading at the surface temperature is a steam jet impingement concern, a steam jet impinging directly on the piece of equipment. We do a high energy line break analysis throughout the power block, and this also includes moderate energy line breaks where the concern is flooding. You can have certain failures. You can still take a single failure and shut the plant down safely, so as part of that analysis, we look at jet impingement, flooding

and all the effects from the pipe break, and that analysis is very well along, as you know. We have not identified anything that we cannot -- we either protect it from the pipe break or, based on the equipment's function, we can let it fail, and we have not identified anything where we have had to environmentally qualify it for the effects of jet impingement or submergence.

MR. BINGHAM: Thank you, Dennis.

Any other questions, John?

MR. ALLEN: Any further questions? George.

MR. SLITER: One of the requirements of NUREG 0588 that you did not highlight in your exhibits concerns synergistic effects. You already said earlier in the proceeding that synergistic effects will be considered. However, 0588 goes on to say investigation should be performed to assure that no known synergistic effects have been identified on materials that are included in the equipment being qualified. What is your intended approach at this investigation? What is your interpretation of that?

MR. BINGHAM: That is still under review.

That could be an open item, John.

MR. ALLEN: Fine. Let's make that an open item to determine how we are going to go about investigating the synergistic effects.

MR. SLITER: Also, may I make the comment that NUREG

0588 is still out for comments and will be published in final form at an early date, I understand.

DR. ROSZTOCZY: I would like to comment on that. NUREG 0588 was issued in December of 1979 in a draft form. Later on, through the Commission order issued May 23, 1980, the draft version has been accepted by the Commission as an interim requirement until a more permanent rule can be generated through the normal rulemaking process. So the draft version of NUREG 0588, which is presently the requirement, is the one that you have to work with until some new regulation comes out. The new rule will be generated through the normal rulemaking process, which will invite comments from industry as well as anybody else. This process normally takes a few years, so we don't expect that to be finished earlier than maybe 1983 or so. In the meantime, it is possible that we will reissue the NUREG, but we will not change the requirements. The draft version is the required version.

MR. ALLEN: Vince, you had a question?

MR. NOONAN: More of a comment. I guess it is really not addressed to Bechtel, but it is addressed mostly to Arizona Power. If you go back to your Exhibit IIIB-67, Items 5, 6, and 7, which are addressing flame resistance, fire tests, et cetera, if you have been following the recent proceedings that are going on in the Commission in the

licensing of one of the plants, the question of hydrogen burn has been raised. While it is more serious in certain types of plants than it is in other types of plants, it is getting quite a bit of Commission attention and the staff has been asked to address the hydrogen burn question as it affects equipment qualification. We are working on that right now. It is not a requirement being placed on the utilities at this point in time, but I think it would behoove you to follow closely those proceedings to see what is being done and what kind of requirements may fall out of that thing. Since you are talking about two years to go before you load fuel, you might be getting additional requirements in this area, so I think it would be wise that you pay close attention to the work that is being done back there in Washington on this item and the types of questions that are being asked.

MR. ALLEN: Fine. Thank you.

Any additional questions?

MR. LaGOW: On IIIB-69, Item 2, you note for the main steam line break that you are using plant specific parameters to compute, I guess, pressure, temperature, and rate of change of pressure. Are you going to provide that data or show how the tests you are performing are relating to that? Maybe that is coming up later.

MR. BINGHAM: You will see it in the environmental parameters, but the answer is yes, we will provide that data.

MR. LaGOW: Do you do so testing for the rate of change of pressure?

MR. BINGHAM: Yes, we do test to the ramps that are shown. We will talk about that when we talk about environmental qualification.

MR. ALLEN: Are there any further questions? Pete.

MR. NEWCOMB: I have two questions. One relates to Exhibit IIIB-68. Item No. 2 states staff recommendations resulting from review of the TMI are not included. What precautions or what provisions have you taken in the set up of your program to maintain enough flexibility to address new requirements as they come along? Your previous discussion clearly points out the sequential nature of testing where you must do each thing in step and each thing must be properly done before you move on to the next step. How do you address a situation where an early part of the program may have to be modified?

MR. BINGHAM: I believe, Pete, your question was how flexible are we going to be.

MR. NEWCOMB: Is there flexibility in your program set-up to accommodate additional requirements, for example, coming from TMI concerns.

MR. BINGHAM: Generally, we always have some flexibility. Of course, the closer you get to wanting to start the plant up, the less flexibility you have. I would say in general that our philosophy is to be aware of what is going on in the industry and at the Commission and to try to assure ourselves through our discussions with our customer that we haven't precluded ourselves from later incorporation of at least some escalation in requirements. However, our basic goal is to get on with the job and get this done. If we sat around and waited and "what if'd" ourselves, we could not proceed.

MR. NEWCOMB: Well, as I understand, what you are indicating is close communication with NRC regarding potential future requirements.

MR. BINGHAM: And with the utilities, through all the agencies, and the industry, that's correct.

MR. NEWCOMB: My second question is really in general. One of the topics discussed in 0588 that you have not discussed here, and it was brought up previously, is the question of the nonsafety-related equipment. There is a requirement in there where nonsafety-related equipment whose failure could make events worse following an accident must be qualified to show that it will not fail in an adverse mode. How do you do that?

MR. CARSON: Nonsafety-related equipment is designed in the plant in such a manner that its failure in any mode will not affect safety-related equipment. It is placed, it is supported, or it is barriered, or whatever, such that its failure will not affect safety-related equipment. Another way of saying this is that all safety-related equipment is looked at in terms of its location, its support, and the things around it to see if there are any nonsafety-related equipment in the area whose failure could affect the safety-related equipment.

MR. ALLEN: George.

MR. SLITER: Although you said that you are still evaluating the effects of TMI on your program, to date was any equipment reclassified as IE as a result of your evaluation of TMI or were there any additional types of equipment added to your plans as a result of TMI?

MR. BINGHAM: There have been some items. We did discuss that at the board of review last month on the auxiliary feedwater system that we were adding some Class I or Class II flow meters. I am sure that there will be some other items added as a result of TMI.

MR. ALLEN: Any further questions?

DR. ROSZTOCZY: Exhibit IIIB-68 indicates the time when 0588 was issued and the statement was made that this does not include lessons learned from Three Mile Island. Since that time, we had time to look at what possible additional requirements are needed because of Three Mile Island and the proposition that has been preferred is presently under NRC management review. Whenever it is in final form,

I am sure it will be made available to the industry, including yourself. I can't recall all the items mentioned in this position paper, but I can recollect four of them, and there aren't so many that four will probably represent most of them. There could be one or two extra. I would like to comment on those. One of them applies to new equipment that has been installed on the plant because of the lessons learned from Three Mile Island. This equipment in general are safety-related equipment. That is why they had to be installed, and they fall under the same rule as all other safety-related equipment. It will qualify the same way as you are qualifying the rest of the safety-related equipment, including instrumentation that has to be installed for the benefit of the operation of the equipment.

The second item mentioned is just simply the list of safety-related equipment. We learned certain things in Three Mile Island and now we are including on the list of safety-related equipment certain equipment that was not included prior to Three Mile Island. It would be important that you review your own list and see if it has been updated and if it includes all of those items that should be included after Three Mile Island.

The third item is stratification both in terms of radiation and temperature. It has been observed during the Three Mile Island accident that rather high radiation doses showed up in certain portions of the containment, higher elevations in the containment, and this indicates a certain amount of stratification, that one part of the containment might have higher dose rates than an average dose rate would be calculated for the completely distributed source. We don't know exactly what is the best way to handle this, but we expect you to take this into consideration at the time when you establish your environmental zones. The same for temperatures. You might elect to divide the containment into more than one environmental zone and you might specify higher temperatures and higher radiation levels, for example, for the higher zones in the higher elevations in the containment and then check if there is any different equipment at that location and whether it is qualified for those higher zones. Normally, the higher elevations in the containment don't have safety-related equipment. However, if there is a possibility, it should be kept in mind.

The fourth item which I recall from this position paper relates to the hydrogen burn. I think Mr. Noonan mentioned that earlier, so there is no need to discuss it any further.

There could be one or two other things. If you are interested, if you check with us, then we can check if there is anything important for you.

MR. ALLEN: When do you think that paper is going to be out?

DR. ROSZTOCZY: Well, I would expect it within a few weeks, probably; maybe within a month. It is a two-page type of thing, so it won't be very long.

MR. ALLEN: Do we have further questions from the board before we proceed?

DR. ROSZTOCZY: The next one is Exhibit IIIB-70. The third bullet down the line talks about the minimum one-hour qualification requirement, if certain equipment is expected to operate only for five minutes after the accident, it should be qualified for one hour and five minutes. Under the position column, I see the words that the requirement is under review. Since this requirement exists on NRC's behalf and since you are performing your tests, I am not sure what these words mean. Are you performing the test to one hour and five minutes for the example case or are you doing something else? Time is running out on you. You can't consider this requirement for too long. They have to be in force, and there is no change in this. This is a requirement. We expect that it is going to stay this way, so the recommendation would be that you should test all of your equipment to this requirement.

MR. ALLEN: Does anyone want to comment on that?

MR. BINGHAM: Yes. The reason we put "in review" is because we are having a great deal of difficulty understanding

the rationale of applying that criterion to some of the equipment, and we have not yet had an opportunity to discuss this in detail with APS or, indeed, with the NSSS vendor or vendors throughout all the projects. We presently are of the opinion that that may be a severe requirement for qualification, and until we have our review completed, we would not be in a position for those discussions. What I understand that you have said is that regardless of the rationale that the utility might provide, that still is the requirement as far as NRC is concerned. Is that correct?

DR. ROSZTOCZY: Yes. In terms of the operating plants, we are looking at what information is available, and so on, and I am not sure exactly what the outcome might be for a piece of equipment that wasn't qualified all the way up to this time period, but for all new tests, we certainly would expect that they will be performed to this time period. Now, I am not sure what you meant when you indicated that this might be a very severe requirement. Do you mean that it is very severe in terms that the equipment might not be able to withstand the environment for this long?

MR. BINGHAM: No, I did not mean that. What I was referring to was the fact that the bulk of the equipment on Unit 1 is installed and, therefore, would not be available for that sort of testing. If I understand what you are saying, it is that this criterion would be applicable to tests that

would be conducted or tests yet to come up and we would conduct it in that manner. That puts a different perspective on our interpretation of the requirement.

DR. ROSZTOCZY: I'm sorry, I didn't mean to imply that. I meant to imply more in terms of the 1971 requirements or the 1974 requirements. You fall under the '74 requirements. You know this now for a number of years and we expect you to meet this one hour plus test requirement. I am not sure if I follow you in terms of the equipment which has already been installed. The question is has this equipment already been tested. If it has been tested, that includes tests under the '74 requirements, meaning that you preaged it, you preradiated it, you have shaken it, and then after that you have underwent a blown core or appropriate environment of that. This last portion of the testing should be performed for this extended period, and if it wasn't followed, then you might have a serious problem at hand.

MR. BINGHAM: I believe we understand your question and Mr. Carson will respond.

MR. CARSON: In terms of BOP equipment, the primary items would be isolation valves operated by Limitorque operators for this project. Limitorque has provided qualification which shows that they are capable of not only operating for one hour in the accident environment, but throughout the accident environment and post-accident, and this has been

demonstrated in their qualification programs. For other equipment, it is still under study.

DR. ROSZTOCZY: Exhibit IIIB-73. Under Item 2)A, you are talking about temperature and pressure steam conditions. You didn't mention humidity. One of the concerns that we have is that sometimes the humidity affects the test for the equipment, whether the equipment will survive the test, and it is not always clear whether the dry or the humid atmosphere is more limiting or whether a combination of dry and humid is more limiting than either the dry or the humid if it applied as a single atmosphere. How did you assure that your equipment will be tested for the most limiting conditions? Let me give you an example. If you have some kind of equipment, let's say electrical equipment, inside a box and the box is sealed in such a way that humidity can't get to it, then testing it at high temperature in a dry atmosphere could fail the seal material. If after that it is exposed to a humid atmosphere, the humidity penetrating into the box could fail the electrical equipment inside. If this equipment together with its box is being tested only in dry atmosphere, there will be no failure. If it is tested only in a humid atmosphere, there will be no failure again. But if it is tested in a dry and then in a humid atmosphere, then it will fail. What have you done to cover this type of cases and to avoid the possibility of qualifying something at the same time

it might fail in the plant because of the combination of dry and humid atmosphere.

MR. CARSON: In the specifications for equipment, as indicated, the environmental parameters are stated including the expected range of humidity at the location of the equipment. The vendors' qualification programs are reviewed to see that humidity has been considered. We have had programs in which with large equipment, for instance, motor control centers or switch gear or such as that, or relay cabinets, the vendors have responded to humidity by actually putting open containers of water in the equipment while it is run through temperature ranges such that the humidity would vary over the appropriate range and the operation of the equipment has been checked under those conditions. As indicated earlier in another discussion on humidity, humidity is primarily looked at by the selection of the materials used to make sure that non-hydroscopic materials are used and that the design of the equipment would not provide surfaces on which humidity condensation would provide for low tracking resistance or for reduced insulation resistance.

DR. ROSZTOCZY: Have you specified for any of your equipment testing at relatively elevated temperatures in a dry atmosphere which would be followed by tests again in elevated temperatures in a humid atmosphere?

MR. CARSON: We have not made any specific test requirements in that specific sequence. As indicated, we have indicated to the vendor the total range of parameters which he must address and have made sure that the qualification programs and the qualification testing have addressed that range of parameters, but we have not been specific in saying that you must closely follow a high temperature dry operational period by a high temperature wet or a low temperature wet operational period.

DR. ROSZTOCZY: I would like to recommend that you review the qualification specifications for all of your equipment that is exposed to this high temperature possibly dry and humid environment and see if there is a need for such a specification.

MR. ALLEN: We will take that down as an action item.

DR. ROSZTOCZY: Exhibit 73 and 74 together kind of list the various environments that I assume you consider. Here they are mentioned because they were mentioned in the bulletin, but maybe this is an appropriate time to bring up some other environments that have not yet been mentioned and which should be considered. If you are planning to discuss this later, then please just let me know and then I will wait for that. Two items that are not mentioned here are, one, what I would call a dynamic environment. This is an environment of expected vibrations created by the accident in various portions of your plant or your system. For example,

if the expected course of the accident is that two-phase flow is going to pass through pumps or valves, then you expect to vibrate under this condition, as they did at Three Mile Island. How do you account for this dynamic or vibration environment and how do you represent this in your specifications when you specify the environmental conditions?

MR. BINGHAM: Dr. Rosztoczy, we are not exactly sure how we have covered that particular issue. We do look at some vibratory motions, and what I would like to do is to check on that particular issue and get back during this proceeding, perhaps during Mr. Schechter's presentation, which I am sure will touch a bit on it, but we will provide the answer.

MR. ALLEN: I would like to request that that be put on the open items list.

MR. QUAN: Could we have that question repeated, your concern?

DR. ROSZTOCZY: In the expected course of an accident or event, various things can happen in the plant, including vibrations or any kind of dynamic loads. How did you account for these environments in your evaluation of the plant and the specifications that you prepared for various equipment?

The other environment that is not mentioned in this slide here is dust. I think earlier we mentioned sand storms. Since Arizona is an area where this is kind of a more frequently expected event than in other areas, are you going to discuss

sometime today or tomorrow how you handle dust and what kind of specifications you have prepared for various equipment in terms of dust?

MR. BINGHAM: Dust is near and dear to our hearts on this project and we have through studies and actual measurements at the site determined the dust loadings, for example, that would affect the diesel generator, both intake and cooling. There is a considerable amount of information available and that has been presented as part of the licensing document.

Dennis, help me on this.

MR. KEITH: I think it is primarily in Chapter 9 in the ventilation.

MR. BINGHAM: Chapter 9 in the ventilation. There is information there that discusses what we have given to the manufacturers that would see dust environment. They have responded back with a statement that their equipment is safisfactory for the dust loadings that we would expect.

DR. ROSZTOCZY: Could you prepare a summary, let's say, for tomorrow in terms of how did you handle dust, what kind of equipment did you specifyc dust for, and give us some examples of what was in the specifications?

MR. BINGHAM: Yes.

DR. ROSZTOCZY: I would like to include equipment, for example, such as pump seals.

MR. BINGHAM: Pump seals?

DR. ROSZTOCZY: Yes.

MR. ALLEN: Dust effect on pump seals?

DR. ROSZTOCZY: Yes.

MR. ALLEN: Vince.

MR. NOONAN: I guess I would like to go back to IIIB-70, the slide that Dr. Rosztoczy talked about before when he was talking about the requirements out of NUREG 0588 including testing at least one hour in excess of the time assumed for the accident analysis. I don't find the answer that you gave to be acceptable. I guess I would consider this to be an open item. The requirement exists. It is a requirement out of 0588. We are talking about a qualification test, we are not talking about acceptance testing. You made a statement you didn't quite understand where the requirement came from. In qualification testing, you define tests in excess of what you expect to see. I guess what I am trying to say is that the requirement is there and it has to be met and the answer that you gave I don't think was satisfactory.

MR. BINGHAM: I may have caused some confusion. I am advised that for the balance of plant equipment that all of the equipment that falls under this concern is or will be qualified with that one-hour requirement. There was a concern on our mind as at what time we were into the design basis event and how to properly apply the one hour. Since

we seem to have things in order, let me say for this particular issue that we will correct the record and the chart to reflect compliance for balance of plant.

MR. NOONAN: That is acceptable.

MR. ALLEN: Did you get that, Terry?

MR. QUAN: Yes.

MR. ALLEN: Bill, again, that is strictly for BOP.

MR. BINGHAM: That is strictly for BOP.

MR. ALLEN: Any further questions?

If not, I had one. On Exhibit IIIB-74, Item C, it seems to me that at one time we were discussing putting in some submersible pumps in the safety-related sumps. Is that not the case now?

MR. BINGHAM: John, Dennis Keith will respond to that question.

MR. KEITH: John, we don't have any sump pumps in the containment that are safety-related. However, as a result of all the work that has been done post Three Mile Island, we are looking at the possibility of getting submersible sump pumps, but that evaluation has not been completed.

MR. ALLEN: And if we do get them, then they will be qualified for the flood levels?

MR. KEITH: They would be qualified, yes. That would be the purpose of changing our design.

MR. NOONAN: John, when you answered me on that last question, you made the statement for balance of plant when he was talking about the one hour, but the requirement still exists for Arizona Power for its plant.

MR. ALLEN: Right, I understand that, but what I clarified that for was for the record of this system review, which is balance of plant.

MR. NOONAN: I understand that, but I want to be sure you understand what I was looking for.

MR. ALLEN: I understand it very well.

DR. ROSZTOCZY: One more comment on this last slide in connection with the flood level. One lesson learned from Three Mile Island is that maybe under some conditions, the flood level will be higher than it showed for three years ago or five years ago. Have you looked carefully at your plant to see what is the maximum flood level that you would be able to flood the containment to under extreme emergency conditions?

MR. BINGHAM: We have looked very carefully at that possibility. As I told you, we have everything on a very large scale model, so we have reviewed to make sure that needed equipment had a considerably safe margin that we added.

MR. ALLEN: Any further questions?

If not, continue with the presentation, Bill.

MR. BINGHAM: All right. That gets us to Section B.9,

PVNGS Environmental Classifications.

I would like to make one correction to the record, John. Early , in the presentation, I believe it was in Section 5, Mr. Carson indicated that the CP date was 1966. The date is 1976.

MR. CARSON: In Exhibit IIIB-76, we discuss the environmental classification of the equipment, and this will be in conjunction with some earlier questions raised at this meeting. The parameter values which led to the environmental conditions for all of the equipment are calculated using appropriate conservative analyses. The values have been grouped on the basis of plant arrangement and the maximum values have been applied to the entire area that is identified.

Figure 12 shows an overall view of Unit 1, which is exactly the same as Units 2 and 3, for the plant -- the main buildings, the containment building, the main steam support structure, auxiliary building, fuel building, radwaste building, control building, diesel generator building, and the turbine generator building. The areas of concern have been designated with different environmental designators as shown on Exhibit 13. The containment building is Environmental Designator I. These parameters, as indicated in Table 2, are the parameters associated with the containment building taken as a whole for both normal and abnormal service and as a result of the design basis accident with the design basis accident indicated.

In answer to an earlier question, the profile for temperature and pressure has been indicated in terms of time and the ramp rates for the various pressures indicated as well as temperatures. Relative humidities have been specified, integrated dose rates for the 40-year life and 40-year life plus accident, chemicals indicated in the spray system for the containment. These are all specified in the information given the vendor for any equipment which must operate in this atmosphere and the qualification will be handled accordingly.

The second area, the main steam support structure, Environmental Designator II, is indicated in Table 3 with the same sort of presentation: temperature, pressure, humidity, radiation, chemicals for both normal and abnormal operations plus the design basis accident, the LOCA main steam line break, in which case temperatures above 100 elevation in this building rise to a 300 degree level, pressure above 100 elevation only goes to 21 pounds, humidity specified, radiation specified, again a higher level above 100 elevation, and in this area, no chemicals are involved.

Designator III has to do with the auxiliary building surrounding the containment. Shown in Table 4 is Designator III indicating that conditions are the same under normal and abnormal conditions and the effects of the LOCA with the exception of radiation. Radiation in this area as a result of circulating radioactive fluids would raise the value to

10 to the sixth power. No chemicals are involved in the auxiliary building.

The control building, Environmental Area IV, is shown in Table 5 with normal and abnormal and the conditions which exist as a result of a LOCA or main steam-line break. Of course, there is no main steam line break or LOCA applicable to this area as such, but the effects of the LOCA or steam line break in another portion of the plant will affect the control building as indicated. We see that there are no effects in normal or abnormal conditions and the accident conditions are exactly the same for this area. As was discussed previously in relation to the batteries, the battery rooms are maintained at a temperature of between 60 and 85 degrees Fahrenheit, well within the operating range of temperatures, which have a normal rated temperature of 77 degrees F.

The diesel generator building, Environmental Area V, is shown on Table 6, the conditions for normal and abnormal service. For the accident in another portion of the plant, the same conditions apply with a slight bit of increased radiation going from something lower than 10 to the third rads to a 10 to the third rad level, which is not considered detrimental to equipment and is being confirmed by tests and analyses of all equipment in this area. In addition to the parameters shown here, Mr. Bingham indicated that the dust

loadings applicable to the ventilation and combustion air systems have been incorporated into the specifications for the diesel generator.

The fuel building, Environmental Designator VI, is shown in Table 7, conditions for normal and abnormal and the accident environments with a slight increase in radiation, which is taken into account for equipment located in that area.

There is one other area, which is all of the outside areas and is called Environmental Designator VII shown in Table No. 8, indicating that there will be some slight increase in radiation, and any safety-related equipment located outside the actual plant buildings will be qualified accordingly.

MR. BINGHAM: Are there any questions?

MR. ROGERS: On the last environmental area, the outside area, are there any pumps or valves located outside of the buildings shown that are safety-related?

MR. BINGHAM: There are pumps and valves for the essential spray pond.

MR. ROGERS: Thank you.

MR. ALLEN: How about pumps and valves on the condensate tank?

MR. BINGHAM: Yes, they are in the same designator.

MR. ALLEN: George.

MR. SLITER: Some of your tables for environmental designators indicate normal and abnormal in a range. Is the lower number normal and the upper abnormal? An additional question would be what basis or what temperature profile do you use for aging equipment in these environments? Is it a combination of both, or what?

MR. CARSON: The range indicated is the range covering both the normal and abnormal conditions. The lower temperature is not the normal; the upper is not the abnormal. We have taken the envelope of the entire normal/abnormal situation and said this is the range of temperatures over which you must operate. The vendor is required to respond to that and they would normally envelope that condition with margin and operate above the upper and below the lower indicated temperatures, so they again operate over a wide range of temperatures.

MR. SLITER: And the aging question. What value normally would be used to age the equipment?

MR. CARSON: Normally, the value that would be used would be the upper temperature.

MR. SLITER: The one with the margin in addition to your upper value?

MR. CARSON: Yes.

MR. SLITER: This you recognize could be extremely conservative in terms of aging.

MR. CARSON: Extremely conservative. Some programs address an average temperature, but those are normally at the higher levels, also.

MR. ALLEN: Norm, did you have a question?

MR. HOEFERT: Yes, I have a question on Table 8. You stated the high range of the temperature for outside areas is 116 degrees. Is any equipment that has to be qualified being exposed to the sun and, if so, how do you justify the 116 degrees?

MR. CARSON: No equipment is exposed to sun. All is in covered areas.

MR. HOEFERT: Does this include the ESF service transformers?

MR. CARSON: ESF service transformers are not safety-related items. All safety-related equipment in outside areas are covered and are not exposed to sun.

MR. HOEFERT: It has been my understanding that they are Class IE. Is that not correct?

MR. CARSON: The ESF service transformers are not specifically Class IE. They are the preferred source of power in the event of a design basis accident. Class IE equipment is incorporated in the AC and DC systems, which were reviewed earlier, and start really with the batteries in the case of the DC system and the DC distribution equipment, all of which is indoors, and start with the source of safety-related AC power, which is the diesel generator and the

distribution system, again which is all indoors.

MR. HOEFERT: I have another question. On your tables, for chemicals, you list none for I think all of those. Did you consider chemicals which are used for firefighting?

MR. CARSON: Environmental qualification programs do not cover the inadvertent actuation of firefighting systems involving chemicals. The only chemicals used for such systems in this plant are Halon in certain areas and carbon dioxide in certain other areas. Other firefighting apparatus includes water.

MR. HOEFERT: It would seem we could expect sometime in the life of the plant to have these chemicals used -- Halon if that is the chemical. Must that be looked at on a case-by-case basis or is there some justification that this already --

MR. CARSON: We would expect not, since both Halon and carbon dioxide are essentially inert gases and the selection of Halon is made on the basis that it does not really affect anything and, in fact, in the concentrations used, is not harmful to human beings.

MR. HOEFERT: What about the temperature effects of CO_2.

MR. CARSON: The temperature effects of CO_2 are not involved, since CO_2 is not directed directly onto safety-related equipment, but into the areas, and it would not be

expected to severely lower temperatures or impinge on the equipment and cause freezing temperatures, for instance, that might damage equipment.

MR. ALLEN: Vince, did you have a question?

MR. NOONAN: Following on the same question he is bringing up here, it is pretty hard to believe that in the 40-year life of your plant that you would not expect to have chemicals outside unless some particular procedure is in place to make sure that this never happens. It is just hard for me to believe that over 40 years of plant life that you will not at some point in time find chemicals in outside areas.

MR. BINGHAM: We have looked at chemicals outside, Vince, from time to time. All of this equipment is protected from missiles, so that means it would be enclosed from direct impingement, although there could be some leakage. One of the major concerns was chlorine gas and we have opted on this project to use sodium hyperchloride to do away with that particular concern. I guess I would have to say that at least to our knowledge, it is quite unlikely that this safety-related equipment would experience direct impingement of some chemical. Here I am assuming some chemical is outside. If you have some examples that we should consider, please state them so that we can assure ourselves that --

MR. NOONAN: I guess I don't really have an example, but if you just think of things that happen over 40 years of time, -- You are saying that there is no way that we are ever going to get any chemicals in outside areas.

MR. BINGHAM: I am not saying no way. I said it is unlikely.

MR. NOONAN: If I go to Table V, can you tell me how the control building environment is controlled?

MR. BINGHAM: Yes, we can.

John, the reason we are taking a minute, this is a little outside of the scope of this particular meeting. We can take a minute and make sure we describe it properly to Vince or we could in the morning if we are getting together sometime later give you an exact description.

MR. NOONAN: Well, the point I am getting to, if you have a control system here to control temperatures, and so forth, inside the building and you lost that system, do you have a redundant backup system?

MR. BINGHAM: Yes, we do.

MR. NOONAN: Okay, that's sufficient.

MR. BINGHAM: Is that sufficient?

MR. NOONAN: Yes.

MR. BINGHAM: All right, fine.

MR. ALLEN: Did you have a further question, Vince?

MR. NOONAN: No. Thank you.

MR. ALLEN: Ed Sterling, have you got one?

MR. STERLING: Yes. Dennis had answered before about

the impingement studies that you had done. Is there any other case that you know of or have you addressed stratification or local hot spots in any of these particular areas? Dr. Rosztoczy had pointed out the fourth item in his list that stratification in the containment, but say in the other buildings as well.

MR. BINGHAM: I believe this is an issue that is coming up to assure that we have been covered, and when it comes up, we will take a look at it.

MR. ALLEN: We will put that on the open item list, stratification, and make sure we review it. We will have to do it because of 0588 anyway.

MR. BINGHAM: Yes.

MR. NEWCOMB: On Table 3, which is the main steam support structure environmental conditions, you identify a 300 degree temperature above 100 feet, 21 psi, et cetera, above 100 feet. Is there anything below 100 feet? In other words, you give a certain level in that structure a temperature and pressure.

MR. BINGHAM: The auxiliary feedwater pumps are below 100 feet and, as we discussed at the last system review board meeting, that is a contained area that is completely separate from the upper portion of the main steam support structure.

MR. NEWCOMB: Do you address that environment? I mean do you have an environment for that area, the auxiliary

feedwater pumps?

MR. BINGHAM: Yes, we do.

MR. NEWCOMB: Is it here somewhere and I missed it?

MR. CARSON: Well, it is this environment right here. The only place where you have a possible problem is due to the design basis event, which only occurs above 100 feet.

MR. NEWCOMB: There is no design basis event below 100 feet?

MR. CARSON: No.

MR. HOEFERT: Bill, wasn't there some discussion in the meeting on the auxiliary feedwater system about a break or leaks in the steam supply line to the turbine driven pump and that Bechtel was going to look at that as far as the effects on the equipment in that area.

MR. BINGHAM: Yes, there was.

MR. ALLEN: Are there any further questions on this before we proceed? Karl.

MR. KREUTZIGER: I would like to refer to Table 4. Under the radiation zone, the ion exchanger, is that correct, 2.7 times 10 to the ninth?

MR. BINGHAM: Yes.

MR. KREUTZIGER: Are there any electrical cables in that area? What equipment is located in that area?

MR. BINGHAM: Just a moment. Let me check to be sure.

No, there is no electrical equipment in there.

There might be some pipes, of course, and valves.

MR. KREUTZIGER: My question is how does the project preclude routing in these areas by the field since they do field routing of conduit. How do you preclude anything from going through that area? To the best of my knowledge, the cables that you have purchased have not been qualified to this level, and my question is how do you assure that something does not get in there?

MR. BINGHAM: We may be confusing the board with this particular issue. This is just a small compartment, it is not safety-related, and I am not exactly sure why that is put on as an example.

To answer your other question, we do review the routing of the conduit by the field and make sure that we don't have safety-related conduit and cable where it would exceed its qualification.

MR. KREUTZIGER: My question is how do you assure that. The electrical designer that might check the conduit route, how does he know that the area is 2.7 times 10 to the ninth? How is it assured in the review process?

MR. BINGHAM: There are reviews, Karl, of the model, our ALARA reviews, separation reviews. All of the groups get together, including the nuclear group, which is responsible for the radiation, and that gives us some assurance that somebody has not misapplied the criteria. I am advised that

this particular area really doesn't pertain to the issue at hand and, if necessary, we could go into why the purification ion exchanger would not fall in the category where we would have to worry about a designer running some safety-related conduit through that area.

MR. KREUTZIGER: Table 6, you have 140 degrees F in the diesel generator area as a maximum temperature. This to my knowledge is one of the few places on power plants, even on other nuclear power plants, that have exceeded the level of about 50 degrees C for normal operating temperatures. My question is how do you assure that the design temperature has been factored into the design of equipment ratings? For example, we have a general temperature for cable derating. Let's say that the cable that leaves a diesel generator to go back to wherever the safety-related switch gear is probably runs in trays. That cable is sized for an ambient condition. Again I am bringing this point up because it is the first time that I have ever seen an ambient condition above 122 degrees F, which is 50 degrees C, and I would like to know what assurance you have that if I were to look at the cable sizing calculation, derating calculation for that cable, how is it assured that the electrical engineer has used for this area 140 degrees F?

MR. CARSON: In this particular area, safety-related cables are run primarily in conduit which act partially as

heat sinks. The 140 degree temperature indicated is one that is an extreme temperature and occurs only very periodically and for short periods of time and is not a long-term operational temperature. Cable sizing is done to accommodate in these cases primarily the average temperature or above average temperature which may occur in the area and the cables are oversized to compensate for increased temperatures.

MR. KREUTZIGER: I would assume that these diesel generators are assumed, at least, to operate for extended periods of time during loss of off-site power in an accident condition. Is this the temperature that comes from this 140 degrees F? My assumption is and my concern is that the 140 degrees F is occurring when the plant is requiring the diesel generators for operation, which could be over a relatively extended period of time on loss of off-site power. Is that correct? Is my assumption correct that the 140 degrees F does occur each and every time that the diesel generator operates?

MR. BINGHAM: I am not sure that's correct.

Let me take care of two of the questions that you had. One was how do we assure ourselves, and I think we left that question open, that the designer includes the information in the design. This information is part of the design criteria and, as I have indicated before, there are procedures and checks and balances to assure ourselves that

the designer is aware of it and has included it in the design. The 140 degrees is based on the peak summer temperature that you might see, so for a short period of time when the day was the hottest and the diesel is operating, you would see the 140 F.

MR. KREUTZIGER: But that 140 degrees F, were an accident or the use of the diesel for loss of off-site power to occur during the summer months -- I guess that would assume during the day.

MR. BINGHAM: The heat of the day.

MR. KREUTZIGER: Then the temperature in that room would be 140 degrees F?

MR. BINGHAM: It might be as high as 140.

MR. KREUTZIGER: The question was then the design basis for cable derating is something less than that.

MR. BINGHAM: Based on the proper use of the criteria, we would expect that that had been properly accounted for.

I cannot answer that question, John, without further review. If you would like to have that as an open issue, we will go back and confirm whether indeed we did cover that properly.

MR. KREUTZIGER: I would like to have that as an open issue, because there are other parts in here that we show also 122 degrees as being the design temperature. The same with things like the steam support structure. These

temperatures are higher than the normal derating that we use in our designs. I think historically they have been 40 degrees -- well, 40 degrees C in the outside areas except containment, which was 50, which equals 122 F. So I would like to have confirmed that the parameters that have been utilized in the design calculations have been properly addressed.

MR. ALLEN: Okay.

John Barrow.

MR. BARROW: I want to clarify something. A couple of times in this discussion, somebody has made reference to 140 degrees C. I want to make sure that it gets into the record that we are talking about 140 degrees F.

MR. BINGHAM: Yes, that's right.

MR. CARSON: All temperatures listed in the tables are degrees F.

MR. ALLEN: Further questions? Vince?

MR. NOONAN: I am going to really address this to Arizona Power, and it is the same concern that I had earlier when I raised the 79-14 bulletin of the as-built conditions, and the question just asked on Table 4 about the purification ion exchanger. Is there some quality assurance program that you have in place to assure yourself that that plant that sits out there is built like your drawings say they are built and is it periodically going to be updated to assure yourself

that you don't five years from now run cables through some of these areas where you have these very high radiation levels?

MR. ALLEN: I think I would have to address that in two parts, number one from our quality assurance standpoint and the program that John Roedel has in effect, and then the program that Bechtel has in effect at the present time to make sure that the as built is actually like the design.

John, why don't you comment on your activities and then I will have Bill say a few words on the Bechtel program.

MR. ROEDEL: Our whole quality assurance program which filters down from Arizona Public Service Company all the way down to Bechtel and all the way down to the subcontractors is to assure that the plant is built in accordance with the design requirements, and in that program, we have various and very numerous management checks and balances to review drawings and specifications to assure that we do accomplish that fact. We also have quality control inspection at the site. We have vendors' surveillance inspection at the shops, and we have receiving inspections for articles at the plant to then assure that that equipment and articles are installed in accordance with the design criteria. Also, the design criteria are expressed in the construction specifications. They are again expressed in the work plan procedures/ quality control instructions, which is the document that

the quality control inspectors work from and the engineers work from at the site. So I believe very strongly that our program is sufficient to accomplish that objective. In the six years that I have been on this project, we have verified many times that the implementation of the design review process at Bechtel for our project is functioning correctly. That activity is covered by the EDP's, which is the engineering department procedures, the project quality control program manual, and in those documents, it describes how these functions are carried out. That is a means by which the engineering manager implements that program, and we have many instances documented from reviews and from audits that that is being implemented.

Now, if you will, let me answer the second part of your question: What will we do in the operation of the plant that we would not make a modification of that plant that would preclude or interfere with the design criteria that we installed the plant to? The corporate quality assurance program has not yet been completed, although we are working on that at the present time, and I will assure you that we will have such management checks and balances to assure ourselves that we do not violate our design criteria when we perform major modifications of the plant. I guess that's all I can say.

MR. NOONAN: I guess the only other comment I will have

on that subject is when we had Bulletin 79-14, and we started getting the results of that bulletin in, industry as a whole did not have a very good track record when it came to looking at those plants and finding out that those plants were not actually built according to the way they were designed and we invalidated a number of particularly the seismic areas because of displaced supports, wrong supports, things hung completely different than what the drawings had shown. The industry as a whole did not have a very good track record. I would hope now that, based on that experience, that is being taken into account and as these new plants come on line that there is a gradual update of the as-built conditions to show that you haven't done anything to that plant in either modifications or field corrections during the building that would invalidate this environmental program.

MR. ROEDEL: I would like to respond to that statement. The design of this project has taken into consideration some of those items. The design of this project precludes the use of cinch anchors, concrete anchors commonly called cinch anchors. You can't find one in our plant, because they are not allowed to be used. We do have the caveat that you can use one, but it takes engineering approval by Mr. Bingham and APS to use one. Therefore, we have precluded that problem, and there are some other designs that we have put into the plant in controls to preclude some of those. For instance,

all the electrical cable for the plant is bought to the Class IE requirements even though some of it is for the balance of plant not safety-related. All the rebar is bought to the same requirements, so, therefore, we don't have to keep segregation of that. The weld rods the same way. All the concrete is produced the same way.

Another feature that we might include here is that, regardless of the qualification, the articles in the drawings and the specifications for the most part are handled the same way. Just because a specification happens to be for a Quality Class Q item or a Quality Class S item, it is handled the same way in Bill Bingham's shop with Bechtel Engineering as it is in APS. Now, we may do some things different relative to vendor inspection because of the quality classification of that equipment, but the rest of it is handled the same.

Now, the item in particular of as-built drawings, I am glad you brought that question up, because I have a packet right here of how we are studying to make sure that the as-built drawings are going to actually depict the condition of the plant and the plant is in fact built to the drawing requirements. These happen to be quality control records of how they had taken the drawing and gone through and made sure that all the conditions on that drawing are reflected in the plant. This one happens to be a weld status

log. All the welds on this isometric drawing, all the field welds and all of the shop welds, are in fact in accordance with the drawing and it shows that the actual weld is in fact in accordance with the drawings requirement.

I can't say for certain that we will always be that way, but we sure are making an attempt to be correct. Maybe I might use our record for inspection by NRC as additional proof that we have in fact done that. If I can remember the numbers correctly, this year we have been inspected approximately every four weeks, and that amounts to -- I am having to guess, because NRC is two reports behind -- I would say on the order of 650 manhours of actual NRC inspection at the site verifying that we are in conformance with the drawings and specifications. We have, and I might be one off, three infractions and one deviation. In addition to that, we have one resident inspector and his reports indicate to me now that he has spent over 600 manhours of actual out in the field inspection, and of the results of that, we have had one infraction and no deviations, which I think, considering that we have three units under construction at the same time, is a fairly decent record.

MR. ALLEN: John, did you have a question?

MR. BARROW: I just wanted to add something specifically in talking about Item 2 of that question, which was how can you be sure after you go into operation that you are not going to

violate the environmental qualification by installing Class IE equipment in high radiation areas or in areas where there is a violation of the temperature, the specific example of that one room that is 10 to the ninth rads and how can you be sure later you are not going to install anything in it. Well, once you get into operation for any period of time, your health physics department is going to keep you from installing anything in high radiation areas, because they are going to be so hot you couldn't have a crew in there long enough to install stuff. As far as the temperature areas, that's different, but that room I don't think we have to worry about.

MR. ALLEN: Are there additional questions? Norm.

MR. HOEFERT: I just want to mention that we will have a modification control program at the plant which Operations will follow to be sure that all the design requirements for modifications are met to prevent overlooking this type of thing.

DR. ROSZTOCZY: Could we have Table 2 up on the screen? Under the normal/abnormal temperature column, there are two numbers, 50 and 120. The question was asked what do they mean, and I believe the answer given was that both the normal and the abnormal fall within this range. Then the question was asked what value did you use for aging, and the answer given was that you used the 120, which would mean to me that every single piece of equipment that is going to be tested or has been tested was preaged to the temperature of 120 degrees for 40 years. Similarly when I go to the other zone. These are generator areas. Then it was preaged to 140 degrees for 40 years; for example, the table which was discussed. If that is the case, then you are certainly doing a conservative job. If you are making any exceptions to that, I don't know what exceptions you are making and I have no idea whether the exceptions you are making are acceptable. I would like to recommend that you include a separate column there and, in addition to temperature, show aging right in there, the excess value that you use for aging. If there is a certain reason for it, it has to be explained somewhere.

MR. BINGHAM: Dr. Rosztoczy, this is a criteria table and really isn't suitable for that information. The information is presented in the data summary, which we will show you later on in our presentation, and in the check-off lists that we have for each of the qualification requirements, so I would suggest that you take a look at that information and then if there is still some benefit to the suggestion of modifying this table, we will take that under advisement at that time.

DR. ROSZTOCZY: I am looking at this table, but these are the tables which tell me that a certain part of the plant in a certain environmental zone, what are the conditions that the equipment has to be qualified for if it is installed

in that zone, and since we mentioned earlier that we have counted up to 10 different environmental parameters, I cannot conduct a program or I cannot write the specifications without having the values for all 10 of them. The slide shown counts up to only 5 out of the 10, so, obviously, information is missing which has to be provided to every equipment supplier or everyone who is performing tests for you in order to do his job.

MR. BINGHAM: Would you indicate the other five that you have on your list, please?

DR. ROSZTOCZY: Flooding, which, for example, in this case it would give the flood level for the containment indicating that everything has to be located above the flood level; otherwise it has to be qualified for submersion. Dynamic, seismic, dust, and aging.

MR. BINGHAM: John, let's see if we can do something this evening to clarify that particular issue. The information is available and I do understand Dr. Rosztoczy's point.

MR. ALLEN: Fine, we will take that into consideration tonight and see if we can't report back tomorrow on it.

DR. ROSZTOCZY: If I go to the last column or the temperature column which gives the time for the LOCA and the main steam line break environmental profiles, it ends at 42 hours. What is the value beyond 42 hours and what is the time period that equipment has to be qualified for that you

are using on the long term after a given accident like, for example, certain pumps which you rely on even a year after the accident? What time period do they have to be qualified for and to what temperature?

MR. BINGHAM: We would like to leave this one open. I believe we can respond to it tomorrow on this particular point.

MR. ALLEN: Why don't we take about a 15-minute break and go off the record here. Before everybody breaks up, I would like to discuss what we are going to do tomorrow.

(Thereupon a brief recess was taken, after which proceedings were resumed as follows:)

MR. ALLEN: We have investigated where we could hold a meeting tomorrow and we want to do the following things this evening before we break. Number one, we want to finish any questions we may have on the environmental qualifications side before we go into the seismic. Number two, I believe we have a couple of answers to questions that we can clear up before we break. Number three, before we break, I want to indicate where we will be meeting tomorrow and what time we will be meeting tomorrow. Our intention is to finish this up and adjourn the meeting for today and then reconvene tomorrow morning at 8:00, so we can continue on with the questions and get that first part of it out of the way.

Go ahead.

DR. ROSZTOCZY: We were talking about Table 2. Could we have that back? The third entry is relative humidity, and under the design basis accident column, it just says steam/air mixture. This is maybe the part where you should spell out more specifically the dry atmosphere as opposed to humid or any combination of them if it is required, which we discussed earlier. I think that should show up in this column.

The next entry is radiation. There is a normal/abnormal part for radiation and then there is a design basis accident radiation, and under the design basis accident, there is a statement that it includes 40 year integrated. Does this mean that the number in the right-hand column includes the number in the left-hand column plus whatever is the result of the accident?

MR. CARSON: Yes.

DR. ROSZTOCZY: I will come back to this in connection with another table. In the accident column, there is one single number given. This environmental zone is the containment building. Our expectation would be that in the containment building radiationwise, there would be more than one environmental zone. I mentioned earlier the stratification observed in Three Mile Island indicating that the dust blowout carried more activity up to the top than somewhere else. There could be an accumulation of activity in the sump. Some equipment close to the sump would have a combination of materials, one from the atmosphere of the containment and one from the sump, so that might be a different environmental zone. Then, finally, we discussed earlier the case when the radioactivity stays in the system as opposed to going out through the containment and being recirculated. Any equipment close to those lines where it is being recirculated would have a different environment or zone based on those. It is also my expectation that some of these zones will have numbers significantly higher than the one presently shown in the accident column and then they will have to be qualified at those higher values.

One more question on the radiation. What time period was used to establish the radiation number in the accident column? How much time after the accident?

MR. BINGHAM: Thirty days.

DR. ROSZTOCZY: How about equipment that has to operate beyond 30 days?

MR. BINGHAM: Like 200?

DR. ROSZTOCZY: Well, one of my earlier questions was, and you will answer it tomorrow, what is the time period that you used as your design criterion, if you wish, for equipment that is needed on the long term. Whatever that number is, that should show up in this radiation column, also.

MR. BINGHAM: We will respond to that tomorrow.

DR. ROSZTOCZY: In connection with the chemicals, there

was a question earlier which asked you whether you considered firefighting equipment and you provided some answer to that. Basically, the answer was that you considered it and there was no need to include those as a chemical atmosphere. My question is how do you document the decision? How do you document it in table form? For example, if I would pull out the file on the environmental tables like this one, would there be something in the file indicating that this other chemical type of atmosphere was considered and the decision was made that it is not needed for the following reasons, giving the reasons? Would I find such a document there?

MR. CARSON: Not at this moment.

MR. BINGHAM: I don't believe at this point.

DR. ROSZTOCZY: It would be important to document some of those decisions.

MR. BINGHAM: Let's note that comment.

MR. ALLEN: Terry, do you have that?

MR. BARROW: He's getting the previous one.

MR. BINGHAM: This next question was that it would be important to document that we have considered other chemical environments and have assured ourselves that the qualification criteria are satisfactory.

MR. CARSON: Specifically, the firefighting chemicals.

DR. ROSZTOCZY: That there was no need to include that in the environment because the chemicals weren't the type

which would have any effect.

Now could I have Table 4? Earlier, I asked on the radiation what is the difference between the first column and the second. If you look at the numbers in the first column, they are not one number, there are about three numbers. On the right-hand side column, there is only one number. Obviously, if I follow the same principle that you described before, then that one number cannot cover all three of these, so something has to be done to this table to accomplish that.

MR. BINGHAM: We have to clarify that table. The doses that you see here are in small compartments that are around the purifiers or the ion exchangers, so we will clarify that.

DR. ROSZTOCZY: But those small compartments exist after the accident, also and they do have a dose rate, also, so they probably should show up in the other column, also, with the appropriate number. For example, a purifier might accumulate a fair amount of radiation as a result of the accident and if it needs to operate after the accident, then the number would be a different number than present in the left-hand side column.

MR. BINGHAM: That's correct.

MR. ALLEN: Terry, do you have that to clarify Table 4 regarding the dose rate?

MR. QUAN: Yes, I do have it.

DR. ROSZTOCZY: Mr. Chairman, I am finished with my questions.

MR. ALLEN: Are there further questions on this issue? I had one if no one else has any.

When we specify design values such as temperature 104 degrees, for example, we qualify the equipment to that, but, as in any design, there is room for error. How do we go back after the plant is in operation and verify that we are maybe not seeing 120 degrees in there when we assumed it would be 104?

MR. BINGHAM: I believe, John, that falls in the same category as the question about continuous monitoring as a benefit to extended qualified life and perhaps we should deal with both those issues at that time.

MR. ALLEN: Norm has a question.

MR. HOEFERT: In line with your question, what do we do if in plant operation we lose the heating and ventilating system and exceed these numbers?

MR. BINGHAM: You will have to evaluate it, Norm, at that time to assure that there has been no significant degradation, and probably that again would tie in with the question of do you have the data to know what happens so that you can analyze it.

MR. HOEFERT: Are we covered by redundant heating and ventilating systems in all these areas?

MR. BINGHAM: Yes.

MR. ALLEN: Are there any further questions?

MR. BINGHAM: We had one clarification, John.

MR. CARSON: I would like to clarify a question that was asked by Mr. Kreutziger earlier as to what constituted the harsh environment. If we could make reference again to Figure 13, harsh environments are the inside of the containment building, the upper level of the main steam support structure, and the accessible areas of the auxiliary building as shown, for instance, here in Table 4 for the auxiliary building and the accessible areas. The only thing that would change is the radiation dose in the containment building, and in the MSSS the parameters were indicated in the tables and showed the difference between normal/abnormal and the design basis event parameters. Those are the harsh environmental areas.

MR. ROSZTOCZY: Could I ask a clarifying question there? You described which part of the plant falls into the harsh environment. If you use a definition for the harsh environment saying that those parts of the plant which are directly affected by the accident environment meaning steam, humidity, pressure, temperature, radiation, those contain the harsh environment, is the description that you just gave consistent with that definition?

MR. CARSON: Yes, because the environment changes

due to the design basis event in those areas, as indicated in the tables.

DR. ROSZTOCZY: And the design basis means not only the loss-of-coolant accidents, but it also includes high energy line breaks like feed line and steam line breaks?

MR. CARSON: Yes.

MR. ALLEN: Any further clarifications?

MR. BINGHAM: One thing I want to make sure, John, you didn't mention it earlier, is that we have a review of the open items from today.

MR. ALLEN: I intend to do that before we break.

MR. BINGHAM: That completes this part of our presentation.

MR. ALLEN: I guess, if the board agrees, we could close that last item out off the open item list regarding the definition of harsh environments.

Before we go any further, I guess this would be a good time to go over the list of open items so we can try to resolve as many as possible tonight and report on the resolution of them tomorrow, so I would like to ask Terry Quan to read off the open items and make sure they are properly closed.

MR. QUAN: Open Item No. 1 was to correct Figure 8 to show the submittal of CENPD-255 to be July, 1980. That was just a correction on those figures.

Open Item No. 2: Send to Dr. Rosztoczy a list of equipment to be qualified taking into account any necessary changes due to post-TMI concerns.

Open Item No. 3: Correct Figure 7 from Qualification "Test" Review to Qualification "Team" Review.

Open Item No. 4: I&E Bulletin 79-14 be considered in the qualification of equipment. This bulletin dealt with as-built changes which may affect qualification, changes such as change in location or position.

MR. BINGHAM: Excuse me, John. I believe that was one that Mr. Noonan asked.

Is that question stated as you had intended?

MR. NOONAN: I guess I heard it from Arizona Power. I don't think Bechtel had that.

MR. BINGHAM: But as he stated the open issue.

MR. NOONAN: The question, yes.

MR. QUAN: Open Item No. 5: Correct all slides which state "in compliance" to more appropriate descriptive wording. Use IIIB-13, Item 2, as a guide.

Open Item No. 6: Further clarify the PVNGS position in Exhibit IIIB-7, which address General Design Criterion No. 4.

Open Item No. 7: Obtain through George Sliter the Sandia qualification testing report dealing with testing sequence effects and cumulative effects.

Open Item No. 8: Also, this incorporates John's last concern on the environmental monitoring. Investigate continuous environmental monitoring to determine if it should be implemented to ensure design qualification parameters were within reason and to supply historical environmental data on which extension of qualification may be based.

Open Item No. 9: In general terms, how would single failure criterion apply for equipment qualification? Illustrate this application through example such as a single failure used to determine the chemical environment.

Open Item No. 10: Investigate how a possible synergistic effect as outlined in NUREG 0588 will be considered in equipment qualification programs.

Open Item No. 11: Review the possibility of including the test sequence of high temperature accompanied by low humidity followed by high temperature accompanied by high humidity in the equipment qualification procedures.

Open Item No. 12: How is vibration or dynamic fluid flow from the event taken into consideration in the equipment qualification plans.

Open Item No. 13: How does dust in the environment affect equipment, especially pump seals.

Open Item No. 14: On Exhibit IIIB-70, the third bullet is to be considered to show intent to comply with the one-hour requirement.

MR. BINGHAM: Excuse me, John. I believe we responded to that question.

MR. ALLEN: I think he closed that one out, Terry.

MR. KOPCHINSKI: We were asked to correct the slide.

MR. ALLEN: Oh, that's right, correct the slide.

MR. QUAN: Open Item No. 15: Was proper cable degrading used for 140 degree environment.

MR. BARROW: Correction. That should be derated, I think.

MR. ALLEN: Derated.

MR. CARSON: That was in regard to the diesel generator building.

MR. ALLEN: I think that should be expanded on. I think that was in general, too. Didn't Karl say in general?

MR. KOPCHINSKI: It was expanded to include the 122 degree areas.

MR. QUAN: Open Item No. 16: Add environmental designators submergence, dust, seismic, dynamic, and aging.

I have a question. Was that in reference to the tables?

DR. ROSZTOCZY: Yes.

MR. QUAN: On these next few, I've just got notes. They are not quite complete.

MR. ALLEN: Why don't you go ahead on them and then Gerry probably has some he can come up with.

MR. QUAN: Open Item No. 17 was in reference to the table on containment environment designator. Investigate LOCA temperature past 42 hours. Is that correct?

Open Item No. 18: Respond to time period assumed for equipment required post LOCA on which the LOCA radiation dise us based,

DR. ROSZTOCZY: That question is a little bit broader. It asked for the time period that was used for equipment qualification following an accident. It includes other parameters like temperature, also.

MR. QUAN: Open Item No. 19: Verify documentation that other chemical environments have been considered, specifically fire protection chemicals.

Open Item No. 20: Clarify the radiation dose rate in Table 4.

Gerry, do you have any others?

MR. KOPCHINSKI: The only other one I have is the question of stratification. I am not sure if that was asked twice or once.

MR. QUAN: I have that one.

MR. ALLEN: Vince, do you have an additional one?

MR. NOONAN: Yes. It is really not an open item, but a reminder that sometime tomorrow when you start talking about your equipment qualification and the environmental and seismic, I want to include a discussion on relays.

MR. QUAN: To clarify that last open item, 21 was to investigate the effect of temperature stratification in the containment environmental designator per NUREG 0588.

MR. KEITH: It wasn't really radiation stratification, was it?

MR. CARSON: Temperature, also.

MR. QUAN: Gerry, were there any others?

MR. KOPCHINSKI: No.

DR. ROSZTOCZY: I have two more items. One of them I identified later, but it didn't show up in the list. I asked for the treatment of dust relative to environmental qualification.

MR. CARSON: Dr. Rosztoczy, that is No. 13.

DR. ROSZTOCZY: Oh, I'm sorry. The other one I believe we didn't identify as an open item, but I think it would be appropriate to identify it as an open item. It related to the radiation source term. Questions were asked and the answer was that, based on some discussion that we had, you are looking at radiation source terms whether they have been evaluated consistently with the approach that in an accident, everything goes into the environment or it stays in the recirculation system.

MR. BINGHAM: That's right.

DR. ROSZTOCZY: You said that one is presently ongoing. I think it would be appropriate to put it on the open item

list.

MR. QUAN: Could you repeat that?

DR. ROSZTOCZY: Yes, an evaluation of the radiation source terms in view of the two possible courses of the accident, one being that the radiation is released to the environment and the second possibility that it is retained in the recirculation system.

MR. ALLEN: Bill Quinn.

MR. QUINN: I would like to go back to Item 2. Could Terry read that one again?

MR. QUAN: Item 2 was send to Dr. Rosztoczy a list of equipment to be qualified taking into account any necessary changes due to post TMI concerns.

MR. QUINN: It seems to me that the open item should be clarified slightly to review the particular table in Appendix 3E and, if there are any changes, to provide those changes. It would not seem necessary to provide something that is already correct, since it is in the licensing document. It, of course, would have to be upgraded.

MR. ROGERS: Furthermore, I think that we said that that was to be submitted to the board, not just to Zoltan, for the board's review.

DR. ROSZTOCZY: It should definitely be submitted to the board, and let me maybe further clarify what it is I am looking for there. In our presently ongoing reviews, we are

ending up with two lists. One list is the safety-related systems list. This lists various systems that you depend on for the treatment of the plant following certain accidents. We have a second list that we call the displacement instrumentation list. This lists instrumentation that are needed for the operator to perform his action appropriately. All equipment, every component in those systems listed in either of those lists, has to be environmentally qualified. So I am looking for these two lists or the combination of these two. I will be very surprised if your FSAR's have a complete list of that nature.

MR. ALLEN: Was the latter list you are talking about the SPDS system?

DR. ROSZTOCZY: The latter list includes every instrument that you include in your emergency procedures and use for operator action.

MR. ALLEN: I understand.

Are there any additional items or questions that anyone would like to ask before we adjourn for the evening? If not, our plans are to reconvene tomorrow morning at 8:00 in the Valley National Building in downtown Phoenix.

(Thereupon a brief off-the-record discussion ensued, after which proceedings were resumed as follows:)

MR. ALLEN: Are there any questions regarding tomorrow? If not, I will declare the meeting adjourned until 8:00 tomorrow morning.

(Thereupon the meeting was at recess.)