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NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

IN THE MATTER OF:

PRESENTATION BY

BECHTEL REPRESENTATIVES ON

NUCLEAR POWER PLANT STANDARDIZATION

Place - Washington, D. C.

Date - Friday, 10 February 1978 **Pages** 1 - 66

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

PRESENTATION BY

BECHTEL REPRESENTATIVES ON

NUCLEAR POWER PLANT STANDARDIZATION

Room 1130
1717 H Street, N. W.
Washington, D. C.

Friday, 10 February 1978

The presentation was convened, pursuant to notice, at 9:45 a.m. before the Commission.

BEFORE:

DR. JOSEPH M. HENDRIE, Chairman

RICHARD T. KENNEDY, Commissioner

VICTOR GILINSKY, Commissioner

PRESENT:

On behalf of Bechtel: Messrs. C. D. Statton, D. W. Halligan, B. L. Lex, S. A. Bernsen, and R. H. Stone.

On behalf of NRR: Messrs. E. Case, R. DeYoung and R. Mattson.

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P R O C E E D I N G S

CHAIRMAN HENDRIE: Well, we're glad to see you. I wasn't sure whether we would turn out a quorum today, but we have, so it's a Commission meeting and we scheduled it in case we could gather a quorum.

I guess you want to tell us where you are going on standardization, Bechtel style. Please do.

MR. STATTON: Okay. We're prepared to proceed. I'll kick it off for Bechtel.

We represent Bechtel Power Corporation, and my name is Charles Statton, and my associates are Mr. Halligan, Mr. Lex, Mr. Bernsen, and Mr. Stone.

The Bechtel Power Corporation's strategic plan provides for a periodic reappraisal or reassessment of the direction we've elected to take in serving the electric utility industry.

Now, we also attempt to assess the directions that the industry is taking; the impact of the agencies that look after those matters; as well as those things that occur from the manufacturers.

We attempt to assess those from the standpoint of how they might change our long- or short-term plan.

Based upon those appraisals and assessments, we then prepare a definitive plan. We present that to our chairman and the board of directors.

We have, on two occasions -- and as you will hear

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further today — discussed the Bechtel Power Corporation's position respecting standardization of nuclear generating facilities. The first occasion was in 1973. We have looked objectively at those conclusions that we have made, and what we have done with that conclusion over these past five years, and we'd like to share some of those results with you today.

We would like to solicit as many of your comments, as we proceed, as we believe that your comments are pertinent in developing any modification that might occur to our plan within Bechtel Power. So, for that purpose, we would like to keep this as generally informal as possible, so feel free to interrupt.

Our presentor is Mr. Lex. Bert?

MR. LEX: Our purpose today, gentlemen, is to discuss the NRC Nuclear Power Plant Standardization Program, and exchange views on the nature of a Reference Design Application which the Bechtel Power Corporation might submit.

As you may know, we have long been a strong supporter of efforts to promote standardization in the nuclear power plant industry, and have carried on an extensive standardization program on our own part, but we have notk elected to submit a Standard Reference Design Application.

It appears to us that your recent efforts to expand and strengthen the standardization program may now offer new opportunities for our participation, and it is that possibility which we wish to discuss.

First, however, because some of you may be unaware of the structure and range of operation of the Bechtel Group of Companies, we thought it well to spend a few minutes giving a brief thumbnail sketch of our organizational structure, as well as of our internal Bechtel standardization program. When we have accomplished that, we will then present our views on standardization and examine how they might match your requirements.

Please feel free to interrupt my presentation at any time that you have questions which you would like clarified. Could we have Slide 1, please?

(Slide.)

The Bechtel Group of Companies is composed of three principal operating entities — the Bechtel Power Corporation; the Bechtel Corporation; and Bechtel, Incorporated — all reporting to the chairman and senior executive management under the direction of Mr. Stephen D. Bechtel, Jr.

We undertake engineering, construction, and construction management projects, both domestically and internationally, through eight operating divisions which report to different operating companies and which serve specific industrial areas of activity — such as thermal

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power, refining and chemical, and mining and metals areas.

Our general corporate services — such as legal, finance and accounting, personnel and procurement — are carried out by Bechtel Corporation for all three operating companies.

(Slide.)

The Bechtel Power Corporation serves the electric utility industry through three operating divisions -- Los Angeles, San Francisco, and Gaithersburg -- reporting to President Harry O. Reinsch and a senior management staff. The Los Angeles Division sponsors an Area Office in Houston, and the San Francisco Division sponsors an Area Office in Ann Arbor.

(Slide.)

Each of our divisions employs the same basic organizational structure composed of departments for business, development, construction, engineering, project operations, quality assurance, and services — all reporting to a division manager, although obviously with minor variations to suit local needs.

(Slide.)

The work undertaken on individual contracts is performed through a project team organization where all personnel necessary to the direct execution of that project are assembled in one physical location organized under the direction of a project manager, and work only on that project.

The typical team structure provides for engineering, construction, quality assurance, and cost and schedule services. The engineering portion of the team is broken down into the classic engineering discipline groups of civil, mechanical, electrical, control systems, nuclear, and architectural.

(Slide.)

This slide is intended to display for you the responsibility and reporting relationships between corporate management, division management, and project management.

Corporate management is composed of Mr. Reinsch, Mr. Statton, and four functional managers -- myself, in Engineering; and managers of Construction, Operations and Services, and Quality Assurance. I have reporting to me four chief engineers who coordinate the technical activites in the principal engineering discipline areas.

The division division managers report directly to Mr. Reinsch and Mr. Statton. The basic departments of their organizational structure receive line direction from their division manager, and functional guidance from the functional managers at the corporate level.

The engineering department has chief engineers in the disciplines to oversee the technical work of the

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technical work of the engineering department. These chief engineers receive functional guidance from the corporate chief engineers.

At the project level, the project manager and key team members receive line direction from their respective department management. The project manager provides project direction to the key team members, and the divisional chief engineers provide functional guidance to the discipline engineering groups.

(Slide.)

Bechtel's nuclear power experience started as early as the construction of the Experimental Breeder Reactor at Arco, Idaho; and participation in the Nuclear Power Study Group in Chicago. This slide tabulates the light-water reactor nuclear power stations in the U.S. and abroad for which Bechtel has performed engineering and/or construction services since 1959. The 24 BWR units total 20,112 megawatts, and the 50 PWR units total 48,236 megawatts. Neither sodium-cooled nor helium-cooled units are included in these totals.

(Slide.)

This slide shows the locations of our current major domestic nuclear projects, consisting of 36 units at 20 plant locations around the U.S. The overlay adds the locations of 26 units previously completed and in operation.

The addition to 12 overseas units at 7 plant locations brings you to the total of 74 nuclear units in which Bechtel has been involved in engineering and construction.

This wide geographic location of site locations have required that our designers respond to virtually every level and combination of seismic criteria, environmental and climatic conditions -- such as tornado design, wind and temperature extremes, tsunami, et cetera -- and soils conditions which it is possible to encounter.

(Slide.)

Our activity is the performance of engineering and construction services tailored to the needs of our client. The scope of services we contract to undertake therefore covers virtually every variation or combination of direct execution or management of engineering, procurement, and construction activities, as summarized on this slide.

Typical projects illustrating some of these examples are: engineering, procurement, and construction job: Arkansas 1 and 2 Units; the engineering, procurement, construction, management variation: Trojan and Rancho Seco were handled under those contracts; engineering only, a good example of that is the Oconee Nuclear Island design; construction only: the Ginna Project; engineering and procurement is best illustrated by the SNUPPS Project, which is a powerblock design and a major equipment

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procurement assignment; engineering management is the typical mode of operation of our overseas projects in Spain and elsewhere; technical service agreements covers areas of continuing operating plant support such as the Pilgrim 1 contract.

(Slide.)

Within the general categorization of scope of services offered, we encounter many variations needed to respond to the requirements of individual electric utilities. Some typical examples are summarized on this slide.

On some occasions we will undertake engineering at the very earliest conceptual stages of a project where a client involves us in site selection, NSSS specification and bid evaluation, but quite frequently we will encounter clients who have already selected their site and perhaps awarded their NSSS and T-G, and we come in with certain preestablished ground rules to work to.

On the licensing and PSAR side, we have been called upon to coordinate the preparation and publishing complete task on PSAR; we've been called upon to support our client who was handling the coordination and publishing. We have occasionally worked with use of outside clients in addition to the basic -- pardon me, outside consultants, in addition to the basic trimverate of client, NSSS supplier, and architect-engineer.

Procurement is handled in almost any fashion you can imagine. Bechtel sometimes functions as a direct purchasing agent, sometimes as agent for the owner, sometimes as a supplier of specifications and bid analysis for owner procurement; and occasionally specifications supplier for contractor or subcontractor purchase.

Thank you for bearing with me for this thumbnail sketch of the organization and of the backlog of nuclear experience which is represented in our group.

Now let me turn your attention to the Generic Nuclear Plant Standardization Program which Bechtel has been carrying out since the early 1970s.

In common with many other architect-engineers and NSSS suppliers, Bechtel had already taken some internal steps at standardization of designs when the AEC standardization policy was announced in 1972. After careful consideration of the policy, we concluded that it was too restrictive in application to meet the needs of the electric utility industry and the responsiveness to site-unique utility-unique requirements which our clients expected of us.

We completed development of the Generic Modular Power Plant concept upon which we were working at that time, and prepared a presentation on our Generic Standardization Program. This presentation, and our views on what was needed for a viable standardization program were discussed with the AEC by Messrs. Allen, Collins, and Schmitz, on January 31st., 1973; and by Messrs. Reinsch, Collins, and Schmitz, on February 1st, 1974.

(Slide.)

That program is summarized on this slide. It is composed of six key elements: criteria definition, criteria application, licensing, basic systems design, physical layout, and procurement.

The element of "criteria definition" is handled through two activities. First is the participation in national codes and standards writing groups. During 1977, some 162 Bechtel people have engaged in 301 separate and distinct code- or standard-writing committee assignments under the auspices of the primary technical societies who direct and coordinate these activities.

The second aspect of "criteria definition" is the embedment of established design criteria and regulatory requirements in our engineering standards program, which encompasses preparation and dissemination of standard specifications; standard drawings for typical engineering details; design guides govering methods of criteria specification, selection, and application; preparation of instructions; and the design control procedures.

The second key element of our standardization

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program is criteria application, which is implemented through technical topical reports prepared to facilitate licensing.

These reports cover detailed design or analysis methods for subjects such as post-tensioned containment design, missile impact analysis, and so on. Bechtel has 13 current topical reports, 11 of which have been approved by the Commission, and 2 of which are under review at present.

The third key element is the Bechtel standard safety analysis report. This is an internal "PSAR without numbers" which provides basic text for use by our engineers in preparing safety analysis reports in conformance with the NRC standard format.

The fourth key element is a set of key design documents which we have prepared to outline basic systems designs. These are standard systems descriptions, describing the design and functional performance criteria for nuclear safety related and auxiliary systems, systems flow diagrams, preliminary piping and instrument diagrams, basic system control logic diagrams, and electrical single-line diagrams.

The fifth key element of the standardization program is the generic modular plant arrangement. There are some eight or nine basic building blocks of which a complete power plant is composed. Each of these blocks has a number of restrictions requiring internal consistency of design, but a relatively small number of interface requirements for association with other blocks. This permits standardization of the basic building blocks themselves, while retaining some flexibility in their arrangement on a particular site.

The last key element of our standardization program is in the area of procurement, which is addressed by the extensive standard specification program described earlier, and by standardization of procedures for supplier qualification and surveillance inspection activities.

You might ask: What have been the benefits of your program? Or how many plants have used this generic approach and generic modular arrangement at Bechtel?

(Slide.)

Of 8 BWR units undertaken since 1972, 4 units have made partial use of the generic, and 2 units have followed it directly. Of 23 PWR units, 3 have made partial use of the generic, and 12 have followed it directly. In power generation capability terms, some 25,000 out of 35,000 megawatts of capacity have been based on partial or full application of the generic designs since 1972.

The Generic Design has continued to evolve during this time, as feedback was received from projects employing BESSAR to help prepare their license application, as experience has accumulated in the execution of detailed plant designs based on the Generic Modular Arrangement, and as new regulatory guides have been issued and regulatory positions established.

This feedback has been incorporated into BESSAR through periodic updates, and in our Generic Modular Nuclear Power Plant Manuals for both the BWR and the PWR. These manuals contain plant and equipment layout drawings, standard system design criteria and functional descriptions, preliminary piping and instrument diagrams, and control logic diagrams.

In combination with our standard specifications, these documents have permitted an extremely rapid start of design and licensing for several foreign and domestic jobs, including the Florida Power and Light South Dade Nuclear Project, with a high level — on our part — of confidence of the technical adequacy and safety of the design. It is indeed unfortunate that Florida Power and Light had to defer South Dade.

Now, with that background on the Bechtel internal effort at nuclear power plant standardization, let us finally turn our attention to the form in which we believe that a standard reference design application could be carried out.

(Slide.)

We would prefer to see a standard reference design process which we would call "Generic Reference Design," which provides for a modular plant layout coupled with standardized design criteria and standardized system design, but with sufficient flexibility to accommodate: each of the major NSSS packages; each of the major turbine-generator sets available; and a family of site specific design parameters -- including seismic design levels; tornado design levels; other safety related natural or man-made hazards phenomena; soils/foundation conditions; and topography, cooling water source, access requirements, and visual impact.

(Slide.)

To be viable, a Generic Reference Design approach requires: an extensive data base of experience; top technical resources available and dedicated; acceptance by potential utility clients; and demonstration of its licensability.

We believe that the first three points are adequately covered, and it is the fourth point which we are discussing with you today.

The several slides present the key characteristics of a Generic Reference Design which we believe can be defined or specified with sufficient exactness to allow an independent examination and finding that a plant meeting them can be designed, constructed, and operated safely. They concentrate on the establishment of the safety design criteria, and the methods of design and analyses which will be employed to meet these criteria, as well as on the acceptance limits or bounding conditions which must be met by the design.

They do not require completion of the final detailed design, but allow sufficient flexibility in detailed design to accommodate equipment from any qualified supplier, and to meet site-specific and utility-specific needs.

These key characteristics include:

(Slide.)

Firm design criteria for safety-related systems, components, and structures including identification of applicable codes and standards and conformance to NRC requirements and guidance.

Criteria would address those characteristics of the items that are important to safety to the same level of detail as a typical safety analysis report.

The various key design documents such as system descriptions, piping and instrument diagrams, electrical single-line drawings, and control logic diagrams which are currently required for SARs would be provided in preliminary form but with sufficient detail to identify features of the systems to satisfy the design bases.

The report would commit to specific analytical methods and associated acceptance criteria for analyzing the consequences of accidents and for radioactive waste management.

Design and analysis methods would be described and appropriate acceptance criteria provided for engineered safety features and other systems as currently required for SARs.

(Slide.)

All material covered in Bechtel Topical Reports would be included or incorporated by reference. Criteria and design rules governing physical separation, fire protection, access controls, and radiation zoning would be provided consistent with current regulatory requirements.

Standardized design details, such as typical penetrations, seismic supports, pipe whip restraints, and other installations would be included.

The report would contain the required general listings and description of safety-related components, however in most instances specific numerical data on size, capacity, horsepower, and so on, would be replaced by definitive criteria for setting these values.

Interface requirements for each NSSS turbine generator system would be included.

(Slide.)

The report would contain sufficient layout information to define firm arrangement and relative location of safety-related features. To the extent possible, specific dimensions would not be included, however, except in instances such as the turbine generator unit where its orientation and separation from safety-related structures might be defined by limiting dimensions.

A family of site-related design bases would be presented, and specific change in plant criteria and in features to accommodate each set of site parameters would be defined.

The report would also contain sufficient utility interface criteria to show how site-dependent features, such as cooling water and ultimate heat sink and multi-unit arrangements, would be accommodated.

(Slide.)

Many of the key characteristics of a Generic Reference Design, as we have just described them, are clearly in conformance to the Standard Format for SARs and the Standard Review Plans. Several may not be, or we may be misinterpreting those requirements, based on our experience with custom SARs. This slide compares our concept of a "GRD," or a Generic Reference Design, to our understanding of a PDA/SDA, and highlights the things we believe differ.

To pick two examples: Take the seismic basis where the present PDA/SDA scheme requires a single seismic design envelope — placing this in the position of having to make a cut between various geographical areas of the country that can or cannot be met by a given seismic design. We would prefer to include, in a Generic Reference Design Application, several discreet seismic intensity level bases to bracket a wider range of sites, without penalizing a low-intensity level with a design for a high-intensity case.

Another example is the "containment," where the present standard review plans and format end up driving us into a fully dimensioned presentation on the containment. We believe that our topical report describing the analysis and the design methods for the containment, the handling of critical details, and telling you virtually everything about a post-tension containment except the diameter and the height of a particular containment, provides an entirely adequate design base for a safety finding on containment. We believe the plant design can be licensed on a generic-reference basis, without limiting the particular dimension that it must be specified for a given NSSS and utility site condition.

We find customers with various problems, in terms of the physical limitations of the site, that may lead to a minimum needed containment diameter vs. units like Calvert Cliffs and the Pilgrim 2 Project up at Plymouth Rock, where local scenic conditions and historic interest leads to a

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desire to have the lowest profile plant possible -- hence the maximum reasonable containment diameter. We need room for that variation.

I don't intend to go through every one of those items on the slide. We would ask if there are any questions or comments, or discussions you would like to have around it at this moment.

(No response.)

MR. LEX: Dr. Bernsen, is there anything you'd particularly care to single out on there?

DR. BERNSEN: Well, for example there might be some concern in the looseness of defining "containment," if necessary, for example, some minimum containment volume might be identified, and things of that sort. But we'd like the flexibility in diameter, and height, and things like that.

And again, in the case of arrangement, as we have said before, the relationship of components, without necessarily specific dimensions, or typical dimensions. Because, particularly in preliminary cases, it appears that the important features are the criteria, and not the preliminary dimensions.

We have commitments to satisfy a certain safety objectives, and if the dimensions have to change to meet those, we do that anyway, normally, in a given situation.

But I think we could get into that discussion

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a little further later on.

CHAIRMAN HENDRIE: I guess I'll want to come back to this. I don't know whether I'll want to comment now.

MR. STATTON: It would be appropriate.

CHAIRMAN HENDRIE: Maybe I would do better to hear some more, and then -- Okay?

MR. LEX: Well, it is apparent from this slide that the basic difference is in the lack of specific numerical data, rather than in criteria bases, design methods, features, analytical approaches, or acceptance limits.

(Slide.)

The benefits of standardization have been described in many ways and from many perspectives. Underlaying the perspectives of the regulator, the utility owner, the equipment supplier, and the architect/engineer, however, are two fundamental objectives: to expedite the licensing process, thereby shortening licensing schedules and improving the utilization of the NRC staff; and to stabilize designs and design and analysis methods, thereby allowing projects to proceed in a more orderly fashion with less exposure to late redesign, and allowing the NRC staff to conduct more thorough reviews and develop greater confidence that important issues have been identified and resolved.

(Slide.)

We believe that a Generic Reference Design has several definite advantages in meeting the objectives of standardization.

A GRD would stabilize design features by establishing the design and performance criteria significant to safety, and the acceptance criteria or limiting conditions which must be met by a safe design.

A GRD would allow flexibility for response to site-unique and utility-unique design features without sacrifice in underlying safety criteria.

A GRD would minimize the potential cost penalty of unneeded overdesign forced by "enveloping" criteria.

A GRD, by focusing on design and safety criteria rather than on final detail, would permit more timely updating to meet changes in the state of the art with minimum impact on overall design and project schedules.

A GRD will provide stabilization of the design process in a manner which will permit an optimum and competitive response by the industry.

Finally, a GRD will have broader acceptibility in the utility industry than a "single-case" reference design.

Gentlemen, that completes the formally prepared presentation. We have copies of it for you, which copies

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do include two appendices providing some backup detail relating to the containment design question, and to the manner in which system descriptive information would be presented in a generic reference design.

CHAIRMAN HENDRIE: Okay, and I hope there are a couple of copies so that the staff can have copies.

Well, let me tell you how it strikes me, and I'll ask other Commissioners to comment. Perhaps we can hear from the staff.

I've recognized Bechtel's reluctance to come down the path that others have come with this on standardization, going back a long time -- there were some meetings in '73 and '74, some in Gaithersburg, and in our offices in which we covered many of these same subjects. And the reasons that seemed to you, in the light of your experience and the way you do your work, were good reasons not to come in and focus down on single designs, and this is certainly consistent with that thrust.

From my standpoint, I must say that as I look at standardization propositions -- do it this way; do it that way; try some variation here; the various options -- I keep looking at it from the standpoint: If we accept a particular option or avenue, okay, and go down that line, after the staff has argued with you over whatever there is to argue in that option and that's settled and agreed upon, and then

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we come to put a specific unit into the process, I ask myself: What does the staff have to do in order to go forward and get a construction -- make a case to justify, as appropriate in the particular case, the necessary findings for the construction permit?

To the extent that that work that was done previously on the so-called "Standardization Module," or design, or whatever, is complete and specific enough so that this work that staff has to do for a specific unit, for a specific CP is either zero — which is an unrealizable ideal — but at least minimum, then I have a higher regard for the standardization option.

Conversely, to the extent that the option has -- that that particular standardization approach has, as yours does, a considerable variability into it -- so that when I come and have the specific application for the specific unit-- then I think there's still a substantial amount of staff work to be done.

And that, it seems to me from my standpoint, makes it a less desirable option from our standpoint.

Now, I'm willing and I recognize that I have to temper this view, also, and take into account what is practicable from the standpoint of the people who have to prepare these designs in advance of specific orders, or "modules," or whatever, and carry the burden forward of developing them far enough, and defending them in the staff review, being able to carry that preinvestment -- you know, normally engineering firms aren't like heavy capital intensive firms; their stock and trade is in their heads and in their design notebooks, and you typically don't put it to work until you've got an order; you don't have a lot of expensive machinery that you have to buy before you can be in the business. And in a way, the standardization things are going in that direction.

It's your form of buying a lot of heavy machinery, which doesn't pay off for you until you get an order for a product.

So, there are some practicality limits there, in terms of what you can stand to do. And those limits vary from firm to firm. They're different between the vendors -- the NSSS vendors -- and architect/engineer firms, clearly.

There are also the antitrust considerations, which mean that we cannot be in a position of locking into specific suppliers on components that may reasonably be supplied by a number of people in the field. We can't lock in on one and, you know, get him a preferred position because he happened to be the guy whose design got used by an engineer in presenting the thing. That clearly is a place we have to go back to performance specs and so on and work fairly closely with the antitrust people to make sure that

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it's --- But in spite of those elements of practicality and the antitrust considerations, I must say my own view about the possible ways to standardize is that: The closer we can get to the place where the thing that we talk about in the beginning -- apart from any specific application -- just comes and is as specific as it can possibly be, and allows us to settle the differences of opinion that there may be, and get agreed on what's going to be acceptable before we get to the specific application, that's where I think the payoff in the desirable path is, from our side.

Now, as I look at your generic modular approach, it does appear to me to lack that degree of specificity which would allow us to go into the construction permit review on a specific item using it, with really a great deal of the safety review already in hand, and written down in the generic staff safety evaluation report that goes with the design.

It seems to me that what you have here in the direction you go is one in which we can get a piece of that done ahead. Your generic standardization -- the module scheme -- amounts, in effect, to a series of presumably coherent and internally consistent topical reports, to the same extent that other topical reports, dealing with how you do a certain piece of analysis, or what your approach is on some design -- safety related design problem.

To the extent that these can be thrashed out

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ahead of time with the staff, then when they arise in a particular case, why we already know what your point of view is, we already know what the staff's point of view is, and that's a help in getting on forward with it.

But it does seem to me that your approach would leave — for a specific CP application for a specific unit -- would still leave the staff with a review effort which, while perhaps somewhat less than that that might be involved with a complete custom-design, still is pretty extensive.

And I wouldn't be surprised to see that the differences in the manpower investment and the time investment on the staff's side, between that and sort of a run-of-the-mill custom design, is not all that great.

After all, not only would the staff have to look at the way in which you have linked the modules and to go over the interfaces, but considerably beyond that, in numbers of areas, instead of presenting specific designs, specific analyses, you say: Here's how we're going to do the analysis. Or, here are the rules we are going to follow to do the design.

Now, we may have agreed back yonder that those were reasonable ways to do the analysis, reasonable rules for the design. Now you've got a specific design. We're going to have to look at it. The staff has to come forward in that CP review and say "we know what the specific design

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is"-- preliminary design, at least. "We've looked at it, and we can find this and that about the safety standpoint." They're going to have to look at that specific design you present, now, and decide whether in fact they agree that you've applied the criteria rules in a way that they agree with.

And by the time they get through doing that, I've got a notion there may not be a great deal of manpower difference on the staff's part between doing that and having taken a specific custom design presented and just said "good," start at day one, and we'll work through it and see whether we agree with it or not.

Now, obviously there would be some areas where that's not so and where there is considerable advantage, but I'm afraid there'd be a number of other areas where it wouldn't.

COMMISSIONER GILINSKY: Could I ask something before --

CHAIRMAN HENDRIE: Yes. That sort of runs me down.

COMMISSIONER GILINSKY: Yes, I'm anxious to hear your response on this.

But to what extent is your thinking tied to coping with the licensing process? And to what extent is it really driven by other considerations. You could mention

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that in responding to Joe.

CHAIRMAN HENDRIE: Yes; it's a useful point. Because, from my standpoint, you know, if pretty well driven by the licensing process, and that's sort of the end of it.

COMMISSIONER GILINSKY: Well, because one of the things that impressed me -- going up and looking at the SNUPPS Project, was that there are just a lot of other important aspects about standardization, having to do with the way you built the plant, and so on, which are quite apart from the licensing project.

MR. STATTON: Yes, much more than we can deliver in a written document to you.

Well, generally, of course we wanted to address the two objectives that we outlined there -- that we wanted to ease the licensing time, if we could; and I think you've become, of course, a little bit attached to whether or not, does a number make the license process easier for your staff or doesn't it? Does the height and the containment, or the diameter, does it make it easier? I don't know.

We have suggested that perhaps it really doesn't make it that much easier --

COMMISSIONER KENNEDY: Could we --

MR. STATTON: I don't want to interrupt now --

COMMISSIONER KENNEDY: I don't want to interrupt now --

MR. STATTON: Go right ahead.

COMMISSIONER KENNEDY: I want to come back to that, because that relates to some assumptions, I think, from your side as to how this process does or ought to work.

MR. STATTON: Yes, and I think this is the sort of exchange we really want from you. Because we're not here to try and "convince" you, or turn you around, or anything. I think we are really trying to get your rebound from the presentation we have made.

So that that issue should be addressed. Does the number, does the height, does the diameter conveniently provide you with more reason to give that a CP or not? I don't know.

COMMISSIONER KENNEDY: Will you, later -- not now, because I don't want to interrupt what you're trying to get at in response to Mr. Gilinsky's point -- but will you explain later why you think it need not?

MR. STATTON: Yes. If I may call on some of my partners here to help do that?

COMMISSIONER KENNEDY: Sure.

COMMISSIONER STATTON: The other point is, looking at all the experience that Bechtel has had -- and particularly the experience we had in getting the SNUPPS Group together. There was originally some 26 utilities involved that we

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suggested ban together to do what 5 of them ended up doing. The reasons we lost the other 21 were varied. Some of the very same reasons we're talking about generic designs.

One happened to be right in this area. His reasons were: Look, he didn't feel that he wanted to be penalized for the site envelope conditions, if we felt we had to envelope so we could cover at least the 4 sites that we had. So, you lose someone on the basis of economics of a design.

In looking at the broad experience that we've had as Bechtel, from seismic character from the West Coast to the East Coast, to the South, we have made quite an analysis of the changes that really need to be respected from any one design to another, insofar as seismic is concerned. And we have a pretty good idea of those things that really need to be addressed.

And in some cases, the seismic character of a plant can treated very easily, going from one location to another, simply by addressing the specific areas that we have a pretty good feel for where those characteristics need to be changed within the design.

So, from the point of view of having a specific design with dimensions, our experience tells us that the market for that, or the useability of that with the utility industry, is going to be substantially limited.

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Because the utilities have an economic thing that they must consider: Is that the most economical design for the plant that they have?

We have probably — in the Gaithersburg office, alone — no fewer than 5 or 6 audits a year by the Public Utilities Commissions, coming to take a look: Are we in fact spending the utilities money as well we we should?

So you can't avoid certain of the economics. And yet, on the other hand, we have to address the fact that we are trying to provide something that has a safety character well enough to get licensed.

So it is for those particular reasons that we have some hesitation of picking "a" NSSS supplier, "a" unit size, "a" containment dimension, and coming in and getting that licensed, and expecting it to have the broad market value or utility interest that we have seen we've been able to get under the generic approach.

COMMISSIONER GILINSKY: Isn't the penalty for enveloping a number of sites really pretty small? In other words, from maximum to minimum?

MR. STATTON: I'm going to let you address that one.

COMMISSIONER GILINSKY: Because I remembered it was a very small percentage.

MR. STATTON: Within the SNUPPS character, you are

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absolutely right. In the locations of those plants, the enveloping that we ended up with was of a very little impact, say from New York to Kansas. So, it didn't have that much.

MR. LEX: But what's the seismic --

COMMISSIONER KENNEDY: You indicated earlier that it might have been quite different, as to a number of other sites which are not in that package.

MR. STATTON: That's right; that's right.

COMMISSIONER KENNEDY: I guess that's the question that Mr. Gilinsky's talking to.

MR. STATTON: Now the exact value of that, we didn't take time to look at. I mean, we didn't go down and investigate the detail, because at the time there wasn't that much detail to look at. But it did bother a number of the utilities that the enveloping was going to be at some particular penalty to their utility.

MR. LEX: Well, our experience, in looking at the cost differentials in particularly civil structural design considerations, and secondarily to some extent the increased quantities of piping, and electrical, and heating, and ventilating, and all these other good things that come along as your plant grows larger, in translating from some low seismic intensity sites to examining .35 and .45 and .55 G-type things, we're looking at more than just a few percent.

We can get up into ranges of 10 to 20 percent pretty rapidly. It's a very awkward thing to put a very specific number on, because you're always looking at apples and oranges -- or else, a hypothetical treatment. But our data do not allow us to concur in the 1 or 2 percent, or 5 percent range, whatsoever.

The cost of these on San Onofre showed significantly more money involved.

COMMISSIONER GILINSKY: Well, but --

CHAIRMAN HENDRIE: Yes, but those are almost pathological cases in the seismic sense. I think, as you raise the seismic design bases, for instance, from a very nominal one down around 10 percent of gravity at 0 period, it does seem to me that the enveloping penalties -- there is one, but it's not a rapidly rising function. And then somewhere around a third the acceleration of gravity, you begin to get into a place where you're really having to scratch hard on the design in order to meet the higher forces involved; and from there on out, why I doubt that it's really very practical to present envelope designs.

But, let's see, Dick, what? Somewhere around a quarter G, or .3, .33?

MR. DeYOUNG: .3 is the normal type, for standard plants.

CHAIRMAN HENDRIE: The standard ones on which that has worked through to a PDA have been around .3 --

MR. LEX: I would agree with that statement.

CHAIRMAN HENDRIE: And furthermore, I think at that level, why you've covered a pretty fair chunk of the U.S., about 75 percent of the likely site locations.

Now there is a fraction left that falls into the higher seismic realms, and there -- there, I think maybe you've got to go custom.

MR. LEX: Dr. Bernsen, I think, had something to add.

DR. BERNSEN: Yes, I think there are a couple of things. First of all, one point didn't come out -- and I believe you may be thinking about it -- what you talked about three, four, five years ago.

In this particular case, we think we're talking -- I shouldn't say we "think" -- we're talking about a committed layout of the module; a relationship with the module. It's not the building-block approach where you move things around, but a fixed relationship of complements for an NSS. So, you firm up the relationship of the safety-related structures.

And it depends upon how far you carry the design to determine how much the cost impact is. At this stage, I think we're saying that relative layout of each structure would not change from seismic level to seismic level, but if

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you get into things such as reinforcing details, and specific wall thicknesses, and additional flaws in diaphrams, then you get to add to the structural cost. But, in a lower seismic level you could take some of these out, if they're not there for shielding or other purposes.

Now, if you get into final design and you want to locate the piping supports, and snubbers, and if you want cable-tray supports, and so on, now your costs are significantly different as you change the seismic level.

So it depends upon how far you want to carry the design in licensing.

I'd like to answer the other question you asked before. From my standpoint, I think that what we're talking about would do more to expedite licensing than anything else, and it is really for that purpose. Because it's hard to figure out why we need so many numbers — specific design numbers — in the licensing process.

As I said before, the important thing to demonstrate in the final design is that you have met specific requirements and commitments and limits. If we said we were going to use a 6-inch pipe for some auxiliary feedwater system, but we also say we have — and that we supply a certain flow — but we also say that we want a certain rate that will satisfy the requirements to take care of decay heat with so much spilling, the governing criteria is the one that says you take care of a certain heat release with a certain amount of spilling, and not how big the pipe was or what flow capacity you specified.

So we've kind of — we've got a belt and suspenders approach. And the numbers — the flow rates, the capacities, the sizes -- don't govern; it's the criteria that govern. And just as in the construction area where the I & E inspectors are verifying that the design is carried out in construction, why not have the staff verify that the final-design numbers implement the commitments and criteria and methods.

MR. LEX: Along that same line, I would like to --

CHAIRMAN HENDRIE: It's possible — Well, you had some other questions?

COMMISSIONER GILINSKY: No.

COMMISSIONER KENNEDY: You were about to say?

MR. LEX: I was about to come back to your earlier question, Commissioner Kennedy, on the containment diameter and height question.

The basic characterization of the containment pipe, the basic purpose of the containment, after all, is to contain energy release from a ruptured system. The basic characterization of that is the energy quantity. It begins to impact or relate to containment dimensions only when you start specifying a pressure and drive yourself into a volume number. We would have little difficulty in selecting, on a generic design basis, a pressure volume relationship necessary to suit a given NSSS and establishing the containment pressure design level that we would attend to.

We're simply trying to retain some level of flexibility in the dimensions to adjust the containment to suit the individual unique site requirements that we handle.

And having been personally involved in shoehorning plants --

CHAIRMAN HENDRIE: Well, there are more NSSS-related, from that standpoint, sites --

MR. LEX: The NSSS establishes the energy-release values, certainly. And after that, it becomes a geometry question.

COMMISSIONER GILINSKY: I wonder if you could comment on how long you see the process taking right now, from inception to operation of reactors, and what you think is achievable by fully employing the plans you are laying out?

MR. STATTON: Chuck just completed a very extensive study on this. To give the variations on it, you can pick it up from there.

MR. HALLIGAN: But the more I worked on it, I think, the less sure I became of what I thought I knew.

(Laughter.)

CHAIRMAN HENDRIE: Yes, I've had the same experience. There may be other fields, but this one is notable, that ones confidence level and ones comprehension goes through an early maximum —

(Laughter.)

CHAIRMAN HENDRIE: — and I haven't found that — after you — once you peak out, why I haven't found that it turns up again.

(Laughter.)

MR. HALLIGAN: Well, we can look at it taking several approaches. If you boil it down to the very simplest parts of the problem, we believe that if you would take a look at from the time you award NSSS until it's delivered at the site -- which is a good, key point to look for -- to date, they're talking about 44 to 54 months for that in today's environment. Although, in talking to the people who make the NSSS systems and their reactor vessel suppliers, and steam-generator suppliers, they feel that if there were a fairly high level of stability in the market and in the requirements, to where they could make commitments and get the long-lead-time materials such as forging on stream, they could cut that down to something on the order of 30 months, say.

So, you look at the -- and also you look at the other end of it: The time the reactor vessel goes in place at the site, and then the bulk work to accomplish -- installing wire, and cable, and piping, and looking at the effective utilization of manpower -- you start, say taking the 44 months -- you end up with about 8 years, say, from the time you award the NSSS until you finish it up as a commercial operation.

CHAIRMAN HENDRIE: So there's about 4 years. Once you get the vessel on the site, you're about 4 years off completion.

MR. HALLIGAN: That is a good contributive time. That looks very easily attainable.

COMMISSIONER GILINSKY: Under present-day conditions?

MR. HALLIGAN: Under present-day conditions.

COMMISSIONER GILINSKY: And how much time is there before the award of the NSSS?

MR. HALLIGAN: In your site-licensing problems, anywhere from 2 to 5 years, maybe. Take 3 years as a good average, maybe. And that's a tremendous licensing window; a tremendous window for the stabilization of given criteria, from the beginning to end.

From the awarding of NSSS, it seems practical as a goal to search for in the industry to match what they're doing overseas right now. And that is, about 6 years from award of NSSS to fuel loading. And they do that by virtue of, say, decision making, and not being hampered by the potential interferences, by licensing, everything moves ahead very boldly, with a sense of confidence that what they are planning today is actually going to occur.

COMMISSIONER GILINSKY: When you say "overseas," is that pretty much the case everywhere? Are you talking about Japan? Or Germany?

MR. HALLIGAN: It's starting to flow down, overseas, also. Bechtel has not has as much experience overseas --

COMMISSIONER GILINSKY: Well, this is your own experience overseas that you're referring to?

MR. HALLIGAN: Yes.

COMMISSIONER GILINSKY: And that would be where?

MR. HALLIGAN: France, Spain --

MR. STATTON: Taiwan.

MR. HALLIGAN: Taiwan.

So as far as doing the design, gathering the material together, getting it at the site and putting it together, 6 years is entirely possible. It's a very realistic time.

But in today's environment in the United States, we believe that about the 8 years is something we ought to be seriously looking at, and not the 10 to 13, 10 or 11 that we seemed to be seeing in the last few years.

COMMISSIONER GILINSKY: Oh, you're actually seeing something like 10, from the award of the NSSS?

MR. HALLIGAN: That's correct.

COMMISSIONER GILINSKY: I see.

MR. HALLIGAN: And of course that's made up of a number of elements, some of it being the lack of stability in the needs by the utilities, their perturbations on their side, the financing problems, and also it's the impact of the licensing process itself and the licensing requirements.

COMMISSIONER GILINSKY: And how do you see the licensing process impacting on this?

MR. HALLIGAN: Probably, in the establishing of the confusion over the lack of confidence of what I plan today, and I can plan a total scheme, and then I put together a method of carrying it out and getting it done, there is enough perturbation associated both in the processes and the public hearings and the changing of the safety requirements, however large or small they might be, it's just enough to keep the industry off its feet from an effective and a very efficient standpoint.

COMMISSIONER GILINSKY: Now is this up to the CP? Or do you see it also going on after the CP.

MR. HALLIGAN: There has been considerably after the CP.

COMMISSIONER GILINSKY: I mean, is that a significant part of this extra time that you're pointing to? The post-CP?

MR. HALLIGAN: In the efforts at looking at this recently -- and believe me, this is not intended as a negative comment towards the review staff in any sense; it's just the fact that we believe the impact of the total licensing activity, if that could be reduced to zero so licensing were not an impact on this whole process, that about 3 years could be reduced from it.

COMMISSIONER GILINSKY: But this is --

MR. HALLIGAN: But part of that is on our own side, as far as responding to existing licensing criteria, in the forms of adequate or understandable codes, and standards, et cetera.

COMMISSIONER GILINSKY: Let's see. Are you including the CP review when you say "3 years"?

MR. HALLIGAN: Yes, I am.

MR. STATTON: Oh, yes.

COMMISSIONER GILINSKY: Well, I mean that --

MR. HALLIGAN: And I would like to go back, and this --

COMMISSIONER KENNEDY: Yes, but how about separating that -- which was the question, earlier.

COMMISSIONER GILINSKY: Yes, in other words --

COMMISSIONER KENNEDY: Take the CP out of it, and then what? After the CP has been issued.

COMMISSIONER GILINSKY: To what extent are you faced with new requirements, and so on, that one hears a great deal about, after the CP is granted? Or, can you plan, reasonably, beyond that point?

MR. HALLIGAN: It's been the implementation of say the broad requirements, and understanding of systems separation, seismic support for cable tray and conduit, the details of implementation which were not fully understood or defined in everyones minds five years ago.

And so a great deal of -- and this gets back to -- leads into something that we believe the approach that we're suggesting might help to solve.

One of the biggest problems that exists in the completing of plants, to date, are those -- the wire and cable, the conduit, cabletray hangers, piping -- all largely associated with the solution of the pipe-break problem, separation, seismic design. The method of design of all these things depends on a lot of field-fit. But yet we're taking the total system of duct supports, cabletray supports and designing a very careful criteria and degree.

The hangers. They have to be installed in sequence. And as we got smarter and smarter, and become more -- say the regulatory requirements became much, much tighter on how we do this -- the tremendous interferences in

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the field — productivity installing all the bulk reduced significantly, because a great deal of backfit was required. to put all of this field-bulk material in place.

So, it's unlikely that you could ever complete a standard design of a plant -- a specific, implemented, standard design — to the degree that you could solve all of that. The physical problems of getting all of these little pieces associated -- and that's another reason why we can't really honestly give you a good answer as to what does it cost to go from .2-G to .33. Because the real cost is in trying to fit 17,000 pipe hangers, along with 27,000 cabletray hangers, in an area that needs to be laid out in extreme detail to avoid the congestion, just to get them in, and still permit some field changes.

DR. BERENSEN: I can't give you anything specific on the effect of schedules, but as a practical matter — to give you some example -- most of the projects we're worrying about today have CPs. And yet the amount of time and effort spent by licensing-oriented people in supporting projects, trying to figure out how to solve new designs, meet new requirements, how new requirements apply to plants with CPs and not OLs, is greater than ever before.

We have a larger number of people worrying more about these specific problems —

COMMISSIONER GILINSKY: What does this do? Does this slow you down in your design? Or do you —

DR. BERENSON: It creates uncertainty, and backfitting, and redoing.

COMMISSIONER GILINSKY: — end up redoing things that you've done already?

DR. BERENSON: Yes, all of these things — depending upon how smart you are, and how far ahead you can anticipate what the requirement might be when you bring the final safety analysis report in, it could be anything from rubbing out a drawing, to ripping out an awful lot of concrete and steel.

COMMISSIONER GILINSKY: Now, doesn't this argue for having a final design, to the extent possible, before we ever get involved in this process? I think maybe that's what Joe was saying at the beginning.

MR. HALLIGAN: Well, let me ask a question. This is really what we're trying to sort out, exactly the same thing.

Will, in fact, a standard reference design which cannot specify all the major components — like the exact manufacturer for the feedwater pump, and for the condensate pumps, and the safety pumps, and all these things — does the perturbation caused by finally acquiring the actual pumps, and systems, and components going in there, does the perturbation to that, as far as the "look-see" or the review of the safety aspects of the plant, are those greater than what we are proposing in the GRD?

COMMISSIONER KENNEDY: What's your answer?

MR. HALLIGAN: We don't think so. Because it seems to us the most important thing is to make sure we all agree on what the criteria is for that pump. So that no matter whose pump we buy, it will fit the safety-related criteria, but yet permit the commercial forces to come into play to adjust to different pipe sizes, different pipe orientations. Because when you get to the seismic, again, the most important thing is to make sure that piping system will withstand the best in a seismic environment, not just meet the criteria.

So, we would like to see a design evolution come about where we would not have to have all of those very cumbersome, awkward, almost impossible pipe supports in there. And today, if we sit down to design a standard plant which would be approved, it would in fact have to include some of those things, to really respond to what you are looking for, to avoid all this continuous review, specific review of some of the design, dimensional details.

Because "dimensions," that's on this whole -- I keep referring back to the seismic, because I think we all perhaps have discussed it enough; we have a pretty good feel for why it is such a pain in the neck.

So, would the review, under the standard plant design, reference design, once you get a given feedwater pump, is that greater than what we are proposing -- which is that you don't size the line that comes out of that pump, but we could agree on what the criteria is for that pump -- for the pump, and also for sizing the line and supporting the line.

Because, again, we would like the flexibility to improve on that design, on incremental -- on a controlled basis, in boxes that fit within a hole, rather than having to change the whole bit.

Another example: On the philosophy as we look at it -- and we're really sure it differs all that much from yours, either -- take the containment vessel again, which is something physical we can all recognize.

There are several major suppliers of the tendon systems for prestressed post-tension systems. There's been a great deal of thought and evolution that has gone into what is the appropriate length, and different manufacturers, for commercial reasons, have different lengths, different sizes, different end connections.

There is a tendency right now that if in fact -- and we have been somewhat of a party to it -- in order to become more standardized on this, and to avoid as much discussion and prolonged review with NRC, to narrow down those requirements to the point where we've almost eliminated any competition.

So, the criteria for the tendons, the methods for analysis, and the way in which the criteria for the end connections would -- if that could be established, then there are several manufacturers that could come in and respond to that.

But there will be a tendency, we believe, as we tend to -- if Bechtel were to draw a containment structure giving dimensions which would tend to fix the tendon length, which would tend to fix the tendon diameter and the numbers of it -- that all of a sudden we would tend to push some of the potential suppliers out of the way. Because it's too risky a business for that size a company to enter into it anyway. So that's one of the things we're trying to get.

MR. STONE: I think it would be worthwhile if you would allow me, just for a few moments, to use I think the best example there is in the industry today -- the advantage of the generic application -- and that's SNUPPS; that sprung from a generic design.

I know two of the Commissioners have been out to visit to see what the project is about. That sprung from a generic design by Bechtel which was far less advanced at that stage than we are today in our generic designs.

It allowed the project to complete its filing,

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from the time that the nuclear steam supply system was selected, to the filing of the PSAR, was 9 months; and the CP was August '76. So that was 24 months.

Now, there was some delay in the construction permit time, but the advantage there was that, springing from a generic design, and bringing together the custom requirements of 5 utilities, was able to benefit the filing of a significant document and achieving the first construction permit, in view of that task of bringing together the people, within 24 months.

Then, the completion of the first unit, the first fuel load, was supposed to be toward the end of '81. We have seen the effects of economics, of slowed growth, have stretched that out. But that was looking at a period from the time the PSAR was docketed, which was June '74, to the fuel loading of the first unit, was 7-1/2 years. Now, if all of those things had come off on time and had not been affected by financing, and low growth, that would have been a significant improvement to the industry.

And I think the example of the utilities being able to work together in small groups such as that with a generic design, allows them the economic advantage that Mr. Statton has talked about as one of their needs.

CHAIRMAN HENDRIE: Well, it's certainly a reasonable way to do business, and is one of the standardization options, I must say, I think the staff is in fact rather fond of. And from our standpoint, it is a very satisfactory one.

But the essence of it, I think from the staff's standpoint, is less that you are able to form the specific application for X units from your generic base that you have in hand; that, you know, is not, I think, a notable point for the staff.

What's of interest to the staff is: By George, here's a specific application that says "here's the design of the plant, and we're going to build six of these, and there are going to be a few minor differences for site-related matters as noted in each of the site-specific applications, but here's the specific design in terms of the basic safety-related plant design. And here are the analyses that go with it. This applies to all these units." And the staff looks at that and chews through that, and that then stands for all the individual units.

And I hope we are doing the same thing in the OL stage, to the maximum possible degree.

Now, it was an advantage to you to have the BESSAR backup in-house, in terms of your putting this application -- the joint application -- together for your clients. I guess there would be some incremental benefit to you and to the staff if the staff had looked at BESSAR

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and there were sections of that on which the staff had said this is a reasonable approach, and so on. But I really wonder if that would have made very substantial differences in the work the staff would have felt it had to do when the specific design came in.

And what I have a feeling is that, because of their need to be able to speak in some detail to things on the specific design, maybe not so much. Not nearly so much advantage, I think, as a case where there has been a reference design -- a standard design which is pretty specific -- which does settle down to the maximum possible degree on how big is this, you know, what have we got here, the whole thing, has been worked over.

And that's, you know, that's sort of a fundamental comment I make to you about this concept.

DR. BERNSEN: I'm curious. How much specific numerical information does the staff need, and what do they do with it? What do they do with a "6-inch line size" or a penetration that's 2 inches, which is 3 inches, and things like this? What's governing in their review at the PSAR stage, first of all?

CHAIRMAN HENDRIE: Well, I think we ought to -- I haven't given the staff a chance to comment, and let me do that in a minute, and then they can address this point, among others.

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But I must say that what you propose, the sort of thrust that you take with this generic modular sort of approach, it may be that it's workable in part at the construction-permit stage, but I think the staff will still have to do more work on a specific application using it than they would if they had a more specific, approved, standard design in hand.

What bothers me more is I don't see any reasonable way for your scheme to progress to the point we would like to get to, I think. And that is, not to have people coming in referencing preliminary design approval standard designs at construction permit time, but rather for us to get into a shape where we can do a single major safety review and let that stand.

What this requires is a design which is final, in a safety sense. It needn't be a final -- now we're going to get all the ready proof for construction drawings and so on, but in the terms of final safety analysis.

And, you know, we have a batch of preliminary design approvals out now, and are working hard on sort of the next phase of the standardization policy, to see where we go from here.

But the thrust, very clearly, is to encourage those people supporting those designs to go forward to final -- to a thing which we'll call a "final design approval," or a "standard design approval," or whatever, in which we feel that we know enough to speak pretty authoritatively on a generic basis to the safety aspects, and not have to retread at OL time.

What that leaves, then, the thing you brought up. Now we have to confirm that what's actually built indeed conforms to that design. The staff will have to look at that. It will be, in part, an inspection function, and in part a licensing review function. But I would see it as nowhere near approaching the present process, where there is a whole new presentation, you know, a refurbishing of everything in the application, for the final safety analysis report, and the whole staff review of that, and so on.

COMMISSIONER GILINSKY: What I understand the Bechtel people to be saying — correct me if I'm wrong — is that this kind of detailed final design somehow conflicts with industrial reality. Is that in fact what you're saying?

MR. HALLIGAN: We question that, yes. That you're going to get enough perturbation, through actual final equipment in there, that there is little or no difference in the amount of time of review required by the staff to confirm the fact that it does fit the preapproved design, with the new specific equipment in it than our approach where the criteria is preapproved, and we still buy the

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specific equipment and put dimensions on it which requires a total staff review.

And the other -- I was thinking as you were talking about SNUPPS, Joe, is there any difference, really, in the approach, from the licensing standpoint, considering the SNUPPS project, to one of the generic family, and it becomes, then, the same reference submitted as a standard reference? It is a standard licensed preapproved design, and would enjoy, or would require the same degree of changes to meet whatever license changes came along, and commercial equipment changes came along, as a standard reference plan submitted for a preapproved design.

The end product seems to me to be identical.

CHAIRMAN HENDRIE: I think that's right, but I would want to cover the ground again to make sure I understood those things. I have been threatening to give the staff a chance to comment, and why don't I -- Ed? Roger? Dick? Please do.

MR. MATTSON: From a broad perspective, as an engineering matter, what the people are proposing today makes good engineering sense. That is, the approach to standardization which emphasizes performance objectives -- I didn't hear the words, but I presume that underlying that is qualifications testing. I did hear words about national standards. That's good, solid engineering sense, at least in my judgment. It is a good approach to standardization.

The problem comes in trying to implement that, along the path that Bechtel is proposing today. One problem is a matter of trust -- trusting people to set performance objectives, not provide you any details about how they're going to meet them, and then expect them to come back a few years later having met them.

I will give you two examples -- one having to do with the line sizes that these people have discussed; and the other having to do with something near and dear to your hearts.

One could look at the question of environmental qualification of electrical connection"s" as a graphic example of setting performance objectives -- namely, "thou shalt provide electrical equipment capable of performing in the accident environment -- as a good example of setting a performance criteria, and then going about procuring equipment without a lot of detailed analysis by the regulatory staff, maybe even none; and then finding out that you had a number of operating plants, ostensibly constructed to have environmentally qualified electrical connections that in fact it did not.

So there's a matter of trust in setting performance objectives and then understanding that they will be met, even when national standards exist.

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COMMISSIONER KENNEDY: Excuse me, Roger. I'm not sure how that situation obtains any differently in the proposal that they're making from any other, including a custom design. As a matter of --

MR. MATTSON: There's none, sir; I agree.

COMMISSIONER KENNEDY: It does not. So that applies anywhere?

MR. MATTSON: Yes, sir.

COMMISSIONER KENNEDY: Okay.

MR. MATTSON: The question as to how much detail is required in something like containment design, it is probably safe to say that the mass and energy capability of the containment to withstand a blowdown -- I don't need detailed dimensions of the containment.

The problem is that the requirement is to assure the safety of the containment, given a loss-of-coolant accident. And that's more than just the mass and energy absorption capability.

It might be, for example, asymetric loads on the vessel. Does the breaking of a pipe blow the vessel open? For that, one has to look at subcompartment loads, at asymetric discharges, at their pipe size, or even break opening time could have quite a lot of difference on the engineering outcome of the technical outcome of the analysis.

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It is possible, in principle, to set performance objectives for all of those kinds of safety considerations, and to approve standard methods and procedures for coming at those problems. It hasn't been done yet. It's conceivable, and we're moving in that direction. It's conceivable that we could achieve that.

This would certainly give us impetus in that direction.

One other comment that's probably a nit on this scale of things. The "topical reports." We have to be a little bit careful of how we use topical reports with standardized plans. If we're talking about 15 topicals, that's a manageable number. I have a standard plan in my division right now under review that has 120 topical reports referenced.

So, 50 of them are unapproved. Some of them are unsubmitted. Now that's sort of counter to standardization in the way that topical reports can get reviewed sometimes. They can get put aside for a number of years before the staff will reach a conclusion on this.

If that eventual review on a topical report leads to a design change, then I've circumvented standardization. So all I would say is "13" is a manageble number. If you keep it manageable, it's consistent with standardization.

CHAIRMAN HENDRIE: Yes?

jwb

DR. BERNSEN: In an effort to present something in a general sense in a half-hour period, it is impossible to get into details. I think we are fully aware of the kinds of things that have been mentioned, and recognize that the arrangement of the reactor vessel and the biological shield in the cavity, and the treatment of this, and the methods as well as, perhaps if necessary, limiting loads as some demonstration that you achieve these, and how, would have to be included in this design, as well, probably in the same degree of detail that you provide now.

I think the real question is: What do they do with the specific numerics, at any point in time, when the real issue is the results. Have you -- for example, are you qualifying the penetrations to the pressure, and how do you get the pressure? What range of breaks do you consider? And where? And how? And so on. What conditions are they qualified for, and what limiting conditions are they qualified for?

These are the things, it seems to me, that everybody is concerned with, and not the specific number.

CHAIRMAN HENDRIE: Aren't there an awful lot of those things in a design where it's easier for you -- God knows it's probably easier for us -- to say, instead of trying to construct this enormous, all-encompassing package of how we're going to do it and gear the criteria, and so on, to say: Here's how we're going to do it. It's a piece of cold roll this big; and here's the dimension on it; and here's -- you want a stress analysis? there it is. And we can look at that and say: By God, that piece of ironwork is okay. And it may be enormously simpler, from an engineering standpoint, to deal with a great number of the features of the plant design.

And, yeah, maybe if you really custom did every piece of every plant you ever did, that piece of ironwork would look different on this one over here, and this one over here. But, for God's sake, it's sort of weighed down in the noise, and if you're going to be on a basis where you can deal efficiently with these designs, we could be on a basis where we can review efficiently, it would make a lot more sense to say "that's the gubber we're going to use there," and never mind a lot of fancy descriptions.

MR. HALLIGAN: I would like to meet our desires, our intent. We would want to answer that problem in our generic design. That's the kind of thing that we want to put to bed in-house. So that we don't have a flock of structural engineers sitting around dreaming up new analytical methods to find more reasons for rebar. But that is exactly the kind of thing that we want to put to bed in our generic, and you can do that for each NSSS supplier. Because we would make the basic piping layouts so we would be able to define that.

Those are the kinds of things that bog down the engineering design -- decision-making and design processes, between us, the client, and you.

MR. MATTSON: I wasn't claiming it was impossible. I say that it is difficult.

MR. HALLIGAN: It's difficult, but if it can't be done, that would be a very fundamental objective of our design -- it would be to tie down that type of thing.

MR. MATTSON: If I could follow up with one more comment, Dr. Hedrie, I think you mentioned, the question of flexibility can become a very difficult question. You can end up doing more review at the CP stage, perhaps, than you would with a custom plan.

If the permutations and combinations of different accident conditions, and different seismic conditions, and different tornado conditions, and different flood conditions, can so complicate at that the PDA review, that you don't know how to sort through them all for a specific cycle. If we're reasonable on that flexibility -- that is, we don't have seven different design levels for earthquakes; we'd have a couple; and we don't have 18 different tornadoes, we have a couple -- then it's manageable.

CHAIRMAN HENDRIE: It at least gets closer to being manageable.

jwb

Well, I was going to -- I'm afraid we're catching up to time --- I was going to comment.

We all recognize that, even in a so-called "final reference design" in which we're able to feel we have a final safety analysis to deal with and can make judgment on it and stand with it, we recognize that there are certain variabilities that end up there -- for the antitrust reasons, among others.

Now, you recognize these things, too. It may be that the place that you end up and the place that the sort of thing I've been talking about ends up are not that far apart. But I start from a place where I say: Let's have a specific design in every possible nut-and-bolt detail that it can be managed; and then come down saying, all right, you've got me. I've got to allow flexibility to take any one of four pump vendors, so I have to come down off that absolutely fully detailed specific design, okay?

And here's another place where -- and that, in turn, maybe means that I can't fully define the piping hookup, so now there's another little flexibility, and so on. And, right, here's a -- It's a balance of plant design, and I have to take account of the fact that just the primary inventories are substantially different between one SSS system and another, so I've got to do something about a swing in containment volume. And we decided, I think in one scheme, why, you know, the containment's either that high, or that high, but it's the same diameter, and the arrangement is the same; it's a way of getting a volume variable term in to fit it, and so on. So I've had to come down some more.

Your approach starts sort of down here, and says: We'd like to, you know, be able to fit the customer, in terms of his specific seismic requirements, so we've got a whole series of variations on that, from a seismic standpoint, plant layout, we've got the module units, but, you know, in some plants we want the turbine building over here, and some over there, and so on, and so on.

And as you -- for your own purposes, and for licensing purposes, fine; it's better to reduce the number of these options, and so on. You sort of work up toward a specific design.

I'm coming sort of down, and you're coming up. It may be that in fact we end up not very far apart, but I sort of continue to feel that from the standpoint of effective licensing and so on, I continue to sort of want to start up here, and then back off if I have to, rather than start out with you and see how far we can encourage you to close down the number of options so that it is manageable.

MR. STATTON: We certainly respect that, and we are also influenced, to a degree, by having had what we think is the Bechtel standard in the SNUPPS Program. But we did an awful lot of work, Joe, to -- oh, we took bids for any equipment components -- to make sure that the manufacturer could handle the load and also stay in business. Because it was obvious that he couldn't dedicate his whole shop to do us for five or six years.

And as a consequence, some of the procurements that we've made have been in trouble, or we've found that our assessment of the guy's ability to handle as much as, say, five units would put on him, has impaired his ability to deliver.

So, I think you have to have the margin that will allow you to proceed under almost -- as many circumstances that appear to be reasonable for the schedule we're trying to achieve.

So we appreciate your comments. I think they are very pertinent; they're the very thing we were looking for. We didn't really come to sell you this; we come to test the water, because our examination tells us that this has been a fairly successful approach within Bechtel, we've bounced it off a number of our clients. They, frankly, are quite concerned about the standards program, as to the advantages that they can see for themselves.

We're not here to relate any concern of theirs whatsoever. I think we're trying to see how we can best serve the industry, from the generic point of view.

So your comments, I think, were frankly very good for our purposes.

CHAIRMAN HENDRIE: Well, that's very useful to us to hear your points of view. You have a lot of experience with these plants, and it's very important that we try to understand the reasons that lead you to the sort of approach you'd like to take.

MR. STATTON: I would --

CHAIRMAN HENDRIE: I think it ould be useful, you know, as time goes on a little bit and you see more clearly where you want to go -- we would encourage you to be in contact with the staff officers who work on these standardization sorts of things, and to keep them informed; that a dialogue be maintained so that we could --

MR. STATTON: We are quite interested in knowing just what is the value of the licensing effort, depending on the kind of submittal we would propose, and of course we don't have that depth of the detail but we could iron that out with the staff.

So I think we are going to try and pursue some evaluation in our terms, and perhaps yours, where that is. It may be that most of the review occurs after the CP, or maybe most of it would occur before CP. We're finding that, in some cases — particularly on SNUPPS — that we had predictable licensing success on the thing, and we really could have enjoyed more engineering time, to get more completed before we went in the field.

CHAIRMAN HENDRIE: There, you see, there are —

MR. STATTON: There are some —

CHAIRMAN HENDRIE: There are disadvantages to speedy licensing.

(Laughter.)

MR. STATTON: But in all good respect, we've tried to point this out to Victor, that for what we're attempting to do, if we're really going to get all the time, all the slack out of it, we've got to work on not only licensing, we've got to work on construction time, the techniques —

CHAIRMAN HENDRIE: That's exactly right.

MR. STATTON: -- and the amount of commitment that we have to make in the field. And that is being done, and it has been very helpful.

CHAIRMAN HENDRIE: And you need to know what we're up to, too. If we all of a sudden turned around and started doing 9-month reviews, why —

(Laughter.)

CHAIRMAN HENDRIE: Thank you very much.

(Whereupon at 11:25 a.m., the hearing was adjourned.)