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RELATED CORRESPONDENCE

NEWMAN & HOLTZINGER, P. C.

1615 L STREET, N. W.

WASHINGTON, D. C. 20036

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June 26, 1985

Charles Bechhoefer, Esq.
Chairman, Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. James C. Lamb, III
Administrative Judge
313 Woodhaven Road
Chapel Hill, NC 27514

Frederick J. Shon
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Houston Lighting & Power Co., et al.
South Texas Project, Units 1 & 2
Docket Nos. STN 50-498, STN 50-499

Dear Members of the Board:

Enclosed are copies of the testimony of the following individuals to be presented on behalf of Applicants in Phase II of this proceeding scheduled to begin on July 11, 1985:

(1) Mr. Jerome H. Goldberg,
(2) Dr. James R. Sumpter,
(3) Mr. Loren Stanley,
(4) Mr. Don D. Jordan,
(5) Mr. George W. Oprea, Jr.,
(6) Mr. Richard A. Frazar,
(7) A panel consisting of Mr. Frank Lopez, Jr. and Dr. Sidney A. Bernsen,
(8) Mr. Mark R. Wisenburg, and
(9) A panel consisting of Messrs. Thomas J. Jordan, Alfredo Lopez and Walter R. Ferris.

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Applicants plan to present the witnesses in the order listed above, unless schedule conflicts arise. However, as noted during the telephone conference call on June 21, during the week of July 15, Mr. Don D. Jordan is available only on July 15 (until 3:00 p.m.) and on July 16 (until 2:00 p.m.). Accordingly, regardless of which witness is testifying at the conclusion of the hearing session on Saturday, July 13, Applicants request that Mr. Jordan be allowed to testify (out of turn, if necessary) when limited appearances end on July 15 and to return on July 16, if necessary.

Since the parties will be submitting cross-examination plans to the Board, Applicants would appreciate being informed by the Board as to the estimated lengths of cross-examination for each witness or panel. Although Applicants realize that such projections may lack accuracy, they will be useful in at least preliminary planning for the scheduled appearance of witnesses. Recognizing the imprecision of any such estimate, to the extent that the prefiled testimony may be indicative of the period required for cross-examination, Applicants suggest the following as a "target" working schedule for the Board's consideration:

(1) Mr. Goldberg - July 11 plus morning of July 12,
(2) Dr. Sumpter - afternoon of July 12,
(3) Mr. Stanley - morning of July 13,
(4) Mr. Jordan - morning of July 15,
(5) Mr. Oprea - afternoon of July 15,
(6) Mr. Frazar - morning of July 16,
(7) Mr. Lopez and Dr. Bernsen - afternoon of July 16 and morning of July 17,
(8) Mr. Wisenburg - afternoon of July 17, and
(9) Messrs. Jordan, Lopez and Ferris - morning of July 18.

If the foregoing time estimates are approximately correct, the afternoon of July 18 plus July 19 would be available for contingencies and for oral argument on motions to quash subpoenas, while still permitting Applicants' direct case to be completed prior to the one-week recess.

In addition to the enclosed testimony (including the attachments enclosed therewith), Applicants intend to offer into evidence a number of exhibits. These are identified in the attachment to this letter.

A copy of proposed exhibit 66 is enclosed. Copies of all other proposed exhibits were served on the Board and the parties either when they were filed with the NRC or when they were produced in response to the Board's order. Additional copies will be available at the hearing when the exhibits are presented.

Respectfully submitted,

Jack R. Newman
Maurice Axelrad
Alvin H. Gutterman
Steven P. Frantz
Donald J. Silverman
1615 L Street, N.W.
Washington, D.C. 20036

Finis E.Cowan
3000 One Shell Plaza
Houston, Texas 77002

Dated: June 26, 1985

NEWMAN & HOLTZINGER, P.C.
1615 L Street, N.W.
Washington, D.C. 20036

ATTORNEYS FOR HOUSTON LIGHTING & POWER COMPANY, Project Manager of the South Texas Project acting herein on behalf of itself and the other Applicants, THE CITY OF SAN ANTONIO, TEXAS, acting by and through the City Public Service Board of the City of San Antonio, CENTRAL POWER AND LIGHT COMPANY, and CITY OF AUSTIN, TEXAS

cc: Service List

ATTACHMENT

Applicants' Exhibit No.*	Document	Date
57	Handwritten notes by J.H. Goldberg re "Prelminary Review" meeting.	4/13/81
58	Memorandum from J.H. Goldberg to J.R. Sumpter re "Quadrex Review of Brown & Root Engineering Problem Categorization" with handwritten notes by L. Stanley.	4/15/81
59	Minutes of 4/27/81 STP Management Committee Meeting (excerpts).	4/30/81
60	Quadrex Report, "Design Review of Brown & Root Engineering for the South Texas Project."	5/81
61	Letter from J. H. Goldberg to E. A. Saltarelli re, inter alia, B&R review of most serious findings from reportability pursuant to 10 C.F.R. § 50.55(e).	5/6/81
62	Letter from E. A. Saltarelli to J. H. Goldberg enclosing B&R review of most serious findings for reportability pursuant to 10 C.F.R. § 50.55(e).	5/8/81
63	Bechtel Power Corporation Report, "An Assessment of the Findings in the Quadrex Corporation Report."	3/82
64	Bechtel Power Corporation Final Work Package Report for Work Package EN-619, "Review of the Quadrex Report."	8/26/82
65	Letter from L. Stanley to J. R. Sumpter re STP ALARA review.	3/16/81
66	HL&P Procedural No. PLP-02 Revision 5 re Reporting Design and Construction Deficiencies to NRC.	5/21/81

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* The last Applicants' Exhibit in Phase I was #56.

Applicants' Exhibit No.	Document	Date
67	Letter from G. W. Oprea to John T. Collins re transmittal of response to notice of violation 83-24-02; response attached.	3/23/84
68	Letter from G. W. Oprea to John T. Collins enclosing summary of programmatic audit of backfill activities; summary attached.	5/25/84

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. STN 50-498 OL
	)	STN 50-499 OL
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	
	)	
(South Texas Project, Units 1 and 2)	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL., OF JEROME H. GOLDBERG

Q.1 Please state your name and current position.

A.1 I am Jerome H. Goldberg, Group Vice President - Nuclear of Houston Lighting & Power Company (HL&P).

Q.2 Have you previously testified in this proceeding?

A.2 Yes. I testified in May and June of 1981 and June, 1982.

Q.3 Describe your educational and professional qualifications.

A.3 My educational and professional qualifications are generally described in my earlier testimony in Phase I of this proceeding.

Q.4 Has your position with HL&P changed since you last testified in this proceeding.

A.4 Yes. On February 1, 1985, I was elected to the position of Group Vice President - Nuclear. As a result of this promotion and the retirement of Mr. Oprea, formerly Executive Vice President-Nuclear, I also assumed his responsibilities. I report directly to Mr. Don D. Jordan, Chairman of the Board and Chief Executive Officer of HL&P.

Q.5 What experience have you had in the interpretation and application of the NRC reporting requirements, particularly reporting under 10 CFR § 50.55(e)?

A.5 During the 9 years I was with Stone & Webster and in much of my prior experience at the Quincy shipyard, I have been involved in analysis of technical questions very similar to the questions involved in application of 10 CFR § 50.55(e). Such questions generally involve evaluations of alternative designs, the safety of alternative designs and the relative significance of deficiencies in design and construction. While at Stone & Webster, personnel reporting to me were responsible for performing the evaluations of reportability of deficiencies pursuant to 10 CFR § 50.55(e) and 10 CFR Part 21 and I reviewed and supervised their work. After coming to HL&P in October 1980, the licensing personnel for the South Texas

Project reported to me and I personally reviewed and approved HL&P's written reports to the NRC pursuant to 10 CFR § 50.55(e).

Q.6 What is the purpose of your testimony?

A.6 The purpose of my testimony is to describe the commissioning and development of the Quadrex Report, HL&P's handling of that Report, including its notification to NRC of the review by the Quadrex Corporation (Quadrex) and, pursuant to 10 CFR § 50.55(e), of various Quadrex findings, and the provision of the Report to the Atomic Safety and Licensing Board (Board or Licensing Board). In addition, my testimony describes my understanding of the Quadrex Report when I testified in May and June 1981, as well as my views on the adequacy of B&R's services of Brown & Root, Inc. (B&R) at that time. My testimony shows that HL&P properly reported the appropriate Quadrex findings to the NRC pursuant to 10 CFR § 50.55(e), that HL&P's delay in providing the Quadrex Report to the Licensing Board was due to a good faith belief that the subject matter of the Report and the hearing were not directly related, and that I was truthful and candid in my testimony before the Board. It also explains why HL&P did not inform the Board prior to September 24, 1981, that it was considering replacing B&R as architect engineer and construction manager.

Q.7 Why did HL&P decide to initiate a review of B&R engineering in 1981?

A.7 When I assumed my position as HL&P Vice President of Nuclear Engineering and Construction in October 1980, I met with HL&P's key managers for the South Texas Project (STP or Project), and had discussions with various engineers who had been involved in the Project. I was, of course, well aware that B&R had never previously engineered a nuclear power facility. I learned that B&R had recently developed its Systems Design Assurance Group, and that a lot of system design work lay ahead. I also found that there was a general concern regarding the limited numbers and experience of the B&R engineering personnel. In addition, in discussions with my engineering staff, they identified a potential weakness in B&R's nuclear analysis capability. These observations coupled with my own observations of the status of the Project, which was less advanced than I would have expected after seven years, caused me to question the strength of B&R's engineering organization.

These impressions about B&R engineering were based largely on discussions with members of my own Project team. Since they had been involved with the Project for some time, there was a potential for bias on their part and I felt it would be desirable to bring in an outside organization that had never previously been

associated with the Project to get an objective and expeditious third party assessment of B&R's nuclear engineering and design activities. I expected the review to assist me in judging what improvements were needed to complete the Project successfully, and also provide information I would find useful for discussions of the status of the Project with HL&P management, the co-owners of STP and regulatory authorities.

I discussed my desire for a third party independent assessment of B&R engineering with Mr. Oprea in late 1980. Mr. Oprea concurred with my judgment that such a review would be appropriate. Mr. Oprea and I also discussed the matter with Mr. Jordan, and he agreed with our decision to go ahead with such a review.

Q.8 How did Quadrex come to be selected to perform the review?

A.8 I had three principal criteria. The organization had to have the necessary skills to perform a competent evaluation of an architect-engineer. It had to have sufficient qualified personnel available to perform the review on a tight schedule. Finally, I wanted the organization to be independent, that is, it could not have had prior substantial involvement in the Project.

The major architect-engineer firms were clearly competent to do such a review. However, I was aware that it was highly unlikely that they would be willing

to critique the work of another architect-engineer. Among the consulting firms that appeared to have adequate technical qualifications were Management Analysis Company, NUS, Quadrex, Torrey Pines, and Teledyne. Each of these firms, with the exception of Quadrex, had significant prior or ongoing involvement in the Project. Quadrex had had some prior contact with the Project but its involvement had been brief and limited to assistance in planning HL&P manpower needs, an effort which did not relate directly to any of the technical issues involved in an engineering review of B&R.

Q.9 What was the assignment given to Quadrex?

A.9 We told Quadrex we were interested in ascertaining B&R's understanding of the significant nuclear engineering technical issues of then current concern in the nuclear industry. In other words, I wanted to gain a better feel for whether B&R was in the "main stream" of nuclear engineering practice as reflected in the industry. We also asked Quadrex to review certain specific areas in which we had reasons to believe that B&R might be experiencing difficulty. The assessment was to assist in benchmarking the status of the Project and identifying opportunities for improvement in the performance of B&R's engineering work. I was not interested in an analysis of B&R's procedures, because

I knew that there are many different ways to organize and perform an engineering job successfully. The objective of the review was to see if B&R understood the task before them, and to get some feeling for where they stood in accomplishing that task.

Q.10 How was the Quadrex review carried out?

A.10 Based on information provided by HL&P, Quadrex prepared a series of technical questions about the STP design and also identified various design documents to be reviewed. The questions were supplied to B&R and then there was a series of meetings between Quadrex and B&R; first to clarify the questions, and later for B&R to answer them. These meetings were organized generally along discipline lines. In addition to getting answers to their questions, Quadrex asked B&R to identify documentary evidence, such as calculations, drawings and reference documents, that could be examined in support of the answers. As a result of these meetings, Quadrex identified specific documents it desired to review. Dr. James Sumpter, then HL&P's Manager, Nuclear Services, who served as coordinator of the Quadrex review, arranged for these documents to be provided to Quadrex. There was an additional series of meetings between Quadrex and B&R after Quadrex had had an opportunity to review the B&R documents. These meetings all took place during February and March of

1981. The Quadrex Report was based on Quadrex's review of these documents and the information obtained from B&R.

Q.11 In what ways did HL&P participate in the review?

A.11 Our objective was to obtain an independent third party assessment, so we tried to keep HL&P involvement to a minimum, but it was not possible to eliminate HL&P entirely from the process. Dr. Sumpter acted as coordinator, as described in his testimony. Although HL&P provided assistance, Quadrex was in complete control of the review. Quadrex wrote the questions to be answered by B&R, ran the meetings with B&R and had complete editorial control of the report.

My personal involvement was essentially limited to discussions with Dr. Sumpter regarding the scope and objectives of the Quadrex review, suggestions regarding the categorization of findings in the Quadrex Report, and participation in the meetings at which Quadrex briefed HL&P on the status of its work. Throughout all of these activities, I refrained from injecting my personal views into the Quadrex Report and I emphasized to HL&P personnel my desire to receive Quadrex's independent views.

Q.12 Did you discuss with NRC your plans for having the Quadrex review performed?

A.12 When we decided to go ahead with an independent assessment of B&R engineering, I informed the NRC's Project Manager for STP, Mr. Donald Sells of that fact.

Q.13 Did Quadrex brief you on the results of its review as it progressed?

A.13 Yes. There were briefings on March 18, April 13, and April 30, 1981.

Q.14 Please describe the March 18, 1981, briefing.

A.14 The March 18 briefing was a relatively short meeting, perhaps a couple of hours with Dr. Sumpter and Mr. Loren Stanley, Quadrex's Project Manager for this review. Mr. Stanley described some of his impressions of B&R design up to that point. I don't have detailed notes of the meeting, but I have looked at an outline that Mr. Stanley apparently prepared for his presentation at the meeting. In view of the brevity of the session, I am fairly sure that he did not cover all of the points in his outline.

It was apparent that even at this early stage of its review Quadrex was convinced that B&R was far behind what most architect-engineers would have accomplished at that stage of the project and that B&R was not performing some aspects of the design in an orderly fashion.

Q.15 Please describe the April 13 briefing.

A.15 Mr. Stanley and Mr. Larry Wray, Vice President, Engineering of Quadrex presented their briefing. In addition to myself, I believe that Mr. David Barker, Mr. John Blau, Mr. Joseph Briskin, Dr. Sumpter and Mr. Cloin Robertson were present. As I recall, the meeting took place in the conference room across the hall from my office and the Quadrex personnel spoke from a number of overhead slides, each of which had textual material relating to some of their current findings, grouped by disciplines. The meeting lasted several hours, and I stepped in and out, as other business called me to my office.

I have reviewed my notes of the meeting, which apparently listed the topics covered by Quadrex.

I do not remember the details of the presentation but it is my recollection that Quadrex summarized a large number of findings on a discipline by discipline basis. Since we had asked Quadrex to focus on areas in which we suspected that B&R was experiencing difficulties, it was to be expected that some problems would be identified. However, there were a significant number of Quadrex findings. At this meeting Quadrex did not explain the severity or importance of the various findings, but several impressed me as being of a potentially significant nature, depending on the results of the review. One of these was computer code verification. Quadrex stated that while its review was

continuing there was some indication of problems in this area. HL&P asked Quadrex to look closely at this matter and provide more detail because it could be of great significance to us.

In the course of the presentation we asked questions from time to time to get a better understanding of the basis for one finding or another. Some of my questions sought the technical bases for Quadrex findings of inadequacies in B&R's design practices which, in some cases, I did not find to be unusual or inconsistent with industry practice as I knew it.

Q.16 Did the Quadrex personnel identify any of their findings as being reportable or potentially reportable to the NRC?

A.16 No. The discussion was fairly general, and I expected Quadrex to provide more specific information in its written report. During the meeting, I marked on my notes a number of areas in which it appeared that the Quadrex concerns, if they were accurate and factually supported, could lead to the identification of reportable deficiencies. However, I thought that it was first necessary for Quadrex to complete its review, determine which findings it believed to be accurate and supported by facts, and provide us with specifics that we could evaluate. During the discussion I believe that I suggested, as reflected in my later memorandum

of April 15, 1981 to Dr. Sumpter (Applicants Exhibit 58), that Quadrex categorize the findings in its final report in such a manner that anything that might pose a serious threat to plant licensability -- areas where we had not satisfied NRC requirements applicable to STP -- would be in a "most serious" category.

Q.17 Please describe the briefing on April 30.

A.17 At that meeting Mr. Stanley and Mr. Wray of Quadrex presented the highlights of their findings, with the use of a series of overhead slides. In addition to myself, I believe that Mr. Edward Turner, Mr. Blau, Dr. Sumpter, and Mr. Donald Betterton were present. Quadrex described in broad terms some of their generic findings and the highlights of their discipline findings. Quadrex gave a similar briefing for B&R the following day. The purpose of both briefings was to give HL&P and B&R some advanced information on the results of the review.

During the briefing Quadrex described its findings and HL&P personnel asked questions to get at their basis. There were more findings discussed at this briefing than had been discussed at the prior briefings, but my overall impression was essentially the same. The Quadrex findings suggested that B&R was having difficulty in completing the design; that it lacked experience in the aspects of the design that are

unique to nuclear plants and that design work in many areas was either in an early stage of development or not yet begun. Quadrex also cited concerns about the adequacy of B&R design work in some areas, such as HVAC design and computer code verification. In addition there were some findings which appeared to constitute Quadrex opinions on the most effecient way to carry out particular aspects of nuclear design work, rather than findings of a failure of B&R to perform in accordance with NRC requirements or generally accepted industry practice.

One question which was raised at the briefing was whether Quadrex's generic findings were based on the discipline findings or represented additional independent findings of fact. Quadrex stated that the generic findings were based on the discipline findings.

Q.18 Why did you not consider any of the described findings as potentially reportable to the NRC at that time or immediately initiate a review for reportability?

A.18 Although by that time Quadrex personnel had completed their review, we still did not have the benefit of their written findings, rationale and support, which were essential to an effective review for reportability. It was clear, however, that there might be some potentially reportable deficiencies identified in the Quadrex Report, and Mr. Robertson and I discussed

the steps to be taken to review the document immediately upon its receipt. As a result, I wrote a letter on May 6 to B&R (Applicants Exhibit 61) which I discuss further in my testimony below.

Q.19 Can you identify Applicants' Exhibit 57?

A.19 Yes. Exhibit 57 is a copy of my notes (referred to in A.15 above) from the Quadrex briefing on April 13, 1981.

Q.20 In Applicants' Exhibit 57 a number of the items in the outline format have an asterisk next to them, and there is a note at the bottom of the page next to an asterisk that says "potentially reportable." Did you mean to indicate by your notes that the items that you had marked with an asterisk were then "potentially reportable" within the meaning of the NRC Staff guidance on implementation of 10 CFR § 50.55(e)?

A.20 No. As I previously mentioned, at that time the Quadrex views were preliminary and I thought it necessary that Quadrex complete its review before any reportability judgment could be made. My notes only indicate that these particular subjects were general areas in which further Quadrex review might identify reportable deficiencies. In most cases it turned out otherwise.

Q.21 When potential deficiencies come to your attention, and you cannot tell whether or not they are reportable, why would you not report them immediately to the NRC as "potentially reportable"?

A.21 The amount of time a licensee may take to evaluate a concern before determining whether it should be reported to the NRC is not specified in NRC regulations. The NRC guidance on conformance with Section 50.55(e) encompasses a category of "potentially reportable" with the thought that licensees would make decisions more promptly on whether to report an item if it could be handled informally while an evaluation was under way. But, even before a licensee reports something as "potentially reportable" it must know enough to determine whether there really exists a basis for concern. I did not believe that I had that basis until I reviewed the text of the Quadrex Report and the documented bases for its findings.

Q.22 Are you familiar with Applicants' Exhibit 58?

A.22 Yes. Exhibit 58 is a memorandum I wrote to Dr. Sumpter on April 15, 1981, giving him my suggestions about the categories into which Quadrex should group its findings.

This memorandum was written a few days after the April 13 meeting with Quadrex and documented my thoughts on categorization of findings in the Quadrex

Report. I wanted Quadrex to group the findings in a way that would simplify the task of identifying items that might be reportable to the NRC and would also assist in setting priorities for corrective action.

Q.23 Was your proposed set of categories used in the Quadrex Report?

A.23 Quadrex modified the categories. My memorandum proposed a "most serious" category encompassing failures to meet NRC requirements applicable to the STP. Quadrex apparently believed that my categories were defined too narrowly and would not include all of its findings of consequence to licensing. Thus, they broadened the most serious category to include matters that, in their judgment, had significance for licensing purposes, whether or not NRC requirements were satisfied. The Quadrex Report ended up including many items in the "most serious" category which related not to safety but to potential delay of the licensing process. For example, finding 4.3.2.1(n) related to the selection of types of electrical isolation devices. Quadrex noted that B&R was still evaluating alternative devices and recommended that a Technical Reference Document (TRD) be developed to guide designers on the use of such devices in the design. Such a TRD would be based on the results of the B&R evaluations which were still underway.

Q.24 Please identify Applicants' Exhibit 59.

A.24 Exhibit 59 is the portion of the minutes of the April 27, 1981, STP management committee meeting in which I discussed the Quadrex review and the then anticipated report.

Q.25 Please explain the notation at the second page of exhibit 59 that the Quadrex findings in the "most serious" category would be reportable to the NRC.

A.25 I do not recall whether I said those particular words. However, at that time I would have expected the Quadrex Report to be based on the system of categorization proposed in my April 15, 1981, memorandum (i.e., that it would identify failures to meet applicable requirements in a "most serious" category). I had reached no judgment on reportability at that time and could not have done so until we had undertaken our own reportability review.

Q.26 Did Quadrex provide another briefing on May 7, 1981?

A.26 Yes. The May 7 briefing accompanied delivery by Quadrex of its report.

Q.27 Please identify Applicants' Exhibit 60.

A.27 Exhibit 60 is the "Design Review of Brown & Root Engineering Work for the South Texas Project," which I have generally referred to as the "Quadrex Report."

Q.28 Please describe the May 7 briefing.

A.28 The May 7 briefing was held at HL&P's offices. In addition to myself, Dr. Sumpter and several other HL&P personnel, Mr. Saltarelli, Senior Vice President and Project General Manager of B&R, was present with the key members of his staff.

The purpose of the briefing was to facilitate the reportability review by B&R and HL&P and the Quadrex presentation was limited to the findings in the "most serious" category. The discussion began with the generic findings. B&R personnel took issue with the broad observations in the discussion of the first two generic findings and it was apparent that a discussion of the generic findings would be lengthy and likely to focus on perceptions rather than facts. I then asked Quadrex to confirm my understanding that the generic findings were based on the discipline findings. Quadrex agreed that they were and, at my suggestion, proceeded to discuss only the "most serious" discipline findings.

The briefing lasted through the morning. There were some questions, but after the first portion of the meeting, little argument about the findings.

At the end of the meeting B&R asked whether its reportability review should be limited to the most serious discipline findings. Based on Quadrex's statement that the generic findings were based on the

discipline findings, I agreed that only the most serious discipline findings need be reviewed. The B&R personnel then went off to perform their reportability review.

Q.29 What was your reaction to the Quadrex Report?

A.29 I received the Report with mixed emotions. The Report was very helpful in providing an independent view of the status of the Project design activities. Quadrex identified a lot of design work that had not yet been done, and this confirmed my initial judgment that the B&R engineering effort was well behind where it should have been at that point in the Project schedule. There were some design deficiencies mentioned by Quadrex, but for the most part these were deficiencies which had previously been identified on the Project and were being resolved.

We had asked Quadrex for a limited review of important aspects of the B&R design and wanted to obtain results promptly. It was not an audit. The Report generated many questions but few answers. With limited exceptions, these questions did not relate to whether B&R design work to date or the B&R design process violated NRC requirements. Rather, Quadrex identified many areas where the B&R design had not proceeded on an efficient and well-coordinated basis. The concerns resulting from the Quadrex Report were for

the most part not of a regulatory nature (except to the extent that delays in producing an acceptable final design would inevitably delay licensing, as well as construction), but the findings had to be addressed fully and on a prioritized basis in order to get the design activities in a mode to support a reasonable Project schedule.

Some of the findings simply reflected Quadrex's view of the best way of performing certain engineering functions. HL&P did not share Quadrex's view of some of these matters and did not agree, in some instances, that B&R's methods were either inappropriate or deficient. For example, finding 4.3.2.1(b) noted that B&R had not prepared a top level document on separations criteria. Use of such a document is a good idea, but it is not an NRC requirement, and I have seen other projects successfully completed without such a document. Other findings referred to B&R designs which were either not yet begun or were in preliminary stages. For example, finding 4.7.3.1(a) noted that B&R had not yet developed criteria for jet impingement protection on unbroken piping systems. Since the criteria would apply to piping design which B&R had not yet done, the finding did not deal with a design error, although it did highlight a serious concern about the progress of B&R design work.

In summary, I regarded the Quadrex Report as a consultant's review containing advisory opinions of the type often reflected in the many technical consultant reports commissioned during the long course of the construction and operation of a nuclear power plant. The Report provided useful confirmation of my concerns about the adequacy of B&R's engineering organization and its lack of experience. While the Report did not suggest that the design of the STP was fundamentally flawed, it did point out that these were important problems in the management of B&R's engineering activities.

Q.30 When you received the Quadrex Report, what did you do to fulfill HL&P's reporting requirements?

A.30 Prior to receipt of the Report, I wrote to Mr. Saltarelli, the Project General Manager of B&R, pointing out that the Report would be received on May 7 and that HL&P would require B&R to review the Report and advise on the reportability of the Quadrex findings by the following day. The May 7 briefing by Quadrex was the first step in this review. As I have mentioned, at the close of the meeting I directed B&R to focus its review on the most serious discipline findings. Their cognizant engineers then reviewed the Report. They convened a meeting later that afternoon

and evening to review the most serious discipline findings to determine their reportability. Mr. Robertson and Dr. Sumpter attended that meeting.

The next day, May 8, I received a letter from Mr. Saltarelli providing advice on the reportability of the Quadrex most serious discipline findings (Applicants Exhibit 62). Upon receipt of that letter, I convened a meeting of Dr. Sumpter, Mr. Robertson, and myself (which I refer to below as the "HL&P review team") to go through the findings, review B&R's advice and make our decisions on reportability.

Q.31 Please identify Applicants' Exhibit 61.

A.31 Exhibit 61 is a copy of my May 6, 1981, letter to Mr. Saltarelli directing B&R to advise HL&P on the reportability of the Quadrex findings and to develop a plan to resolve the Quadrex findings.

Q.32 Please identify Applicants' Exhibit 62.

A.32 Exhibit 62 is a copy of Mr. Saltarelli's May 8, 1981, letter providing B&R's advice on the reportability of the Quadrex findings. Attachment B to the letter is the specific advice regarding each of the "most serious" discipline findings.

Q.33 Please describe the meeting of the HL&P review team.

A.33 I used the attachment to Mr. Saltarelli's letter as a check list. We read each of the findings and B&R's advice, and then we considered whether the finding was reportable. Our review identified three potentially reportable deficiencies. When it became apparent that at least one item would be reportable we called Mr. Michael Powell, the Chairman of the HL&P Incident Review Committee (IRC), and he joined our meeting. After the meeting Mr. Powell phoned the NRC and reported the three items that we had identified as potentially reportable:

(1) Concerning the heating, ventilating and air conditioning (HVAC) design - that certain faulted condition heat loads may not have been considered in the design of portions of the safety-related HVAC system.

(2) Concerning computer program (code) verification - that the verification program lacked visibility to the user as to whether or not the program versions in use had been verified.

(3) Concerning shielding analysis - that certain shielding calculations affecting safety-related design may not have been verified consistent with the requirements for verification of safety-related calculations.

Q.34 Was it the usual practice at HL&P for Dr. Sumpter, Mr. Robertson and yourself to conduct reportability reviews?

A.34 No. The usual practice at that time was that anyone who identified a concern that should be reviewed for reportability would notify appropriate supervisory personnel. Such personnel would review the information and determine if it warranted a review for reportability. If such a review was warranted, the matter would then be reviewed for reportability by the HL&P IRC, made up of the Team Leader, Nuclear Licensing; the Project QA Supervisor in the Houston office; and the Supervising Project Engineer -- Design Engineering. Mr. Robertson, as Licensing Manager, and I both would have occasion to review decisions on reportability made by the IRC, and we both would review and approve the written Section 50.55(e) reports to the NRC.

Q.35 Why was the usual IRC review not used to determine reportability of the Quadrex findings?

A.35 The Quadrex Report was different from the matters usually considered by the IRC -- it covered a wide scope of design considerations, contained a large number of findings and raised a number of questions that required an in-depth understanding of nuclear engineering design and design processes. I felt the reportability determinations needed to be made by our most senior engineers, ones who had the greatest experience in the nuclear design process. The team I chose, Dr. Sumpter, Mr. Robertson and myself, represented the most experienced HL&P nuclear engineers. Dr. Sumpter, who was HL&P's Manager, Nuclear Services, had 11 years of professional experience in nuclear engineering and design activities. Mr. Robertson, HL&P's Manager of Nuclear Licensing, had 15 years of nuclear engineering experience. I had 26 years of such experience. Each of us was very familiar with the requirements of 10 CFR § 50.55(e) and had previously considered reportability questions on numerous occasions.

Q.36 What criteria did the HL&P review team use on May 8, 1981, to determine whether findings on the Quadrex Report were reportable under 10 CFR § 50.55(e)?

A.36 Determinations of reportability under 10 CFR 50.55(e) require the application of technical and engineering judgment to a series of three criteria identified in the regulation: These three criteria are:

First, a deficiency in design or construction must be identified.

Second, the deficiency must have the potential, if left uncorrected, to affect adversely the safety of plant operations.

Third, the deficiency must represent

(i) a significant breakdown in any portion of the quality assurance program under Appendix B to CFR Part 50; or

(ii) a significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria and bases stated in the safety analysis report or construction permit; or

(iii) a significant deficiency in construction of or significant damage to a structure, system, or component which will require extensive evaluation, extensive redesign

or extensive repair to meet the criteria and basis stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function; or

(iv) a significant deviation from performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of a structure, system, or component to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

Unless all three criteria are satisfied, a finding is not reportable. We applied these criteria to the Quadrex findings. Of course, since the Quadrex Report dealt only with design, parts (iii) and (iv) of the third criterion had no bearing on our decision.

Q.37 In determining whether a finding was reportable as a significant breakdown in the QA program for STP, what weight, if any, did the HL&P Review Team give to the

fact that the finding did not pertain to an activity that had resulted in a design released for construction?

A.37 We did not conclude that a finding was not reportable as a significant breakdown in the QA program solely because it did not pertain to an activity that had resulted in a design released for construction. For example, the HL&P review team determined that findings 4.2.2.1(a) and 4.8.2.1(d) regarding computer code verification and shielding calculations, respectively, were potentially reportable as significant breakdowns in the QA program without considering whether either finding related to an activity that had resulted in the issuance of a design released for construction.

Q.38 Which of the findings in the Quadrex Report did the HL&P review team review on May 8, 1981, for reportability under 10 CFR § 50.55(e)?

A.38 We reviewed the discipline findings in Section 4 of the Quadrex Report which were designated by Quadrex as being the "most serious." The other findings in the Quadrex Report were not specifically reviewed at that time.

Q.39 Why didn't the HL&P review team specifically consider the reportability of other findings?

A.39 We wanted to focus our attention on the findings that were most likely to have reportability implications. Quadrex had indicated that if we reviewed the "most serious" findings we would have examined all of those matters with the potential for reportability. In addition, the other discipline findings in Section 4 of the Quadrex Report were not reviewed by HL&P on May 8, 1981, because the characterization of them by Quadrex indicated that they were not reportable. Quadrex classified the discipline findings into five groups: "most serious findings," "serious findings," "noteworthy findings," "potential problem findings," and "other findings." The "serious findings" were not reportable because they did not relate to safety but only to "the generation of reliable power." (Quadrex Report p. 4-1). The "noteworthy findings" were not reportable because they did not relate to safety but only to "project schedule and/or cost increases." Id. The "potential problem findings" were not reportable because they did not identify a deficiency but only identified a subject warranting "further investigation." Id., p. 4-2. Finally, "other findings" were not reportable because they did not identify a significant deficiency but only identified "minor items or items that are not amenable to corrective action." Id.

The generic findings in Section 3 of the Quadrex Report were not specifically reviewed for reportability because the Quadrex Report stated that they were "based on the detailed evaluation of each discipline presented in Section 4 of this report." Id., p. 3-1. As I mentioned previously, Quadrex had in our meeting on May 7, confirmed this view. Consequently, by reviewing the "most serious" discipline findings, we were aware of all of Quadrex's findings of fact that might be reportable under 10 CFR § 50.55(e).

Although we did not specifically review each generic finding to determine its reportability on May 8, each of us read the generic findings on May 7-8. Consequently, we were sensitive to the concerns expressed in the generic findings when we reviewed the discipline findings for reportability on May 8, 1981.

Q.40 The Bechtel Task Force report, entitled "An Assessment of the Findings in the Quadrex Corporation Report," March 1982, (Applicants' Exhibit 63), at p. A-5, states that one statement in generic finding 3.1(b), regarding errors in verified calculations, was not the subject of a specific discipline finding. Was the HL&P review team aware of this on May 8, 1981?

A.40 No. It was our belief on May 8, 1981, based upon the advice of Quadrex, that the generic findings were based upon the discipline findings and we did not review

finding 3.1(b). However, we were aware of Quadrex's concern and had it in mind when we reviewed the discipline findings, which included instances of calculational errors. In any case, as is discussed in the testimony of Sidney A. Bernsen and Frank Lopez, Jr., finding 3.1(b) does not identify a potentially reportable deficiency.

Q.41 The Quadrex Report defined the "most serious findings" as "those that pose a serious threat to plant licensability because either (a) the findings would prevent the obtaining of a license or (b) the finding could produce a significant delay in getting a license, or (c) the finding addresses a matter of serious concern to the NRC at this time." (Quadrex Report, p. 4-1). Why didn't HL&P decide to report all of the "most serious" findings under 10 CFR § 50.55(e) based upon this definition alone?

A.41 The definition of "most serious findings" did not automatically imply "reportability" under 10 CFR § 50.55(e). For example, some of the Quadrex "most serious" findings, such as 4.7.3.1(a) and 4.8.2.1(f), related to an activity which had not been completed by B&R or which was to be performed in the future by B&R. The fact that an activity had not yet been completed "could produce a significant delay in getting a license" but would not necessarily identify a "deficiency

in design or construction." Similarly, a finding might address "a matter of serious concern to the NRC at this time" but that is not necessarily a "deficiency in design or construction." Thus, the fact that a finding fell within Quadrex's definition of "most serious" did not establish that the finding was reportable.

Q.42 Please explain why something that has not been commenced or completed would not necessarily be a deficiency in design or quality assurance for design?

A.42 Designing a nuclear plant is generally an iterative and evolutionary process. Consequently, some structures and systems are designed and even constructed based upon preliminary but conservative assumptions, and later design activities are undertaken to determine final loads applicable to the structures and systems. Since the original assumptions are usually conservative, these final calculations are confirmatory in nature and are not expected to result in the need for structural alterations. If a final calculation identified that a preliminary assumption was non-conservative, that condition might be reportable. However, the fact that certain design activities may have not yet commenced or been completed generally does not mean there is a deficiency in a design or in quality assurance.

A.43 In its reportability review on May 8, 1981 did the HL&P review team rely solely on the information provided in the Quadrex "most serious" discipline findings?

A.43 No. In addition to the findings we had other information in the Report such as the Questions, Answers and Assessments as well as our knowledge of the Project, and other information available to us, including the results of B&R's review (Applicants' Exhibit 62.) We also had the benefit of Dr. Sumpter's insight gained through his contacts with Quadrex, as well as the information gained by Dr. Sumpter and Mr. Robertson while attending the B&R meeting in the late afternoon and evening of May 7, 1981. In addition, we brought to the May 8 meeting our considerable background and experience as nuclear engineers.

Q.44 What consideration did you give to the possibility that findings may not have been reportable individually but that, as a group of two or more, they might be reportable as a significant breakdown in the QA program for STP?

A.44 We were aware that Quadrex had identified what it considered to be generic findings that encompassed findings from more than one discipline. During our review we were alert to the possibility that several findings might identify deficiencies that collectively could have constituted a significant breakdown in the

QA program for STP. However, we did not discern from the discipline findings any pattern of deficiencies in the design QA program for STP or any systematic failure to implement the QA program other than the matters we reported to the NRC.

Q.45 Please identify the items which the HL&P review team determined to be potentially reportable on May 8, 1981, and explain why they were determined to be potentially reportable.

A.45 As I mentioned before, we found three items to be potentially reportable. First, as reflected primarily in findings 4.4.2.1(a) and (b), faulted condition heat loads were not considered in the design of portions of the HVAC system. B&R, in its May 8, 1981, assessment (Applicants' Exhibit 62), had identified findings 4.4.2.1(a) and (b) as being potentially reportable. HL&P agreed that this item was potentially reportable because it identified a deficiency in the design of the HVAC system, some design drawings for the HVAC system had been released for construction, and the failure of the HVAC design to account for certain faulted heat loads might, if left uncorrected, have adversely affected the ability of plant operations personnel and/or equipment to perform safety functions during an accident.

Second, as reflected in finding 4.2.2.1(a), the methods for identifying whether the computer code version in use had been verified lacked adequate visibility to the users of those codes. B&R, in its May 8, 1981, assessment (Applicants' Exhibit 62), identified finding 4.2.2.1(a) as not reportable because its preliminary assessment of this matter found procedural problems only. Nevertheless, HL&P approached this finding conservatively and determined that it was potentially reportable. The finding identified a deficiency in the process of design which represented possible breakdown in the QA program for STP (i.e., inadequate controls on the use of unverified codes) that might have resulted in the use of unverified computer codes in safety-related design activities. Until a detailed assessment could be made, it could not be determined whether there were design deficiencies that could adversely affect the safety of operation.

Finally, as reflected in finding 4.8.2.1(d), B&R did not treat shielding calculations as being safety-related and therefore may not have verified the calculations in accordance with its practice for safety-related calculations. B&R, in its May 8, 1981, assessment (Applicants' Exhibit 62), indicated that some shielding calculations might be safety-related but stated that finding 4.8.2.1(d) was not reportable

because it would not impact the safe operation of the plant or the public health or safety. Nevertheless, we decided to treat it as potentially reportable, because it appeared to identify a deficiency in the design process which represented a significant breakdown in part of the QA program for STP (i.e., a systematic failure to perform verifications). Without further review it could not be determined whether this deficiency might have created significant flaws in the design which could adversely affect the safety of operations. Where it is not possible to determine promptly whether a deficiency could adversely affect the safety of operations, it is HL&P's practice to inform the NRC of its existence as a potentially reportable item if the deficiency otherwise satisfies the reporting criteria. After the NRC has been notified, HL&P determines whether or not the deficiency is, in fact, reportable. This practice is consistent with the NRC's "Guidance-10 CFR 50.55(e), Construction Deficiency Reporting" dated 4/1/80, pages 6-7. After the NRC was notified that this finding was potentially reportable, HL&P determined that shielding calculations are generally considered in the industry not to be safety-related and therefore that any failure to verify these calculations was not a deficiency in the QA program for STP.

Q.46 Did HL&P notify the NRC after May 8, 1981, that any other findings in the Quadrex Report were potentially reportable?

A.46 Yes. On March 15, 1982, HL&P notified the NRC that one additional matter was potentially reportable. This matter, as reflected in findings 4.3.2.1(a) and 4.8.2.1(a), related to a common instrument air line in the Fuel Handling Building (FHB) HVAC system which Quadrex identified as violating the single failure criterion. B&R, in its May 8, 1981, assessment (Applicants' Exhibit 62), identified findings 4.3.2.1(a) and 4.8.2.1(a) as not reportable because the design for this system was incomplete and had not been released for construction. For the same reason, HL&P determined on May 8, 1981, that these findings were not reportable. However, when the Bechtel Task Force issued its assessment of the Quadrex findings in March of 1982 (Applicants' Exhibit 63), it identified these findings as being potentially reportable. Accordingly, since this was a specific recommendation of the Task Force, HL&P notified the NRC that the FHB HVAC common instrument air line design constituted a potentially reportable deficiency. Subsequently, Bechtel confirmed that the design of the FHB HVAC common instrument air line had not been released for construction. Conse-

quently, HL&P informed the NRC on April 8, 1982, that this item did not meet the criteria for reportability under 10 CFR § 50.55(e).

Q.47 With respect to each finding that the HL&P review team determined not to be reportable, do you remember precisely the basis for that determination?

A.47 After more than four years it is difficult to recall the precise reason why a finding was determined not to be reportable on May 8, 1981, particularly since, as I have previously described, there could be several reasons why any item would not be reportable. However, with respect to each finding discussed in the following portion of my testimony, I have described at least one reason why such finding was not reportable at that time.

Q.48 What does finding 4.1.2.1(b) state?

A.48 Finding 4.1.2.1(b) states as follow:

> There was no evidence of Civil/Structural evaluation of the reasonableness of postulated internal missiles or that the criteria for internal missiles presented in TRD 1N209RQ013-A had been implemented in the design (see Question C-9).

Q.49 Please explain why finding 4.1.2.1(b) was not potentially reportable.

A.49 In May, 1981 the design activities associated with protection against internal missiles had not yet commenced. Finding 4.1.2.1(b) was not potentially

reportable because it did not identify a deficiency in a design or in quality assurance for design but rather an activity to be performed in the future by B&R as part of its remaining design work.

Q.50 What does finding 4.3.2.1(a) state?

A.50 Finding 4.3.2.1(a) states as follows:

> The common instrument air line, as depicted in FSAR drawing 9.4.2-2 attached to Question R-6, does not meet the single failure criterion required by IEEE 279-1971 and 10 CFR 50 (see Question E-15). The occurrence of this design error in the late 1970's in concert with the B&R response to other single failure criterion questions suggests that B&R is not sufficiently experienced in the performance of a Failure Mode and Effects Analysis that crosses discipline boundaries.(5) In most organizations, the I&C discipline would detect and immediately correct this type of design error by performing a rigorous examination of the separation provided between redundant divisions in the safety-related portions of the plant for all involved disciplines.

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(5) Instrument line blockage was identified as a potential concern for single failure analyses in the 1970 period when an early B&W plant had three instruments connected to two piping taps. Technicians repeatedly replaced the instrument connected to one tap because it read differently than the other two instruments connected in common to the other tap; only later did they discover that a blocked instrument line was causing the two common instruments to read erroneously.

Q.51 Please explain why finding 4.3.2.1(a) was not potentially reportable.

A.51 As discussed above in connection with HL&P's 1982 notification to NRC, the design of the common instrument air line had not been released for construction. The finding did not identify a significant breakdown in

the quality assurance program for design because it addressed only a limited aspect of design and did not suggest the existence of a systemic deficiency.

Q.52 What does finding 4.3.2.1(d) state?

A.52 Finding 4.3.2.1(d) states as follows:

> No formal methodology or documentation exists to verify adequate separation or the single failure criterion (see Questions E-1, E-8, and E-19.)

Q.53 Why was finding 4.3.2.1(d) not potentially reportable?

A.53 We knew that B&R had a formal design verification procedure in place. With respect to the documentation Quadrex was looking for, "formal" documentation is neither universally used nor required by the NRC and in my experience many nuclear projects have been successfully completed without formal documentation of the type noted by Quadrex. Since finding 4.3.2.1(d) did not identify a deficiency in a design or in quality assurance for design it was not potentially reportable.

A.54 What does finding 4.3.2.1(n) state?

A.54 Finding 4.3.2.1(n) states as follows:

> It is planned that various types of isolation devices will be used. Actual devices are still under evaluation and qualification. There is no existing document that provides guidance to the designers on the circuit application of these various types (e.g., optical couplers vs. fuses vs. relays, etc.). It is our opinion that lack of such a document (TRD) could result in design errors and licensing problems (see Question E-14).

Q.55 Why was finding 4.3.2.1(n) not potentially reportable?

A.55 This Quadrex finding was identifying that isolation devices were still under evaluation by B&R and that the design had not yet been developed. A TRD of the type mentioned by Quadrex could be a useful tool, but until B&R began to select isolation devices there would be no need for such a document.

Q.56 What does finding 4.5.2.1(b) state?

A.56 Finding 4.5.2.1(b) states as follows:

> EDS did not perform a design review or design verification of preliminary loads transmitted to B&R; these loads have, however, been used as a basis for plant design (see Questions C-4 and M-8).

Q.57 Why did the HL&P review team determine that finding 4.5.2.1(b) not potentially reportable?

A.57 Preliminary designs are often used as a basis for design and construction activities, subject to later verification. This is true not only at STP, but at every other nuclear project with which I am familiar. Where preliminary data is used, it is industry practice to include an extra margin of safety to minimize the likelihood that the final design will require changes. Since these preliminary data are carefully controlled to assure they are later finalized and verified, their preliminary use does not represent a deficiency.

Q.58 What does finding 4.6.2.1(n) state?

A.58 Finding 4.6.2.1(n) states as follows:

Assumptions regarding the availability of various heat sinks under varying plant conditions should be re-examined (see Question N-17).

Question N-17 provides further details, stating that B&R should have analyzed the temperature of the water in the Essential Cooling Pond (ECP) under conditions of normal shutdown of two units as well as the condition actually analyzed by B&R (normal shutdown of one unit and a loss of coolant accident (LOCA) in the other unit).

Q.59 Why was finding 4.6.2.1(n) not potentially reportable?

A.59 B&R had performed an analysis of the ultimate heat sink (Essential Cooling Pond or ECP) that did consider the combinations of plant conditions identified in the NRC guidance. This analysis was described in FSAR section 9.2.5. B&R had subcontracted with NUS for a reanalysis of the heat loads to the ECP and that reanalysis was underway at the time of the Quadrex Review. Thus, the re-examination Quadrex was recommending was already in progress. The finding did not identify either a design deficiency or a breakdown in quality assurance.

Q.60 What does finding 4.7.3.1(a) state?

A.60 Finding 4.7.3.1(a) states as follows:

B&R has not yet developed a criteria for jet impingement protection on unbroken piping systems (see Question P-20). A future TRD is planned.

Q.61 Why was finding 4.7.3.1(a) not potentially reportable?

A.61 The analysis of the effects of postulated pipe breaks had not yet been performed and the "criteria" referred to by Quadrex would be necessary only when such analyses were commenced. Finding 4.7.3.1(a) did not identify a deficiency in a design or in quality assurance for design.

Q.62 What does finding 4.7.3.1(b) state?

A.62 Finding 4.7.3.1(b) states as follows:

Approximately 50% of the reviewed SDDs do not yet contain system operating temperatures (see Question P-1).

Question P-1 provides further details in support of this finding. Question P-1 states that, of the sixteen SDDs which were reviewed by Quadrex, eight identified system design temperatures, seven did not identify a design temperature directly but did provide a reference for enabling the designer to determine the temperature, and one did not identify either a system design temperature or a reference for obtaining the temperature. These temperatures were used in performing preliminary stress analyses.

Q.63 Why was finding 4.7.3.1(b) not potentially reportable?

A.63 All but one of the SDDs contained system design temperatures or referenced a document that did. The single SDD in which a temperature had not been identified was for a system that had not been designed or released for construction. This isolated example in which one SDD did not contain a design temperature did not constitute a significant breakdown in a portion of the quality assurance program for STP.

A.64 What does finding 4.7.3.1(k) state?

A.64 Finding 4.7.3.1(k) states as follows:

> B&R assumptions for seismic to nonseismic boundary anchors are probably unconservative and difficult to technically justify as adequate (see Question P-29).

Q.65 Why was finding 4.7.3.1(k) not potentially reportable?

A.65 Finding 4.7.3.1(k) was not potentially reportable as a design deficiency because the design for the boundary anchors was not released for construction. It was not potentially reportable as a significant breakdown in QA because the TRD on which it was based was in draft status and still undergoing review.

Q.66 What does finding 4.8.2.1(a) state?

A.66 Finding 4.8.2.1(a) states as follows:

> The instrument air piping, between the valves actuated by redundant radiation monitors and the valves that divert air flow through safety-related filter trains in the FHB HVAC exhaust subsystem, does not meet the single failure criterion (see Question R-6).

Q.67 Why was finding 4.8.2.1(a) not potentially reportable?

A.67 This finding is already addressed in response to the questions regarding finding 4.3.2.1(a). As discussed there, the design of the common instrument air line had not been released for construction and the finding did not identify a significant breakdown in any portion of the QA program for STP.

Q.68 What does finding 4.8.2.1(b) state?

A.68 Finding 4.8.2.1(b) states as follow:

> No procedures exist that define the minimum qualification requirements for ALARA reviewers. Some design drawings have been reviewed and signed off for ALARA. There is limited evidence that proper follow-up has occurred to verify incorporation of ALARA specified designs (see Question R-1).

Q.69 Why was finding 4.8.2.1(b) not potentially reportable?

A.69 Finding 4.8.2.1(b) does not identify a deficiency in a design that was released for construction or a significant breakdown in any portion of the QA program. As with other engineering personnel, ALARA reviewers were selected by the B&R Engineering Project Manager, who was responsible to assure that they were qualified to perform their assigned functions. Additionally, B&R's procedure required that the ALARA reviewer sign all relevant design drawings to verify that the cognizant engineer had incorporated, as appropriate, the comments of the ALARA reviewer. Although this procedure could

have been improved as suggested by Quadrex in its assessment of B&R's response to Question R-1, it was adequate to ensure that the ALARA review process was properly controlled and performed by qualified individuals. We agree with the emphasis which Quadrex placed on ALARA and believe our program was, and is, consistent with that view. HL&P had instituted an ALARA program that was one of the most comprehensive in the industry. In addition to requiring the designers to address ALARA considerations in design, HL&P was requiring a separate design review for ALARA considerations.

Q.70 What does finding 4.8.2.1(c) state?

A.70 Finding 4.8.2.1(c) states as follows:

> Modification of the MAB HVAC system to eliminate filter media needs to be re-examined (see Questions R-5 and R-29).

Q.71 Why was finding 4.8.2.1(c) not potentially reportable?

A.71 Finding 4.8.2.1(c) did not identify any deficiency in a design or in quality assurance for design. These filters were eliminated in the course of the construction permit review and the Construction Permits were issued based on an analysis that showed the plant would meet Appendix I without such filters. Reexamination of the decision to eliminate the filters was appropriate because source term assumptions were changing as a

result of the TMI-2 accident. Bechtel has since confirmed that the addition of such filters to the MAB exhaust is unnecessary.

Q.72 What does finding 4.8.2.1(e) state?

A.72 Finding 4.8.2.1(e) states as follows:

> B&R has not correlated radiation zones to the shielding design and shielding design has not adequately considered ISI requirements or the potential locations for temporary shielding (see Question R-10).

Q.73 Why was finding 4.8.2.1(e) not potentially reportable?

A.73 The plant design was based on B&R's original shielding analysis. As the plant design evolved B&R was doing confirmatory analyses. This aspect of the design (ALARA) is dynamic, changing with the development of plant design and was an ongoing activity. This is consistent with industry practice. The finding identified a requirement for future work and not a deficiency in the design.

Q.74 What does finding 4.8.2.1(f) state?

A.74 Finding 4.8.2.1(f) states as follows:

> Radiation zone drawings based on accident conditions have not been prepared (see Question R-30).

Q.75 Why was finding 4.8.2.1(f) not potentially reportable?

A.75 The requirement for radiation zone drawings based upon accident conditions was a post-TMI requirement that B&R had not yet addressed in its design work. The finding was not potentially reportable because it did not

identify a deficiency in a design or in quality assurance for design but rather an activity to be performed in the future by B&R as part of its remaining design work.

Q.76 What does finding 4.8.2.1(g) state?

A.76 Finding 4.8.2.1(g) states as follows:

> A design basis governing removable concrete block walls was not evident (see Question R-11).

Q.77 Why was finding 4.8.2.1(g) not potentially reportable?

A.77 The design basis for removable concrete walls was still in the process of development. Accordingly, the finding was not potentially reportable because it did not identify a deficiency in design or in quality assurance for design but a concern for an activity to be performed in the future by B&R as part of its remaining design work.

Q.78 Did you give any consideration to submitting the entire Quadrex Report to the NRC Staff under 10 CFR § 50.55(e)(1)(i)?

A.78 Yes, I did. Given the nature of the findings in the Quadrex Report and the fact that only three of the findings were determined by the HL&P review team to be potentially reportable, the Report as a whole did not, in my judgment, identify any widespread breakdown in quality assurance or suggest that a significant amount

of the safety-related design was flawed. Consequently, I did not believe it would be appropriate to submit the entire report under 10 CFR § 50.55(e).

Q.79 When did you first inform the NRC of the existence of the Quadrex Report?

A.79 As I mentioned before, after we decided to perform an independent third party assessment of B&R engineering, I mentioned that fact to Mr. Donald Sells, the NRC Project Manager for STP. In April 1981, when receipt of the Quadrex Report appeared to be imminent, I called Mr. Sells again and told him that the report was due soon and that some Section 50.55(e) reports might result. I offered to give Mr. Sells and Nuclear Reactor Regulation (NRR) a briefing on the Report as soon as it became available. When he asked whether we planned to file the Report with the NRC I told him that we would not, but that the NRC could review it at HL&P at its convenience.

Since both Mr. Sells and I were going to be in Bay City the first week of the Phase I hearings, which was the week after receipt of the Report, that appeared to be the best, earliest opportunity to meet with him. We met during the course of the week of May 11, 1981. The meeting lasted about twenty minutes. I told Mr. Sells about the three potentially reportable items that had been reported to NRC Region IV and that one of those

items had been identified as potentially reportable by B&R, while the other two had been identified by HL&P in its review of the Report. I explained that there was a large number of findings and I briefed him regarding the general areas of concern. I told Mr. Sells that HL&P intended to take an in-depth look at the issues identified in the Report and that we would take all necessary corrective actions. I also told him again that the Report would be available for NRC review at the Project site.

Q.80 Why did you discuss the Quadrex Report with Mr. Sells instead of with NRC Region IV?

A.80 I believed NRR was the appropriate arm of the NRC to inform regarding the Quadrex Report in view of the fact that, generally, the NRC's technical and engineering expertise was, at that time, concentrated in NRR. I would have gone to Bethesda to brief NRR staff had it not been for the earlier opportunity presented by the ASLB hearings in Bay City. I understood the Region's area of interest to be in the identification of particular deficiencies representing departures from regulatory requirements rather than the general efficiency of the design process. I believed that in advising the Region of the potentially reportable deficiencies as required by 10 CFR § 50.55(e), and in

advising NRR by my discussions with Mr. Sells, I was being completely candid in my dealings with the NRC Staff.

Q.81 Did you brief Mr. Jordan and Mr. Oprea on the Quadrex findings?

A.81 Yes. I discussed the status of the review with Mr. Oprea from time to time in separate conversations and called him about the Report on May 7 and 8. Once the HL&P review team decided that three items were potentially reportable, I promptly informed Mr. Oprea.

On May 11, I met with Messrs. Jordan and Oprea and provided them a briefing on the Quadrex findings. I told them of the large number of findings in the Report and described their significance. This included both the identified weaknesses in the B&R engineering organization and the large amount of design work yet to be performed, especially the lack of analyses to confirm the preliminary design. I described the three items which had been reported to the NRC and explained the potentially serious nature of the computer code verification issue. I also mentioned that a number of the findings were based on incomplete information or premised on views of engineering practice that I believed to be not supported by industry practice.

Q.82 Prior to submitting the Quadrex Report to the Licensing Board in September 1981, did HL&P keep the Quadrex Report secret?

A.82 No. The Quadrex Report was treated like numerous other reports and studies on the Project. It was distributed to individuals who would have a reason to want the information contained in it. There were no instructions that it be kept secret.

I did consider whether it should be sent to the NRC, particularly in light of Mr. Sells' original inquiry during our April telephone call. There was no regulatory requirement that it be submitted to the NRC, and I decided not to do so. I knew that if the Report were transmitted to the NRC, it would be sent, in the ordinary course of business, to the Public Document Room. It had been written rather hurriedly and, in some cases, on the basis of incomplete information. I knew that it reflected some judgments about acceptable engineering practice which I did not share. I believed that there was a high likelihood that the Report could be misread or quoted out of context if it were made publicly available without extensive explanatory materials -- a situation which, as it turns out, has occurred. I had, of course, made clear to the NRC that the Report would be available for its review.

Q.83 Did you participate in a meeting regarding the Quadrex Report with NRC Region IV on September 8, 1981?

A.83 Yes. In August of 1981 Mr. Oprea suggested that Region IV would be interested in hearing about the Quadrex Report. He arranged for a meeting with Region IV personnel, and he and I participated in a meeting on September 8 with a large group of NRC personnel. We described the Quadrex review and its results, including the areas reviewed, the number and significance of the findings and HL&P's plans for resolving the findings. The Region emphasized the importance of disposition of all of the findings and we agreed that we would do so.

Q.84 Was there a discussion at that meeting regarding HL&P's reporting obligations as they related to the Quadrex Report?

A.84 Yes. Mr. Seyfrit asked whether there were any additional potentially reportable findings beyond the three that had been identified in May. He also asked if we had considered whether the Report as a whole might be reportable. We assured him that if we identified any additional potentially reportable findings, we would promptly report them. Either at that meeting, or later, we also advised him that we could see no basis for reporting the entire Quadrex Report.

Q.85 At pages 20-21 of its Memorandum and Order of February 26, 1985, the Licensing Board discussses the obligation of parties "to keep licensing or appeal boards informed

of newly developing information bearing on issues pending before such boards," i.e., the so-called "McGuire doctrine." Were you aware of such obligation in 1981?

A.85 Yes. I may not have been familiar with the term "McGuire doctrine", but I was aware of HL&P's obligation to advise the Licensing Board of new information that could affect its decision regarding matters under its review.

Q.86 When you received the Quadrex Report did you consider whether HL&P was obligated to provide it to the Licensing Board?

A.86 Yes, I did. However, I understood that the hearing was aimed primarily at construction and construction-related QA problems -- not design questions. My testimony described HL&P's Project organization, including the HL&P engineering organization and its responsibilities, but I did not view this description as being a focus of the hearing. The Quadrex Report did not raise any question with respect to the manner in which construction was performed or the adequacy of construction QA. Because, in my view, the Quadrex Report did not relate to the issues in the licensing hearing, I did not believe the Report should be furnished to the Licensing Board until September 1981. I did not discuss with HL&P's licensing counsel whether

the Report should be provided to the Board. At that time HL&P's counsel advised me that counsel to the NRC Staff had taken the position that the Licensing Board should be given the Report. I agreed to do so.

Q.87 Did you view the Quadrex Report as a report on QA?

A.87 No. There were quality concerns addressed in the Report, such as the three items that HL&P identified as potentially reportable, but I viewed this report as being primarily focused on the efficiency of B&R's engineering activities, not its QA program. The important message of the Quadrex Report was not that the quality of the engineering products or processes was deficient (although there were a few such concerns) but rather that the B&R engineering organization was weak and unlikely to support the Project without substantial, additional improvement. I did not, and do not, view the Quadrex Report as identifying weaknesses in QA (either as administered by the QA department or within the engineering organization) but rather as pointing up problems in engineering itself -- problems of a type not likely to be identified by the QA function.

Q.88 In view of the reporting obligation under the McGuire doctrine, please explain why HL&P did not inform the Board prior to September 24, 1981, that it was considering replacing B&R as architect-engineer and construction manager?

A.88 When I testified in June of 1982, I explained the sequence of events that lead to the replacement of B&R as architect-engineer and construction manager. As I explained then, the Licensing Board was promptly notified when an agreement in principle was reached with Bechtel to replace B&R. Until that took place there was no meaningful information to convey to the Board.

Although early in 1981 I had suggested to Mr. Jordan that it might be advisable to determine whether there were options in the event that B&R could not complete the job on a reasonable schedule, it was not until June 29, 1981, that HL&P decided to seriously investigate whether there were qualified contractors that would be willing to replace B&R as architect-engineer and construction manager. Once that decision was made Mr. Oprea and I contacted a number of qualified firms to determine their interest. I then prepared a Request-for-Proposals, received and evaluated proposals and interviewed each of the candidate companies. It was only after the completion of this evaluation process that we were in a position

to recommend to the STP Management Committee, the HL&P Board of Directors and the Chief Executive Officers of the Project owners that HL&P enter into negotiations with Bechtel. The dates at which these approvals were received were September 12, 14, and 15, respectively. At that point it was still uncertain whether Bechtel would agree to acceptable contract terms; in fact, important basic contractual matters remained to be resolved during the following week. When the negotiations with Bechtel reached a point at which it was apparent that there were terms that would be acceptable to both companies the Licensing Board was promptly informed of the transfer of responsibilities. The actual preliminary agreement with Bechtel was not fully executed until October 3, 1981.

Until HL&P had determined that a qualified company would be willing to replace B&R on acceptable terms, HL&P could not be certain that any change would occur. Moreover, I did not see any reason why the Board should be informed prior to that time because the determination to seek a replacement for B&R was based on cost and schedule concerns, not QA or nuclear safety related considerations that might be of interest to the Board.

It would have been irresponsible of HL&P to announce the replacement of B&R before it was certain to occur. A premature announcement would have had a

significant adverse effect on Project activities. Many people would have immediately begun to seek other employment and it would have become more difficult to recruit new employees. Morale of B&R employees who remained on the job would have been adversely affected and attention to detail would have suffered. It was thus essential to be certain of the decision before making the announcement that B&R might be replaced.

Q.89 Have you reviewed your May and June 1981 testimony in this proceeding in preparation for this hearing?

A.89 Yes. I have reviewed the portions of my 1981 testimony that mentioned B&R's performance of engineering.

Q.90 At the time you testified in 1981, what was your view of the adequacy of B&R's services?

A.90 When I joined HL&P in October, 1980, I had questions about the adequacy of B&R's services on STP generally. I was aware of the limited nature of B&R's prior nuclear experience, the Show Cause Order and the less than adequate progress of the Project. Progress on the Project during the early part of 1981 was below B&R's earlier projections and it was clear that construction was being delayed by the failure of B&R to complete the design on schedule. I began suggesting to HL&P management in early 1981 that, to keep its options

open, HL&P should explore whether an experienced architect-engineer would be available to complete the project, if that became necessary.

As I testified in 1982, there was a meeting of executives of the Project owners and B&R on April 10, 1981, at which time we discussed the need to attract more experienced personnel to B&R. I expressed my view that B&R needed to make a number of improvements to its engineering department, involving the addition of experienced personnel in key technical positions. Additionally, B&R needed to acquire a senior executive with nuclear experience to take complete charge of their STP activities.

After the April 10 meeting I met with B&R executives and we were successful in achieving some needed improvements, including reorganization of engineering to improve lines of authority and a recruitment program which included hiring bonuses and improved compensation for relocation expenses. There was also consideration of employing some experienced subcontractors for specific design tasks. These were positive steps that I found encouraging. On the other hand, B&R had resisted my suggestion that it hire a senior nuclear executive who would report directly to the President of B&R. This step, in my judgment, was absolutely essential and Mr. Jordan had undertaken to pursue this question with higher levels of B&R management. In view

of B&R's position, I urged even more strongly that HL&P ascertain whether an alternative was available. Recognizing, however, the enormously complex nature of employing another architect-engineer, I could understand that HL&P management had to explore, and perhaps exhaust, every possibility of improving B&R's performance before formally soliciting the interest of the industry in taking over the job.

So, at the time I testified I was not satisfied with B&R's engineering and management resources. The Quadrex Report had confirmed my concern about the adequacy of B&R's engineering resources. However, meaningful steps had been taken to attract more experienced engineers and subcontract part of the design effort, and HL&P was still discussing with B&R the need for an experienced senior nuclear executive.

Q.91 Do you now believe that you should have mentioned either the Quadrex Report or your concerns regarding B&R's engineering services in response to the questions at the portions of your testimony cited in the Board's February 26, 1985, Memorandum and Order?

A.91 No. Although it was not the purpose of my testimony to address the engineering capabilities of B&R, when asked about these issues I did mention my concerns. I discussed the fact that B&R had never before designed a nuclear plant and that it was experiencing problems of

a type that were commonplace in the industry in the early 1970's (Tr. 1158), and that B&R was taking steps to acquire additional resources to cope with its task. I also mentioned that HL&P had identified to B&R "a number of areas that . . . [were] in need of strengthening, both in terms of talent, as well as in terms of depth of talent." Tr. 2386. I mentioned a need to bolster B&R engineering in the areas of cable tray supports, design of seismic pipe supports, technical management and acquisition of a more senior technical leader to provide over-all technical direction. I also discussed the need for "other changes relative to the way they are structured in order to bring more focus of management attention to the needs of the South Texas Project." Tr. 2387. And finally, I stated, that I was not satisfied with the B&R engineering organization and I hoped that B&R management was not satisfied because there were "substantial improvements that can yet be made." Tr. 2404.

Q.92 Specifically, please explain why you did not mention these subjects at Tr. 1095-96.

A.92 At those pages Mr. William Jordan, representing CEU, referred to a statement on page 5 of my direct testimony which stated that HL&P administered the contracts with B&R and Westinghouse, and asked me to identify other major contractors. I answered that they were the

two major contractors. Mr. Jordan then asked if any of the other contractors had responsibility for QA and QC. I answered that by pointing out that a number of contractors were under subcontract to B&R.

It would not have been appropriate to mention Quadrex in response to these questions because Quadrex was neither a major contractor, nor did it have QA or QC responsibilities for STP. Neither did the questions call for an assessment of B&R's performance of design work.

Q.93 Why did you not mention these subjects at Tr. 1143-52?

A.93 At these pages Mr. Jordan and the Licensing Board asked questions regarding the types of B&R design documents routinely reviewed by HL&P and how such reviews were performed. Since these questions dealt with the normal HL&P process of reviewing B&R design by HL&P's engineers nothing in the discussion suggested to me that it would have been appropriate to mention the Quadrex Report. The Quadrex Report did not address the subject of what type of design documents HL&P did or should have reviewed. Neither did it focus on problems in the relationship between the HL&P and B&R engineering organizations.

Q.94 Why did you not mention these subjects at Tr. 1158-59?

A.94 At these pages Mr. Hager asked me how I perceived the problems facing me at the time I accepted the position of Vice President, Nuclear Engineering and Construction, of HL&P. My answer to this broad question was very general. I mentioned that many of the problems at STP were ones that were common-place in the nuclear industry in the early seventies and that the newer requirements made the tasks involved in designing a nuclear plant more difficult. I suggested that B&R may have been caught off guard by these new requirements, but that it was "recognizing the magnitude of the task and [was] acquiring additional resources of quality and experience nature to cope with those tasks." I then went on to say that HL&P was also increasing its experience base.

I believe my answer addressed the question appropriately. I described my perception of the problems, which included a recognition of difficulties in addressing the newer requirements, and a general need for more experienced personnel. It did not enter my mind to single out the Quadrex Report for mention, because it was only one source of my perception of the Project problems, and in any event, did not contribute to my perception of the problems at the time I accepted

the job. I believe my answer clearly stated that there was a need for improvement of B&R's resources on the Project.

Q.95 Why did you not mention these subjects at Tr. 2404-06?

A.95 At these pages Mr. Reis, counsel to the NRC staff, asked me about the adequacy of B&R's management of design. My answers recognized that there had been substantial improvements, but that I was still not satisfied and hoped that B&R management was not satisfied either. I then stated that where B&R was not meeting minimum requirements these matters were being brought to the attention of B&R management and would be corrected. I emphasized our determination "to encourage B&R to acquire the resources to improve the quality of their effort."

Mr. Reis then inquired about the "principal problem areas" in which B&R's design activities had been found "lacking." I discussed a number of problem areas we were then addressing, HVAC, shielding analyses and consideration of faulted condition loads. These were all matters addressed in the Quadrex Report. The first two of these had, a few days earlier, been the subject of "potential reportability" notifications to Region IV. While I cannot remember it with certainty, from my review of the transcript I suspect that I was about to mention the computer code verification concern as well,

but Mr. Reis interrupted to clarify a point. After the clarification he shifted immediately back to questions about the adequacy of construction. My omission of the computer code area was due to the interruption.

The question did not call for any mention of the Quadrex Report. My answer mentioned several of the specific deficiencies identified in the Quadrex Report, and knowledge of the Report, itself, was not necessary to understand my answer. I believe my answers in these pages and elsewhere did convey my view that B&R needed to improve its design capabilities.

Q.96 In the CCANP Motion to Reopen the Phase I Record, CCANP accuses Mr. Oprea of giving "what appears to be misleading testimony to the ASLB in June of 1981 . . . ." In support of that accusation, CCANP cites an excerpt from your testimony before the Public Utility Commission of Texas. (CCANP Exhibit "A" to the foregoing Motion to Reopen, Tr. 1378-80). In that excerpt, and in the immediately preceding pages you testified before the Texas PUC regarding your suggestions to Mr. Jordan and Mr. Oprea prior to June 29, 1981 that HL&P explore the availability of alternatives to completing the Project without B&R as A-E. Have you previously testified on this subject before the Licensing Board?

A.96 Yes. In my testimony on June 15, 1982, (Tr. 10518-20), I explained that starting in January of 1981 I suggested to HL&P management on several occasions that HL&P explore the marketplace to determine the availability of alternatives for completing the Project without B&R as A-E. I also mentioned that I made this same suggestion not long after the April 10, 1981, meeting when B&R made clear that it would not be receptive to my urging that it acquire a senior nuclear executive to assume overall direction of the Project. (Tr. 10,417).

Q.97 Did you consider your discussions with Mr. Jordan or Mr. Oprea regarding your suggestions of exploring alternatives to be discussions regarding removal of B&R?

A.97 No. I think this is reflected in my June 1982 testimony before this Board. After describing the discussions that took place regarding the exploration of alternatives, in response to a question from Judge Hill I specifically stated that" . . . there was absolutely no conversation or decision that I am aware of prior to June 29 along the lines of seriously considering replacement of Brown & Root . . . . " Tr. 10519.

Q.98 Exhibit "A" to the CCANP Motion to Reopen cites Mr. Oprea as responding "No, I have not," to the question "Have you had any discussions with any of your staff or other individuals after the show cause order regarding removal of Brown & Root?" Do you consider that answer as inconsistent with your testimony or as misleading?

A.98 No. I do not think it was unreasonable for Mr. Oprea to have understood that question to ask about serious discussions focused on the removal of B&R rather than our discussions about the need to explore alternatives. When, in answer to a question about Mr. Oprea's testimony before the Texas PUC (Tr. 1378), I suggested that Mr. Oprea's recollection was different than mine, I really did not have in mind anything other than our discussions about the advisability of exploring other alternatives and I immediately pointed out (TR. 1379), as I did before this Board in 1982, that there were no serious discussions regarding removal of B&R before June 29, 1981. I think Mr. Oprea took our conversations as part of discussions we had from time to time about the desirability of exploring our options and not a discussion about "the removal of Brown & Root" and he was right.

Q.99 In your review of other portions of your testimony, did you find any answers that you now believe would have called for you to mention the Quadrex Report or your views at that time concerning B&R's engineering services?

A.99 No. My answers were responsive to the questions and there was no instance in which mentioning the Quadrex Report would have contributed to the substance of my answer. I did mention my views concerning B&R's engineering services in response to the few questions that dealt with that subject. I believe that all of my testimony was truthful and candid and that I responded properly to the questions that I was asked.

Q.100 What is your opinion regarding how HL&P's commissioning and handling of the Quadrex Report reflects on HL&P's character and competence?

A.100 I believe that HL&P demonstrated both competence and good character in the commissioning and handling of the Quadrex Report. In the current regulatory environment independent design reviews have become a standard technique, but in 1980-81, when HL&P decided to commission the Quadrex review there was little or no precedent for such reviews. In the circumstances then confronting HL&P and myself, I believed such a review would contribute measurably to our understanding of the Project. We kept the Quadrex review independent of HL&P to obtain unbiased results, and imposed very tight

deadlines so that we would get timely information. As a result, the Report was written under great time pressures and HL&P did not get the opportunity to provide Quadrex with comments that would have helped put the findings in a clearer perspective. Nevertheless, the Report provided valuable insights into the engineering problems which were constraining progress on the Project.

HL&P was candid about this report with the NRC. When the review was commissioned, I told the NRR Project Manager about it, and when the Report was received I described the findings to him. Our review for potentially reportable findings was undertaken promptly on receipt of the Report. Although B&R advised that only one item was reportable, HL&P performed its own independent review and reported two additional items that appeared to be potentially reportable.

Application of 10 CFR § 50.55(e) requires engineering judgment based on the specific facts. Although I am confident that our judgments were correct, I recognize that others may reach differing conclusions with respect to one or another of the findings. Such differing professional opinions would not, in my view, in any way negate the fact that HL&P made a good faith review of the findings and made responsible judgments on reportability.

On our compliance with the "McGuire doctrine," I would not propose to quarrel with any judgment the Board may make. However, our course of action was based on our understanding of the issues before the Board and our very different perception about the basic thrust of the Quadrex Report. But even if the Board feels otherwise, I would hope that our failure to furnish the Report to the Board would not diminish the credit which belongs to HL&P for commissioning the Report, and for dealing fairly with the NRC Staff in advising them of that fact and, subsequently, offering to share with them the information in the Report.

In terms of the relationship of the Report to the ultimate decision to seek alternatives to continuing with B&R, we were aware of many of the basic problems in B&R's engineering organization before we received the Report. The Report helped to confirm my judgment, but it was not a major factor in our decision to seriously explore the possibility of replacing B&R in the summer of 1981. To the extent it had an impact, it underscored not deficiencies in B&R's QA/QC program but rather the basic question of whether B&R could be relied on to finish the Project on a reasonable schedule. The Project would not have moved forward if there had been a fundamental flaw in the design or a serious question about B&R's ability to control the design process to assure its quality. B&R was not,

however, terminated for these reasons. The decision was a complex business judgment based largely on cost, schedule and contract feasibility. Speaking for myself, I did not regard these matters as being within the Board's interest. But even if I am wrong, we were just beginning to wrestle with that problem in June of 1981. Practical considerations required care against premature public disclosure of our investigation into the feasibility of replacing B&R. The Board was informed as soon as that judgment was reached.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL., OF JAMES R. SUMPTER

Q.1 Please state your name and current position.

A.1 My name is Dr. James Robert Sumpter and I am currently Manager-Litigation Technical Support for Houston Lighting & Power Company (HL&P).

Q.2 Please describe your educational background and professional experience.

A.2 I received my B.S. in Engineering Science from Pennsylvania State University in 1965, my M.S. in Nuclear Engineering from the University of Michigan in 1967, and my Ph.D. in Nuclear Engineering from Texas A&M University in 1970. From October, 1970 until August, 1972 I was employed as a Nuclear Analyst for Sargent & Lundy Engineers. During that time I was responsible for radiological systems design for several nuclear power plants, including radioactive waste

treatment and disposal systems, area and process radiation monitoring systems, and hydrogen control and charcoal filtration systems. My responsibility included the development of design criteria, drawings, plant equipment layout, specifications, testing requirements, radiation transport and release calculations and purchase of equipment.

In August, 1972, I joined HL&P and served as a Nuclear Engineer until March, 1973. During that time, I participated in the evaluation of bids of nuclear suppliers for the South Texas Project (STP) and the Allens Creek Project. From March, 1973 until February, 1975, I was Supervising Engineer, Nuclear Safeguards and Licensing for HL&P. In that capacity, I directed HL&P's nuclear licensing efforts for both the STP and the Allens Creek Project. I was promoted to Manager, Nuclear Services Department in February, 1975, with responsibility, at various times, for Nuclear Fuel, Nuclear Engineering, Nuclear Licensing, Health Physics and Nuclear Security for both projects. I was appointed to my current position in December, 1984. In that capacity, I coordinated HL&P technical support for the lawsuit brought against Brown & Root, Inc., (B&R) in Matagorda County, Texas. I am a registered Professional Engineer in the State of Texas, and have

been appointed by the Governor to the Texas Radiation Advisory Board. A copy of my resume is attached to this testimony.

Q.3 Please describe your professional experience in evaluating matters for reportability to the NRC pursuant to 10 C.F.R. § 50.55(e).

A.3 As Manager of HL&P's Nuclear Services Department, I have had considerable experience with 10 C.F.R. § 50.55(e), including managerial responsibility for HL&P's reporting of design deficiencies from February, 1975 until March, 1981. As part of my responsibility for STP licensing activities, I supervised the development of HL&P and B&R reporting procedures, sponsored training seminars for HL&P personnel on their reporting responsibilities both before and after issuance of the STP construction permits, and participated in the evaluation of design matters for reportability.

Q.4 In May, 1981, were you familiar with the B&R design and design process at STP?

A.4 Yes. I had been involved in the development of the STP design and with B&R's design effort since the inception of the Project and was generally familiar with the Project design and the B&R design process. My responsibilities as head of Nuclear Services included review of B&R System Design Descriptions (SDDs),

specifications, and selected drawings against applicable requirements, industry code provisions and operational needs, and review of selected B&R engineering procedures, including ALARA review procedures.

Q.5 What is the purpose of your testimony?

A.5 The purpose of my testimony is to describe my involvement in the initiation and conduct of the review of B&R engineering undertaken by Quadrex Corporation (Quadrex), and in the review of the "Design Review of Brown & Root Engineering Work for the South Texas Project" (Quadrex Report or Report) for reportability pursuant to 10 C.F.R. § 50.55(e).

Q.6 Please describe your first involvement with the Quadrex review.

A.6 My first involvement was in early December, 1980, when Mr. Jerome H. Goldberg, who was then HL&P's new Vice-President, Nuclear Engineering and Construction, told me that he desired an independent evaluation of STP engineering. Over the next several weeks, I discussed with Mr. Goldberg various areas he wished to be included in the evaluation.

Q.7 How was Quadrex selected?

A.7 Mr. Goldberg and I discussed the criteria to be used to select a contractor to perform the review. After consideration of a number of potential contractors, it was decided that Quadrex was the most appropriate contractor to perform the review. Accordingly, Mr. Goldberg instructed me to contact Quadrex and request a proposal.

Q.8 Once it was determined that a proposal would be solicited from Quadrex what did you do?

A.8 I contacted Mr. Loren Stanley, Group Manager, Consulting Engineering Department, Quadrex Corporation, and requested a proposal for an engineering review. I indicated that we anticipated a brief two to three week review of various disciplines.

Quadrex promptly submitted a proposal calling for a review to begin in early February and to cover the technical disciplines which I had identified. I met with Mr. Stanley and other Quadrex personnel to discuss the specific methodology to be utilized for the review, and in late January, authorized them to proceed.

Q.9 What additional guidance did you provide to Quadrex?

A.9 I elaborated on the key technical areas which HL&P desired Quadrex to examine within each technical discipline and some of the unique nuclear criteria to

be reviewed such as single failure criterion, separation of safety-related components, ASME code and pipe stress analysis. It was decided that a series of technical questions would be prepared by Quadrex for presentation to B&R engineering personnel and that B&R's responses would be used as one of the bases for reviewing its technical engineering effort, along with Quadrex's review of various engineering "products" such as drawings and calculations. Quadrex subsequently developed draft questions and transmitted them to HL&P for comment.

Q.10 What input did HL&P have in formulating the specific questions to be posed to B&R?

A.10 On January 29-30, I met with Quadrex personnel to discuss the draft questions they had developed and to provide comments I had received from Mr. Goldberg and HL&P discipline engineers. Mr. Goldberg had commented that the questions were more detailed than he had anticipated, but he did not request Quadrex to modify them. HL&P discipline engineers provided additional information regarding appropriate areas of inquiry. I continued to work with Quadrex until mid-February to refine the questions to be asked B&R. My principal objective was to assure that the areas which we had agreed that Quadrex would cover were adequately reflected in the questions.

Q.11 Was anything else discussed at the January 30, 1981 meeting?

A.11 Yes. Mr. Arnold Granger, HL&P's Project Engineering Manager, participated in that meeting. He explained, in general terms, B&R's engineering process and some of their key design documents (such as SDDs, technical reference documents (TRDs), etc.), in order to familiarize the Quadrex reviewers with B&R's basic engineering approach. We also discussed some specific areas where we believed B&R may have been having some difficulties, such as HVAC design and computer code verification.

Q.12 When was your next involvement with the Quadrex review?

A.12 I attended a number of meetings in February between Quadrex and B&R in which the Quadrex questions were further discussed and clarified.

Q.13 How was the review conducted?

A.13 Quadrex conducted "on-site" reviews and meetings with B&R personnel in March, 1981 at B&R's offices in Houston. During these meetings, answers to the questions were discussed and B&R engineering personnel led the Quadrex reviewers through the relevant design documents.

Q.14 Did you take part in these meetings between Quadrex and B&R?

A.14 Yes. I attended almost all of the review meetings and served as HL&P's coordinator for the review effort. I coordinated schedules and assisted in obtaining necessary information. Where I had specific knowledge of aspects of the STP design, or felt that certain areas required additional exploration by Quadrex, I participated in the review sessions.

Q.15 During its review, did Quadrex keep HL&P management informed regarding the status of its review and its preliminary findings?

A.15 Yes. As indicated in Mr. Goldberg's testimony, Quadrex met with HL&P several times during the course of its review in order to keep HL&P apprised of its efforts.

Q.16 Did you meet with Quadrex to review drafts of the Report?

A.16 Between April 8-10, 1981, I visited Quadrex's offices and reviewed draft copies of volumes II and III of the Report, containing the Quadrex questions, B&R answers and Quadrex "assessments."

Q.17 What was the purpose of your review of the drafts of volumes II and III?

A.17 I wanted to ascertain the bases for the Quadrex assessments, and to assure that the facts were based on the information available to Quadrex and that the Quadrex reviewers' thoughts had been clearly stated.

Upon returning from Quadrex's offices, I furnished the draft questions, answers and assessments to HL&P lead discipline engineers for their review. Subsequently, I received marked-up copies of volumes II and III containing the HL&P engineers' comments and forwarded them to Mr. Stanley. Although I wanted to be sure that Quadrex was working with accurate information, I did not want to influence their judgments. Accordingly, I told Mr. Stanley that HL&P was simply furnishing comments and that Quadrex did not owe HL&P an answer with respect to any of the comments.

I returned to Quadrex's offices on April 15-16 in order to review the latest drafts of volumes II and III. I also discussed with Quadrex Mr. Goldberg's suggestion for defining the categorization of the Quadrex findings.

Q.18 What was Mr. Goldberg's suggestion?

A.18 Mr. Goldberg's suggestion was set forth in his April 15, 1981 memorandum to me (Applicants' Exhibit 58) and is described more fully in his testimony. It

recommended, among other things, that a category of "most serious" findings be established containing matters which might violate NRC requirements.

Q.19 What was Quadrex's reaction to Mr. Goldberg's suggestion?

A.19 Mr. Stanley felt that there would be a number of findings that would not fall within any of the categories suggested by Mr. Goldberg. As a result, he indicated that the categories would be broadened and that, for example, Quadrex would include in the "most serious" category, those matters that might cause delays in licensing reviews, regardless of whether those matters violated NRC requirements.

Q.20 What was the outcome of these discussions?

A.20 The definition of the categories to be utilized was refined by Quadrex. As reflected in the Quadrex Report, Quadrex expanded the "most serious" category to include items which could entail significant licensing problems, especially items which could affect timely review of the license application.

Q.21 At any time prior to receiving the final Quadrex Report were there matters which you felt should be reported to the NRC?

A.21 No. While I had indications that there were areas which would require close scrutiny for possible reporting to the NRC, I do not believe that, prior to actual receipt of the final report, I had been presented with sufficient information to knowledgeably undertake an evaluation of any matters for potential reportability. That was the first time I saw Quadrex's actual findings in conjunction with all of the supporting information. Until I received the Report, I had only, in essence, preliminary opinions and information regarding the B&R design. This preliminary information did not provide an appropriate basis for making a reportability determination. Thus, it was necessary to await the final Report rather than engaging in a piecemeal review based upon partial and preliminary information.

Q.22 When did you receive the final Quadrex Report?

A.22 On May 7, 1981, I received copies of the final Report (Volumes I-III) from Mr. Stanley and arranged for its reproduction for use by HL&P and B&R personnel. I had received volumes II and III on April 29 but did not review or distribute those volumes at that time.

Q.23 How was the Report reviewed for reportability?

A.23 In a letter to B&R on May 6, 1981, Mr. Goldberg instructed B&R to review the "most serious" findings and report to HL&P by noon on May 8 regarding the reportability of those findings under 10 C.F.R. § 50.55(e). After the meeting on the morning of May 7, B&R assigned the "most serious" discipline findings to its appropriate lead engineering personnel for review. A one page form had been prepared for the reviewers to record their reportability determination and their rationale for each of the findings. A meeting was then convened in B&R's offices at about 5:00 p.m. during which the B&R discipline engineers presented their results to various B&R personnel. Mr. Cloin Robertson and I attended the meeting.

The results of B&R's review were presented in writing to HL&P on the morning of May 8, 1981. (Applicants' Exhibit 62). Attachment B was a set of the forms on which B&R's reportability determinations had been documented. B&R had concluded that no findings were reportable except an item associated with HVAC design, which it identified as reportable under 10 C.F.R. § 50.55(e) and 10 C.F.R. Part 21.

Q.24 What did HL&P do with this input from B&R?

A.24 At about 12:30 p.m. on May 8, I met with Messrs. Goldberg and Robertson to review each of the "most serious" discipline findings for reportability. While we took into account B&R's input, we made our own independent judgments as to the reportability of the individual findings.

Q.25 What did you conclude as to reportability?

A.25 We concluded that, in addition to the HVAC design deficiency identified by B&R, the NRC should be notified of potential deficiencies related to computer code verification and classification of shielding analyses.

Q.26 After May 8, did you have any other occasion to review the Quadrex findings for reportability?

A.26 Yes. I subsequently reviewed each of the Quadrex findings with Mr. Robertson to provide him with the benefit of my knowledge of the findings and to consider again whether any items which should have been reported had been missed in our prior reviews. We identified no additional reportable items.

Q.27 Are you aware of any discussion by HL&P regarding withholding the Report from the NRC Staff?

A.27 No. While prior to the receipt of the Report Mr. Goldberg indicated to me that a copy would not be transmitted to the NRC Staff, there was no discussion of any intention to prevent the Staff from reviewing the Report. On the contrary, Mr. Goldberg informed me that he intended to brief Mr. Sells, NRC Project Manager for STP, on the Report. During the hearing session in Bay City during the week of May 11, 1981, Mr. Goldberg told me that he had briefed Mr. Sells on the Report and had told him that a copy would be available for his review.

Q.28 Was the Quadrex Report maintained as a confidential document within HL&P?

A.28 No. Numerous copies were available at both HL&P and B&R, and I am aware of no instructions being given which would have limited access to the Report.

Q.29 Do you think HL&P met its obligations under 10 C.F.R. § 50.55(e) in its review and reporting of the Quadrex Report?

A.29 Yes. A timely review of the Quadrex Report was undertaken by HL&P's most experienced management personnel aided by prompt review and advice, at HL&P's direction, from B&R, the organization most familiar with the details of the design. Despite the large number of matters to be evaluated in a short time, all

potentially reportable matters were identified and reported to the NRC. Therefore, I believe that HL&P carried out its responsibilities under 10 C.F.R. § 50.55(e) in an expeditious and effective manner.

RESUME OF
JAMES R. SUMPTER

Employment History:

Sargent & Lundy Engineers
Nuclear Analyst, October, 1970-August, 1972

Houston Lighting & Power
Nuclear Engineer, August, 1972-March, 1973
Supervising Engineer, Nuclear Safeguards and Licensing, March, 1973-February, 1975
Manager, Nuclear Services Department, February, 1975-December, 1984.
Manager-Litigation Technical Support, December, 1984-Present

Education:

B.S., Penn State University, Engineering Science, 6/65
M.S., University of Michigan, Nuclear Engineering, 12/67
Ph.D., Texas A&M University, Nuclear Engineering, 12/70

Professional Affiliations:

Member, Electric Power Research Institute, Safety Technology Task Force, 1984 - present
Lecturer, University of Houston, Department of Curriculum and Instruction, Energy Course, 1982 - present;

Member, Texas Radiation Advisory Board, 1980 - present; Member, Low Level Waste, Uranium Mining, and Fees Committees, 1981 - 1984; Member, Sunset Commission Committee, 1983 - present
American Nuclear Society - South Texas Section, Program Co-Chairman, 1977; Treasurer, 1978 - 1980; Vice-Chairman, 1981; Chairman, 1982; Executive Committee, 1983; National Society, Joint Subcommittee on Teacher Communications, 1983 - present

Registered Professional Engineer, State of Texas, 1979 - present

Member, Advisory Committee on Nuclear Energy, Texas Energy & Natural Resources Advisory Council (TENRAC), 1980-1983; Member, Nuclear Operations Subcommittee, 1980 - 1983

Lecturer, Institute of Energy, Economics and the Environment, University of Houston, Clear Lake City, 1979 - 1982

Member, Edison Electric Institute, Nuclear Operations Subcommittee, 1979 - 1982

Member, Utility Occupational Radiation Standards Group, 1978 - 1981

Member, Industrial Representatives Committee, Doctor of Engineering Program, Texas A&M University, 1977 - 1981

Member, Technical Program Committee, ANS Reactor Operating Experience Conference, 1979

Member, Gas Cooled Reactor Associates Direct Cycle Technical Advisory Committee, 1977 - 1980

Chairman, Technical Session on New Developments in Radwaste Management, ASME Joint Power Generation Conference, 1978

Lecturer for International Atomic Energy Agency (IAEA) Nuclear Power Projects Course, Argonne National Laboratory, 1976, 1977

American National Standards Institute (ANSI) Steering Committee on Nuclear Power Plant Fire Protection, 1976 - 1978

Atomic Industrial Forum (AIF) Steering Committee on Reactor Licensing & Safety, 1975 - 1978

Secretary, American National Standards Institute (ANSI) Standard on Nuclear Power Plant Air Cleaning Units & Components, N509, 1972 - 1975

Awards, Honors:

Honorary Societies: Sigma Pi Sigma (Physics), Psi Chi (Psychology)

Fellowships: Graduate Fellowship, National Science Foundation, 1967 - 1969
Graduate Fellowship, Atomic Energy Commission, 1970 - 1972

Publications:

"BWR Liquid Radwaste System Optimization Studies"
1975 Winter Meeting of American Nuclear Society,
"ANS Transactions," 22 542 (1975)

"Nuclear Power Plant Fire Protection-Status", AIF Conference on Reactor Licensing & Safety, February, 1977

"Impact of Nuclear Regulatory Commission Regulations on Fire Protection for Nuclear Plants"-American Power Conference, March, 1977
"Proceedings of the American Power Conference," 39, 127 (1977)

"Working for Energy Literacy Through the Public Schools" - 1983 Winter Meeting of the American Nuclear Society, "ANS Transactions," 45, 584 (1983)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	
	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL., OF LOREN STANLEY

Q.1 What is your name?

A.1 My name is Loren Stanley.

Q.2 Please identify your present employment.

A.2 I am President of Zytor, Inc., located in San Jose, California. Zytor, Inc., provides engineering and consulting services related to nuclear power generation and other areas.

Q.3 Please describe your professional qualifications.

A.3 My professional qualifications are described in the Statement of Professional Qualifications of Loren Stanley, which is attached hereto and incorporated by reference.

Q.4 What is the purpose of your testimony?

A.4 The purpose of my testimony is to describe the purpose and nature of the "Design Review of Brown and Root Engineering Work for the South Texas Project" (Quadrex Report) (May 1981).

Q.5 What was your role in preparing the Quadrex Report?

A.5 At the time the Quadrex Report was prepared, I was employed by the Quadrex Corporation (Quadrex) and was assigned as the project manager in charge of the review of Brown & Root (B&R) engineering. The Quadrex Report was prepared under my supervision and control, and it describes the results of the review of B&R engineering.

Q.6 Is Applicants' Exhibit 60 a true and correct copy of the Quadrex Report?

A.6 Yes.

Q.7 Have you read the "Testimony on Behalf of Houston Lighting & Power Company, et al., of Jerome H. Goldberg" and "Testimony on Behalf of Houston Lighting & Power Company et al., of Dr. James R. Sumpter?"

A.7 Yes.

Q.8 Do you agree with Mr. Goldberg's and Dr. Sumpter's description of the role of Houston Lighting & Power Company (HL&P) in the performance of the Quadrex review of B&R engineering and their description of the meetings involving HL&P and Quadrex?

A.8 Yes.

Q.9 What was the purpose of the Quadrex review of B&R engineering?

A.9 The purpose of the Quadrex review of B&R engineering was to evaluate B&R's engineering activities as they might reflect on B&R's ability to complete the plant in an efficient and orderly way. Quadrex was asked to make this evaluation by reviewing selected aspects of B&R's engineering response to issues that were known to present difficulties to the nuclear industry as well as those areas in which HL&P believed that B&R was experiencing problems. Based on this information, Quadrex found indications of potentially weak areas and identified these to HL&P so that they could inquire further into the specific details and characterizations regarding each issue.

Q.10 What were the major results of its review that Quadrex intended to convey to HL&P in its Report?

A.10 Our review of B&R engineering primarily indicated that B&R was not as far advanced in the design of STP as we would have expected for a plant which had been under design for at least seven years. In many areas, such as mechanical, electrical, instrumentation, and piping, B&R had not yet performed much of the work needed to complete the design, including the development of basic design documents. In a few instances, we also observed some deficiencies in the design work that had been performed; these instances are identified in the Report.

Q.11 Was it the purpose of the Quadrex review to identify failures of B&R to conform to the requirements of Appendix B to 10 CFR Part 50 in the design process for STP?

A.11 No, this was not our assigned task. We did not review B&R's design procedures or quality assurance (QA) program for design activities, nor did we assess B&R's compliance with such procedures and program.

Q.12 Did you separately identify specific findings which might have licensing implications?

A.12 Yes. These findings were placed in a "most serious" category.

Q.13 At the time Quadrex performed its review, were you aware of 10 CFR § 50.55(e)?

A.13 Yes, we were aware of it. However, the only similar reporting requirement applicable to Quadrex was 10 CFR Part 21.

Q.14 Did you identify findings which were reportable to NRC under 10 CFR § 50.55(e)?

A.14 No. HL&P had asked us to try to identify any findings which might be potentially reportable under 10 CFR § 50.55(e). However, we could not make this determination because we felt we did not have sufficient information to make such a judgment. Instead, we put everything with possible licensing implications into the "most serious" category. We believed this category would encompass anything that might be possibly reportable. Additionally, this category included findings which clearly were not reportable.

Q.15 Why did Quadrex include generic findings in its report?

A.15 The Quadrex review of B&R engineering was not intended to be a detailed review of the B&R design work. HL&P desired to have a quick review of the status of B&R's engineering work. Consequently, Quadrex devised a program to sample a limited segment of B&R's work in selected areas. The specific results of this sample

are presented in Volumes II and III of the Quadrex Report and are summarized in the discipline findings in Section 4.0 of Volume I of the Report.

In the generic findings in Section 3.0 of Volume I of the Quadrex Report, we attempted to identify some common threads which appeared in the discipline findings. The generic findings were intended to assist HL&P in identifying areas where HL&P could inquire to determine whether improvements were desirable; they do not represent conclusions regarding the existence of any deficiencies in design.

Q.16 Do you recall discussing with HL&P whether the generic findings were based on the discipline findings?

A.16 Yes. Our report plainly stated that the generic findings were based on the discipline findings. Additionally, I confirmed that point with HL&P.

Q.17 Could a determination of whether the most serious generic findings in the Quadrex Report were reportable be made based upon a review of the most serious discipline findings?

A.17 Yes. Since the generic findings did not have independent factual bases, they did not have to be reviewed separately for reportability. A careful examination of the most serious discipline findings by experienced

engineers alert to the potential that several most serious discipline findings could, as a group, represent a systematic deficiency would have captured anything reportable under 10 CFR 50.55(e). If the HL&P reviewers were sensitive to this consideration, the foregoing approach was reasonable.

Q.18 Please describe Applicants' Exhibit 65.

A.18 Applicants' Exhibit 65 is a copy of a letter dated March 16, 1981, from me to Dr. J. R. Sumpter, then Manager of HL&P's Nuclear Services Department. This letter states my conclusions that B&R's method of conducting ALARA reviews was inadequate to meet HL&P's needs.

Q.19 Was it your intent in this letter to identify a significant breakdown in the QA program for STP with respect to ALARA or to identify violations of the ALARA principle?

A.19 No. B&R's ALARA review program was similar to industry practice at that time. However, it was HL&P's goal to establish an ALARA program which far exceeded industry practice. The purpose of my letter was to alert HL&P to the fact that B&R's ALARA program did not satisfy HL&P's goals.

Q.20 Does this conclude your testimony?

A.20 Yes.

STATEMENT OF PROFESSIONAL QUALIFICATIONS
OF LOREN STANLEY

Experience Highlights

Twenty-nine years in engineering design, systems evaluation, and consulting service with nuclear plant systems and aerospace instrumentation. Thirteen years experience in Quality List development and implementation, and seventeen years experience in systems design review on BWR, PWR, and HTGR plants.

Thirteen years managing technical groups performing design, licensing, and consulting activities. Provided FSAR licensing; response to USNRC questions; failure mode and effects reliability analyses; safety-related component determinations; instrumentation design and analysis, and design review of engineering work.

Professional Experience

2/83-Present — President, Zytor, Inc., San Jose, CA.

Performed the Instrumentation and Control (I&C) portion of Integrated Design Inspections at two BWR and three PWR plants, and participated in an audit of electrical construction at a PWR plant. Performed accident monitoring instrumentation conformance analyses relative to USNRC R.G. 1.97 rev. 3 and provided recommendations for analog transmitter implementation at an operating BWR plant. Provided ASLB testimony regarding a BWR plant Component Classification Program involving safety-related and important-to-safety aspects.

3/74-2/83 — Quadrex Corporation, Campbell, CA.

Group Manager, Licensing and Systems Analysis Department.
Supervised consulting activities in licensing, design review, safety classification of plant components, and probabilistic risk assessment. Directed a technical review of Brown & Root South Texas Project engineering work.

Deputy Director, Engineering Services. Prepared technical proposals and performed technical design reviews of engineering output for client projects.

Director, Project Services.
Supervised consulting activities in Licensing and Safety, Quality Assurance, Environmental Services, Reliability and Risk Assessment, and

Records Management. Participated in a MFTF fusion reactor reliability improvement program, a TNS fusion reactor licensing criteria evaluation, and an EPRI study of PWR feedwater steam generator level trips.

Manager, Licensing, Safety, and Reliability. Supervised FSAR reformat with added technical content for six BWR plants. Developed and implemented Q-List methodology to identify and classify safety-related components and spare parts for BWR and PWR plants. Supervised an accident monitoring instrumentation study of a typical Westinghouse PWR and a pressure sensor response time verification program for EPRI. Prepared FMEAs for TMI 1/2 ECCS, BWR 5/6 ECCS, HTGR Steam Dump System, ATR Plant Protection System Upgrade, and LMFBR secondary control rod system and test facility. Performed hazard analysis and MTBF estimates for the ATR PPS Upgrade program.

4/63-3/74 General Electric Company, San Jose, CA.

Manager, Nuclear Instrumentation and Protection Systems.
Supervised initial conversion of the BWR safety systems to a solid-state design, and design of safety-related control systems. Prepared technical system descriptions, compliance analyses, and technical responses to USNRC licensing questions.

Technical Leader, Control and Electrical Systems. Performed design improvements for BWR control rod drive and reactor protection systems. Designed instrumentation for the process computer system, rod worth minimizer, and a prototype RWM system at Dresden 1. Participated in the development and testing of intermediate range neutron monitoring system equipment.

6/56-4/63 General Electric Company, Utica, NY.

Lead Electrical Engineer, Polaris Guidance Electrics and Orbiting Astrological Observatory Electronics. Assisted in the initial design of the Apollo guidance computer, and Polaris guidance and fire control computers.

Field Service and Senior Field Service Engineer. Provided technical training and maintenance supervision for Polaris guidance electronics equipment and airborne ARR-39A data link electronics equipment.

Education

M.B.A. University of Santa Clara, Santa Clara, CA, 1970.

B.S.E.E. Carnegie Institute of Technology, Pittsburgh, PA., 1956.

Professional Registration

Professional Engineer, California, Electrical Engineering, 1975.

Professional Affiliations

Senior Member, IEEE
Member, IEEE/PES Nuclear Power Engineering Committee, 1971-Present
Chairman, IEEE/PES/NPEC SC6, Safety-Related Systems, 1972-1975.

Member, American Nuclear Society
Chairman, ANS 4.5 Writing Group, Criteria for Accident Monitoring Functions in LWRs, 1979-1980.
Member, ANS Nuclear Power Plant Standards Committee, 1981-1983.

Member, IAEA Work Group on Safety System Safety Guide SG-D3, Vienna, 1976.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL.,
OF DON D. JORDAN

Q.1 Please state your name and occupation.

A.1 I am Don D. Jordan, Chairman of the Board of Directors and Chief Executive Officer of Houston Lighting & Power Company (HL&P).

Q.2 Have you previously testified in this proceeding?

A.2 Yes, I testified on May 14, 1981.

Q.3 Has your position at HL&P changed since you testified in 1981?

A.3 Yes, on May 12, 1982 I was elected Chairman of the Board and relinquished my position as President. I have continued as Chief Executive Officer.

Q.4 Does the HL&P officer responsible for the South Texas Project (STP) still report directly to you?

A.4 Yes. Mr. George W. Oprea, Jr., Executive Vice President-Nuclear, reported directly to me until he retired on February 1, 1985. Since that date, Mr. Jerome H. Goldberg, Group Vice President - Nuclear, has reported directly to me.

Q.5 What is the purpose of your testimony?

A.5 The purpose of my testimony is (1) to describe my knowledge of the Quadrex Report when I testified on May 14, 1981, as well as my views on the adequacy of B&R's services at that time, and (2) to show that I was truthful and candid in my testimony before the Board and that there was no occasion for me to mention either the Quadrex Report or the review of B&R's design engineering services.

Q.6 What was your involvement in the decision to initiate the Quadrex review of B&R engineering at STP?

A.6 In late 1980, I had been informed of, and concurred in, the decision by Messrs. Oprea and Goldberg to undertake a third-party assessment of B&R engineering.

Q.7 Did you receive any information concerning the Quadrex review during its conduct or after the Quadrex Report was received?

A.7 During the conduct of the review by Quadrex, I occasionally received information concerning the progress of the review. After the Quadrex Report was received, Mr. Goldberg briefed me on its results on May 11, 1981. He mentioned a number of engineering problems and some general observations that had been raised by Quadrex. He indicated that some of the Quadrex findings were unsupported or did not take into account complete information, since the review had been limited in time and scope. However, Mr. Goldberg said that some engineering problems would require significant attention and that Quadrex confirmed the lack of progress in many important aspects of B&R engineering. He concluded that this lack of progress meant that engineering was insufficient to support the construction schedule, and, if not corrected, the completion of STP might be substantially delayed. Mr. Goldberg also mentioned the three potential deficiencies that had been reported to the NRC on May 8, and noted that the computer code verification problem could be a pervasive concern.

Q.8 When you testified on May 14, 1981, what was your understanding of the import of the Quadrex Report?

A.8 Mr. Goldberg did not convey to me that the STP design was deficient or did not meet regulatory requirements (except for a few items reported to the NRC) but

rather that the Report confirmed that B&R had not performed its engineering functions in a timely and efficient fashion and that the present B&R engineering organization was weak and unlikely to support the Project without substantial, additional improvements. In other words, it was not my understanding that the Quadrex Report dealt with compliance with quality assurance requirements at STP, but rather that it primarily identified problems in the efficiency and timeliness of the performance of engineering functions.

Q.9 At the time of your testimony, what was your opinion concerning B&R's services at STP?

A.9 The progress of the Project had been disappointing to me for a number of years, and that disappointment related to a significant degree to B&R's performance. When I testified in May 1981, my opinion of B&R differed with respect to the distinct categories of services they were performing at STP.

One category of services provided by B&R was as constructor of the STP. A number of serious problems relating to the construction of STP, including significant QA problems, had been identified in I&E Inspection Report No. 79-19 and the related Notice of Violation and Show Cause Order in early 1980. But, by

the time I testified, those problems had been vigorously and effectively addressed to the satisfaction of both HL&P and, we believed, the NRC Staff. Thus, I expected that B&R could satisfactorily perform the remaining construction at STP.

My opinion concerning B&R's ability to perform construction management and engineering services was not as positive. My concerns stemmed from the fact that, since the inception of the Project, significant delays and changes in scope of the Project had occurred, only some of which could be attributed either to regulatory changes or to the construction problems associated with 79-19 and the Show Cause Order. We were concerned that engineering was not sufficient to support the construction schedule, although the magnitude of the impact on schedule was unknown. As I previously testified (Tr. 1376), B&R was preparing a reforecast of cost and schedule which was to be issued in August or September of 1981.

When the independent third-party assessment was performed by Quadrex in 1981 it confirmed our concerns, and indicated that the lack of progress in engineering would have more of an impact than we had expected.

At the time of my testimony, we were taking steps to enhance B&R's capability to perform engineering in a manner that would support the construction schedule. Representatives of the owners of STP met with B&R in Corpus Christi on April 10, 1981, to discuss Project problems and corrective measures that might be taken to remedy them. Some discussion centered on the availability of human resources and lack of sufficient experienced B&R nuclear personnel, principally in the area of engineering and basic project management. We considered various incentives to enhance B&R's ability to attract qualified personnel, as well as subcontracting portions of the engineering effort. We also considered the possibility of reorganization of the B&R project team, with new senior nuclear experienced executive management at B&R to supervise the STP effort.

I met personally with B&R officials to discuss a reorganization plan in attempting to reach a mutually satisfactory solution. When B&R resisted the suggestion that it acquire a senior nuclear executive who would report directly to B&R's president, Mr. Goldberg believed this was a serious setback. However, as of May 14, 1981, my discussions with B&R on reorgani-

zation were continuing, and I was not yet convinced that some combination of sufficient corrective actions was not achievable.

Thus, when I previously testified before this Board, we were concerned about B&R's engineering performance and we were in the midst of taking actions to enhance such performance.

Q.10 When you testified were you actively considering removing B&R?

A.10 No. In June of 1980, Mr. Oprea and I questioned whether an experienced A-E alternative to B&R would be available if that became necessary. In discussions that I had with management of Bechtel and Ebasco, however, they indicated that they were not interested and that it would not be in the best interest of the Project to change contractors. I was also well aware that such an action would have been unprecedented -- never in the history of the United States nuclear power program had an architect-engineer been dismissed after issuance of a construction permit -- and could have entailed an extended cessation of Project activities. Accordingly, I did not pursue the subject any further at that time.

Shortly after Mr. Goldberg joined HL&P - probably in January, 1981 - he suggested that it would be prudent to establish whether it would be feasible to replace B&R with another engineering organization, if that became necessary. This would keep open HL&P's options if it were determined that B&R could not complete the engineering work in a timely and efficient manner. He thought such a contingency should be explored while we sought to improve B&R's performance. We discussed the matter again after the meeting in Corpus Christi on April 10, 1981.

My own view was that our efforts should be devoted primarily to steps aimed at improving B&R's performance, such as enhancing B&R's ability to attract experienced nuclear personnel, subcontracting as appropriate, and restructuring of B&R's engineering organization. In the latter connection, when B&R resisted the suggestion that it acquire a senior nuclear executive who would report directly to B&R's president, Mr. Goldberg increasingly urged us to determine whether there were available alternatives to retaining B&R. However, I was not prepared to do so until we were in a position to evaluate the potential effectiveness of the steps being taken by B&R.

In short, when I testified before this Board, replacement of B&R was a course of last resort, not to be explored until the results of the steps being taken to improve B&R's engineering performance could be assessed. Replacement of B&R was not under active consideration, and there was some question whether it would be feasible to retain a more experienced architect-engineer.

Q.11 When did you begin consideration of replacement of B&R?

A.11 As Mr. Goldberg has described in his previous testimony (Tr. 10,468-69), it was not until the meeting of the owners of STP with B&R at San Antonio on June 26, 1981, that we became convinced that the prospects for sufficient improvement by B&R were poor. It was then apparent that B&R, having spent substantial sums and effort to develop a new construction schedule, would be unable to support that schedule because of engineering problems that were continuing to plague the Project's ability to move forward in a reasonable and effective way. Immediately thereafter, on June 29, 1981 I met with Messrs. Oprea, Goldberg and Barker, and it was agreed that the situation was sufficiently ominous that we had to find out if there

were feasible alternatives to B&R available in the industry. It was from that point on that discussions were held concerning replacing B&R.

Q.12 Have you reviewed your May 14, 1981, testimony in this proceeding in preparation for this hearing?

A.12 Yes. I have reviewed the portions of my testimony that mentioned B&R engineering services.

Q.13 Do you now believe that you should have mentioned either the Quadrex Report or your concerns regarding B&R's engineering services in response to the questions at the portions of your testimony cited in the Board's Memorandum and Order of February 26, 1985?

A.13 No, I do not believe so. After a lapse of more than four years, it is, of course, difficult for me to recall exactly how I understood a question in the middle of cross-examination and why I did or did not refer to matters beyond those contained in my replies. However, it is my personal view that I could not reasonably have thought that the Quadrex Report or my views concerning the adequacy of B&R's engineering services would be relevant to my response to the particular questions that were asked.

I should emphasize that when I appeared on May 14, 1981, I was focusing almost entirely on the impact of 79-19 and the Show Cause Order on HL&P and the steps being taken to prevent a recurrence of those events. Those NRC actions stemmed from construction and construction QA problems and I understood that this NRC proceeding dealt basically with those problems and their solution. Moreover, even had I thought that this proceeding dealt with engineering aspects of the STP, I understood that the NRC was interested in safety-related matters and not whether B&R was capable of completing the job in a timely and cost-effective way. It was not my perception that the Quadrex Report or the factors weighing on our minds about the adequacy of the B&R engineering effort were QA/QC matters. I had certainly received no such suggestion from Mr. Goldberg.

For both of those reasons, neither the Quadrex Report nor our concerns about B&R's ability to complete engineering came to mind when I was testifying.

Q.14 Specifically, please explain why you did not mention those subjects at Tr. 1269-70.

A.14 The questions and answers at Tr. 1269-70 were plainly focused on improvements made in response to 79-19 and the Show Cause Order, i.e., improvements in the

construction program (e.g., see question at Tr. 1268, lines 2-7) and in the quality assurance program. I do not see that those questions related to the effectiveness of B&R engineering services or the cost and schedule of the Project, and thus they would not have called to mind either the Quadrex Report or my concerns as to B&R's engineering services.

Q.15 Please explain why you did not mention those subjects at Tr. 1294.

A.15 My testimony at Tr. 1294 was in direct response to questions concerning actions taken as a result of the Show Cause Order (see, e.g., question at Tr. 1293, lines 14-18). At that point I was reflecting my view concerning improvements in QA/QC performance made as a result of problems identified by the NRC and the responsibility for those problems. On the basis of the corrective measures taken, I felt that from the standpoint of QA the Project was in "good order." That discussion did not trigger in my mind mentioning the Quadrex Report or concerns with the effectiveness of B&R engineering services.

Q.16 Please explain why you did not mention those subjects at Tr. 1337.

A.16 My remarks at Tr. 1337 were in response to questions concerning whether, prior to the Show Cause Order, I came to any conclusion as to the need for extra quality assurance measures by HL&P in light of B&R's limited experience in constructing nuclear power plants (see questions at Tr. 1336, line 19 to Tr. 1337, line 1 and Tr. 1337, lines 10-12). These questions dealt with a time frame well before the Quadrex Report and my testimony. Moreover, in the context of my testimony, I believed that the questions pertained to B&R's limited experience in nuclear construction, not nuclear engineering, and my answers dealt with whether additional HL&P QA measures were needed. For reasons I have previously described, I did not relate the Quadrex Report nor our concerns with the effectiveness of B&R engineering to any need for additional HL&P QA measures.

Q.17 Finally, please explain why you did not mention those subjects at Tr. 1402-05.

A.17 At Tr. 1402-05, I discussed improvements in QA-QC operations and the possible need for additional modifications. It is apparent that I had in mind the QA improvements resulting from the Show Cause Order and additional changes relating to activities at the site (see, e.g., Tr. 1404, lines 1-2). Those questions did not bring to my mind the Quadrex Report

or concerns regarding B&R engineering. Moreover, one question's reference to "major problem areas" that I had previously mentioned (see Tr. 1402, lines 11-13), apparently referred to an earlier discussion of QA-QC problems at Tr. 1276-77.

Q.18 In your review of other portions of your testimony, did you find any answers that you now believe would have called for you to mention the Quadrex Report or your views at that time concerning B&R's engineering services?

A.18 No. In no instance do I believe that it would have been reasonable to expect me to mention the Quadrex Report or my views concerning B&R's engineering services. I believe that all of my testimony was truthful and candid and that I responded properly to the questions I was asked.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	
	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL.,
OF GEORGE W. OPREA, JR.

Q.1 Please state your name.

A.1 I am George W. Oprea, Jr.

Q.2 Please state your present occupation.

A.2 I retired from my position as Executive Vice President-Nuclear of Houston Lighting & Power Company (HL&P) on February 1, 1985. I presently serve as a consultant to HL&P.

Q.3 Have you previously testified in this proceeding?

A.3 Yes, I testified in May and June of 1981.

Q.4 What is the purpose of your testimony?

A.4 My testimony will explain why HL&P did not furnish to the Atomic Safety and Licensing Board (Licensing Board or Board) the report prepared by Quadrex Corporation

(Quadrex) entitled "Design Review of Brown & Root Engineering Work for the South Texas Project" (the Quadrex Report) and why HL&P did not advise the Board of the potential replacement of Brown & Root, Inc. (B&R) before the decision was announced publicly.

In addition, in response to the Board's request at page 19 of its Memorandum and Order of February 26, 1985, my testimony will describe my knowledge of the Quadrex Report when I testified, as well as my views on the adequacy of B&R's services at that time. It will also show that I was truthful and candid in my testimony before the Board and that there was no occasion for me to mention either the Quadrex Report or the review of B&R's design engineering services.

Q.5 What was your involvement in the decision to initiate the Quadrex review of B&R engineering on STP?

A.5 After Mr. Jerome H. Goldberg joined HL&P as Vice President-Nuclear Engineering and Construction in the fall of 1980, he recommended that there be an independent third party assessment of the engineering services of B&R. I agreed that such a review be undertaken, because I thought it important to assure that engineering was coordinated and properly sequenced to support the construction schedule in an orderly fashion. I had considered such a review in

mid-1980, but initiation of the activity was delayed because of the pressure of other, more immediate activities associated with responding to I&E Inspection Report No. 79-19 and the Show Cause Order.

Q.6 Were you briefed on the progress of the Quadrex review?

A.6 Several times during March and April I obtained information as to the progress of the review, either in conversations with Mr. Goldberg or at meetings of the STP Management Committee. It was apparent that Quadrex was finding weaknesses in the B&R engineering program which, in some cases, tended to confirm an underlying concern we had regarding its ability to perform the work necessary to support the construction schedule. Mr. Goldberg also indicated the possibilities of some deficiencies that would be reportable to the NRC under 10 CFR § 50.55(e). I did not attend any meetings with Quadrex or briefings by Quadrex.

Q.7 Were you briefed on the Quadrex findings after completion of the review?

A.7 Yes. I was aware that the Quadrex Report would be received on May 7. At about that time Mr. Goldberg informed me that B&R would do an immediate review to determine the reportability of any Quadrex findings to

the NRC, and that an HL&P review team (Mr. Goldberg, Mr. Cloin G. Robertson, and Dr. James E. Sumpter) would do an additional review and would decide if any items were reportable.

In the late afternoon of May 8, Mr. Goldberg told me that B&R had recommended reporting one Quadrex item to the NRC and that the HL&P review team had decided to report two additional items. He also informed me generally as to the results of the Quadrex review. A couple of days later, on May 11, Mr. Goldberg briefed both Mr. Jordan and myself.

Q.8 When you testified what was your understanding of the substance and import of the Quadrex Report?

A.8 On the basis of the briefings I had received, it was my understanding that the Quadrex Report contained a large number of specific findings and general observations. Mr. Goldberg explained that some of the findings and observations were unsupported or based on incomplete information, at least in part because the Quadrex review had been performed in a short time period. I recognized the potentially serious implications of some of the deficiencies which had been reported to the NRC, particularly the one dealing with computer code verification. Apart from the items that had been reported to the NRC, I understood that

Quadrex had reported a number of areas in which engineering was even further behind than we expected, and that the schedular impact on Project completion could be significant. These types of concerns underscored the importance of actions which we were then taking to improve the B&R engineering organization with additional experienced personnel, as well as other related measures such as subcontracting specific portions of the engineering work.

I was also aware that Mr. Goldberg had tasked B&R with developing an action plan to disposition the Quadrex findings. Thus I was confident that any substantive engineering questions raised by the Quadrex Report would be properly taken into account in completing the design of STP.

Q.9 Do you know how the NRC Staff was informed of the Quadrex Report?

A.9 I was aware that Mr. Goldberg had informed Mr. Donald Sells, the NRC Project Manager for STP, of the conduct of the review by Quadrex and that he briefed him on the Quadrex Report in Bay City during the week of May 11, 1981. It was logical to contact Mr. Sells because the Office of Nuclear Reactor Regulation (NRR) is involved in the design and technical areas for NRC.

Both Mr. Goldberg and I believed that Mr. Sells was the appropriate contact with the NRC concerning the Quadrex review, and there was no apparent reason to discuss the subject with Region IV in addition to NRR, except to the extent that our review of the Report disclosed the existence of reportable deficiencies.

Q.10 Were you involved in August 1981 when personnel from Region IV asked to see the Quadrex Report?

A.10 Yes. I received a call from Mr. Richard Frazar. I made clear that the Report should be made available to the Region IV personnel for review. It was our view, however, that the Report would not be filed with the NRC since it could be misunderstood and misinterpreted if it were made publicly available.

Q.11 Did you subsequently discuss the Report with officials of Region IV?

A.11 Yes. When I realized that Region IV might not be aware of our contacts with Mr. Sells regarding the Report, or, if they were aware, might be concerned as to why we had not provided them with a similar briefing, I called Mr. Karl Seyfrit, the Director of Region IV, in late August, 1981, and offered to discuss the Report with him and his staff. Such a meeting was held on September 8, 1981, and Mr.

Goldberg and I briefed Region IV on the contents of the Report and the actions being taken by HL&P and B&R.

At that time, I believe that Mr. Seyfrit asked whether HL&P planned to file any additional reports under § 50.55(e) or whether HL&P considered the entire Quadrex Report to be reportable under § 50.55(e). Although I do not recall whether we responded at the meeting or in subsequent telephone conversations, our position was that only three distinct matters were reportable under § 50.55(e) and we did not see any basis for reportability of the entire Report. Since HL&P and B&R were implementing a corrective action plan for the Quadrex findings we would, of course, file additional § 50.55(e) reports if any additional reportable matters were found.

In the course of the meeting, Mr. Goldberg had mentioned 10 priority matters being addressed by B&R under the corrective action plan. Region IV stressed that all of the Quadrex findings would have to be dispositioned, and we agreed to do so.

Q.12 At the time of your testimony, what was your opinion concerning B&R's services as constructor at STP?

A.12 As my testimony in 1981 indicated, I believed that both HL&P and B&R had taken effective actions to correct the problems concerning the performance of construction of the STP, including the QA problems that had been identified in I&E Inspection Report No. 79-19 and the related Notice of Violation and Show Cause Order. Accordingly, I had no doubts regarding B&R's ability to perform construction services at STP.

Q.13 At that time, what was your opinion concerning B&R's engineering and construction management services?

A.13 The situation was not as clear with respect to B&R's performance of those services at STP.

A baseline estimate for cost and schedule had been prepared in 1979, and a reforecast was being developed by B&R to be issued by August or September 1981. (See my testimony at Tr. 3469-70.) The Project was significantly behind the previous schedule. Only part of B&R's difficulties in construction management could be attributed either to changes in NRC regulatory requirements after the Three Mile Island or to the effects of 79-19 and the Show Cause Order. As I have previously indicated, I had considered conducting an assessment of the status of engineering in mid-1980. It was apparent that the B&R engineering organization needed to be strengthened to be able to support the

construction schedule. B&R had brought in Mr. Saltarelli from NUS to strengthen the engineering organization but improvements in this area were not given the same priority as resolving the construction problems.

As Mr. Jordan mentions in his testimony, we thought it would be useful in 1980 to ascertain whether an experienced alternative to B&R would be available. However, his contacts with Bechtel and Ebasco indicated a lack of interest and strong suggestions that the better course for the Project would be to improve B&R's performance.

After Mr. Goldberg joined HL&P in the fall of 1980, the efforts to improve B&R engineering continued with additional vigor. At a meeting of the STP owners with B&R in Corpus Christi on April 10, 1981 we discussed the types of actions that could be taken to enhance B&R's ability to attract experienced nuclear personnel, the possibility of subcontracting various specific engineering tasks and restructuring of the B&R engineering organization.

These potential improvements were actively pursued in the succeeding couple of months. Mr. Goldberg was in continuous contact with B&R and received weekly

progress reports. Mr. Goldberg and I prepared a proposed new B&R organizational chart for Mr. Jordan to discuss with Mr. Feehan, President and Chairman of the Board of B&R. These organizational changes -- as well as enhanced recruiting and subcontracting -- were still being actively pursued with some degree of success when I testified in 1981. We were attempting to attract about thirty engineers and discussions were moving along looking toward subcontracting parts of the work to such organizations as Westinghouse, Gibbs & Hill, and others.

In sum, at that time I had serious concerns with respect to B&R's ability to successfully complete the engineering effort, but I had not yet reached a judgment on the likely effectiveness of steps being taken by B&R at our urging, to turn things around.

Q.14 When and how was the decision to replace B&R made and implemented?

A.14 In essence when the owners of STP met with B&R on June 26, 1981, it became apparent that all the steps taken and contemplated by B&R still would not likely enable B&R to perform engineering services in a fashion that would support the construction schedule. It would take an extensive period before engineering could achieve the desired productivity, if at all.

At a subsequent meeting held on June 29 by Mr. Jordan with Messrs. Goldberg and Barker and myself, we all expressed doubts as to the ability of B&R to complete the engineering in an orderly, timely and cost effective manner. Thus, it became essential to ascertain whether any alternative was available.

In early July, 1981, Mr. Goldberg and I contacted four prospective contractors and ascertained that each would be interested in undertaking to complete the Project. Invitations to submit proposals were sent to them in late July, and the proposals were evaluated during August and early September. Bechtel's proposal was accepted as a basis for negotiation and an agreement in principle was reached by September 24, 1981.

Q.15 At pages 20-21 of its Memorandum and Order of February 26, 1985, the Board discusses the obligation of parties "to keep licensing or appeal boards informed of newly developing information bearing on issues pending before such boards," i.e., the so-called "McGuire doctrine." Were you aware of such obligation in 1981?

A.15 I was not aware of the McGuire doctrine by name. I fully understood, however, that HL&P had to report to the Board any new information that might affect issues under consideration in this proceeding.

Q.16 In its Memorandum and Order of February 26, 1985, the Board has determined that under the McGuire doctrine, the Quadrex Report should have been turned over to the Board shortly after its receipt by HL&P (pages 21-23). Please explain why you did not furnish the Report to the Board at that time.

A.16 I, quite candidly, did not associate the Report with the issues under consideration in this proceeding. I knew that the matters being considered by the Board were issues arising from 79-19 and the Show Cause Order and certain contentions raised by the intervenors. In my mind all of these matters related either to construction or construction QA, neither of which were addressed directly or indirectly by the Quadrex Report.

The Quadrex Report seemed so remote from the matters at issue in this proceeding that I can recall no discussions about providing the Report to the Board prior to late September 1981, when counsel for the NRC Staff suggested that we do so.

As I understand it, the Board's determination is that the Report should have been provided to the Board because its subject is design QA and "[c]onstruction and design QA are not so disparate as to be considered unrelated subjects." (Memorandum and Order of February 26, 1985, at page 22).

I do not intend to take issue with the Board's determination, but I can only explain that my perception of the Quadrex Report was significantly different from the Board's. In my view the Quadrex Report dealt with the effectiveness of B&R's engineering effort and did not (with limited exceptions) deal with compliance with QA requirements. The main import of the Quadrex Report was what it told us concerning the limited progress of the design of the Project -- a productivity concern, not a QA concern.

In sum, I believe that our action in not furnishing the Report to the Board was reasonable under the circumstances. I can assure the Board that the failure to furnish the Report -- or to even consider doing so - did not occur because of any willful or careless disregard of obligations under the McGuire doctrine.

Q.17 In view of the reporting obligation under the McGuire doctrine, please explain why HL&P did not inform the Board, after June 29, 1981, that it was considering replacing B&R as architect-engineer and construction manager.

A.17 We did not inform the Board before September 24, 1981, because we did not believe that we had any meaningful information to provide to the Board until we had reached an agreement in principle with an experienced architect-engineer who was willing to replace B&R on acceptable terms and conditions. Until that time the replacement of B&R was only a possibility - one which might never occur. Informing the Board that the process of seeking a replacement was taking place would not have conveyed useful information to the Board and, for obvious reasons, could have had an unnecessary and devastating effect on B&R personnel carrying out Project activities.

The Board's question may be whether the concerns that led HL&P to seek a replacement for B&R should have been disclosed to the Board after the June 29, 1981 meeting. However, as I have explained, those concerns related to B&R's inability to perform engineering services in a manner which would support the

construction schedule. Such productivity considerations did not seem to me to be germane to the matters under consideration by the Board.

I should emphasize that there was no new information that related to B&R's ability to perform the construction services, including construction related QA, that was the focus of this proceeding. In fact, as the Board will recall from the initial notification to the Board on September 24, 1981, HL&P expected to retain B&R as constructor and had confidence in B&R's ability to perform such services under Bechtel's direction. All of the previous information provided to the Board concerning actions to remedy the problems identified in 79-19 and the Show Cause Order remained fully accurate.

Since the decision to ascertain the availability of an acceptable alternative to B&R was not based on any deficiencies in the B&R QA program -- either relating to construction or design -- or on any nuclear safety concerns, we simply did not perceive any obligation to inform the Board earlier. No discussion concerning notifying the Board took place until a decision regarding replacement of B&R was imminent in September 1981. At that time counsel urged an early decision and prompt notification of the Board.

Again, the fact that HL&P did not inform the Board earlier was not based upon any willful or careless disregard of our reporting obligations under the McGuire doctrine.

Q.18 Have you reviewed your testimony in this proceeding in preparation for this hearing?

A.18 Yes. To prepare myself to testify today, I have reviewed portions of my testimony that mentioned B&R engineering services.

Q.19 Do you now believe that you should have mentioned either the Quadrex Report or your concerns regarding B&R's engineering services in response to the questions at the portions of your testimony cited in the Board's Memorandum and Order of February 26, 1985?

A.19 No. I have reviewed those responses in the context of the overall cross-examination then taking place, as well as my prefiled testimony, since I wanted to recollect to the best of my ability how I understood the particular questions that were being asked. Even in retrospect, I do not believe that those questions reasonably called for me to mention either the Quadrex Report or my concerns as to the adequacy of B&R's engineering services.

My review of my prefiled testimony confirmed that (aside from a few brief references to engineering) it was clearly aimed at the identification and correction of matters of the type addressed in 79-19 and the Show Cause Order, and in particular deficiencies in the construction QA program and their resolution. Therefore, in responding to questions, I had in mind construction or construction QA overtones. Unless the questions were very direct, they would not have brought to my mind the Quadrex Report or concerns regarding engineering, which, as I have previously explained, did not seem to me to be within the focus of this proceeding.

Q.20 Specifically, please explain why you did not mention those subjects at Tr. 3486.

A.20 At Tr. 3486, I was responding to the last of a series of questions beginning at Tr. 3482 pertaining to whether B&R's lack of experience as an architect-engineer for a nuclear project contributed to construction delays at STP. As is evident from my answer at Tr. 3483, I understood the first question to elicit information germane to the hearing on construction matters, and I referred to the concern previously identified by HL&P that B&R's inexperience as an architect-engineer may have led it to prepare excessively complex construction procedures (one of

the "root causes" of the QA/QC problems identified by HL&P). A question was then asked as to my personal responsibility for assuring that such lack of experience "did not show up in construction" (Tr. 3483-84), which reinforced in my mind the relationship of the line of questioning to the focus of the hearing on construction matters. My answer referred to difficulties in recruiting qualified personnel in all areas, but that steps were being taken to upgrade B&R's capabilities. (Tr. 3484-85). Finally, I was asked whether I should have set up a system "which reviewed Brown & Root's architect engineering with any greater scrutiny." (Tr. 3485). My answer (at Tr. 3486) acknowledged that HL&P might have conducted more engineering reviews. I was reflecting the thought that reviews of that type might possibly have prevented the types of root causes of some of the construction problems I had been discussing all along. In view of my understanding of the focus of the hearing and in the context of the cross-examination, the question did not suggest to me that I refer to the Quadrex Report or the pending review of B&R engineering services. I did not consciously decide not to refer to those subjects; they just were not brought to mind by the question.

Q.21 Please explain why you did not mention those subjects at Tr. 3527.

A.21 I am not sure that I understand the Board's reference to Tr. 3527. At that point I was answering a question pertaining to whether the problem with QA/QC was in implementation of the program. Obviously both the question and the answer were in the context of the problems that had been identified in 79-19 and the Show Cause Order. I do not see how either the Quadrex Report or the review of B&R engineering services would have been pertinent.

Q.22 Please explain why you did not mention those subjects at Tr. 5458-74.

A.22 Similarly, the excerpt at Tr. 5458-74 seems fairly well limited to the concerns raised by 79-19 and the Show Cause Order. Tr. 5458-62 is a philosophical discussion of QA/QC relationships between a utility and its contractors in the context of a question from Dr. Lamb, seeking from me a retrospective insight about whether too much responsibility had been left with B&R before the Show Cause Order (the "abdication" aspect of the issues in this proceeding). Tr. 5462-68 deals with the justification for the Show Cause Order and its beneficial impact. Finally, Tr. 5468-74 deals with an allegation concerning construction at STP which was the subject of an I&E investigation, and

HL&P's efforts to achieve open communication with site personnel. I do not see how any of those questions could have brought to mind either the Quadrex Report or the pending review of B&R engineering.

Q.23 Please explain why you did not mention those subjects at Tr. 3469-73.

A.23 From Tr. 3469 to the top of Tr. 3473, I was answering questions pertaining to studies performed by MAC in 1978 and 1979 and some internal discussions of the removal of B&R from the Project prior to the Show Cause Order. Obviously, such questions would not have suggested that I refer to the Quadrex Report or to my views in 1981 concerning B&R engineering services.

The only question in that excerpt that could relate to then current circumstances appears at Tr. 3473, where I answer negatively a question concerning whether I had any discussions concerning the "removal of Brown & Root" after the Show Cause Order. Even though such discussions did not take place, the Board may be suggesting that it would have been appropriate for me to mention that the Quadrex Report confirmed that B&R engineering was not sufficiently supporting construction and that steps were being taken to enhance B&R's engineering capability.

However, having reviewed not only Tr. 3469-73 but many pages of transcript before that (Tr. 3447-69), I note that the entire line of questioning for those pages arose from lines 16 to 20 of page 6 of my prefiled testimony, which dealt with HL&P staffing at the beginning of the Project. Immediately after the single question at Tr. 3473 concerning post-Show Cause Order consideration of removal of B&R, the questioning continued as to lines 20-27 of page 6 of my testimony (dealing with staffing at early stages of the Project). Accordingly, I can only say that when -- in the midst of much historical questioning -- I was asked a single question concerning post-Show Cause Order circumstances, it did not bring to mind other aspects of our then current relationship with B&R. I answered the question put to me, and I answered it truthfully and candidly. I might add that the decision to replace B&R was not a direct outgrowth of the Quadrex Report. Quadrex confirmed, in part, the conclusion we reached about the ability of B&R's engineering to support the construction schedule but it was not, in itself, an influential factor in the decision.

Q.24 In the CCANP Motion to Reopen Phase I Record of April 15, 1985 (at page 4), CCANP accuses you of giving "what appears to be misleading testimony to the ASLB

in June of 1981 . . ." In support of that accusation, CCANP cites an excerpt from Mr. Goldberg's testimony before the Public Utility Commission of Texas. (CCANP Exhibit "A" to foregoing Motion to Reopen, at Tr. 1378-80). In that excerpt, Mr. Goldberg is questioned concerning your response to the question at Tr. 3473 which you discuss in A.23 above. Do you now believe that your response to that question at Tr. 3473 was "misleading"?

A.24 No. As I explained above, I believe that my response was truthful and candid.

It appears that CCANP views my testimony as inconsistent with that given by Mr. Goldberg before the Texas PUC, but I do not see any inconsistency. As Mr. Goldberg testified before the Texas PUC, as he testified before this Licensing Board in June 1982, and as both he and I are testifying in our present testimony concerning events in early 1981, almost from the time Mr. Goldberg joined HL&P he advocated that HL&P ascertain whether there was an available alternative to B&R. When B&R resisted the suggestion that it appoint an experienced nuclear executive reporting directly to the president, he advocated that course even more strongly. I did not then -- and still do not -- view that as a discussion "regarding removal of Brown & Root." Mr. Goldberg testified similarly in

June 1982. (Tr. 10519) In my mind, discussions regarding the removal of B&R did not begin until June 29, 1981. I can appreciate that others might read the words "discussion . . . regarding removal" more broadly than I understood them, but I believe that my understanding of the question was reasonable. Certainly it was a fair understanding on my part in the course of a lengthy cross-examination on matters unrelated to this subject.

Similarly, Mr. Goldberg's testimony before the Texas PUC mentions that other personnel at the Project might have made remarks such as, "Well, we ought to get rid of those fellows." Remarks of this type were undoubtedly made, both before and after the Show Cause Order. However, in my opinion, these do not rise to the level of a "discussion . . . regarding removal," and they did not come to mind when I responded to the question at Tr. 3473.

Finally, in reviewing that particular answer, I asked myself whether I should have mentioned my discussions with Mr. Jordan in June 1980 when he explored with Bechtel and Ebasco the basic feasibility of an alternative to B&R. Those discussions did not come to mind when I answered the question on June 2, 1981. Even if they had, I do not believe that the question

called for any mention of such discussions. At that time, our focus was on trying to ascertain whether an alternative was available if we had to pursue it. In my view, those discussions could not be fairly characterized as "regarding removal of Brown & Root."

In sum, I believe that my response to the question at Tr. 3473 was accurate and, notwithstanding CCANP's allegation, did not mislead the Board in any way.

Q.25 In your review of other portions of your testimony, did you find any answers that you now believe were incorrect or misleading or that would have called for you to mention the Quadrex Report or your views at that time concerning B&R's engineering services?

A.25 No. I believe that my testimony was truthful and candid, that I responded properly to the questions that I was asked, and that I could not reasonably have been expected to mention the Quadrex Report or my views concerning B&R's engineering services in the context of that testimony and the questions addressed to me at the hearing.

Q.26 Do you believe that the failure to provide the Quadrex Report to the Board when received, to inform the Board of the seeking of alternatives to B&R prior to September 24, 1981 or to mention the Quadrex Report or

the pending review of B&R's engineering services in HL&P's testimony in May and June of 1981 reflects adversely on HL&P's character or competence or its ability to manage the construction and operation of the STP?

A.26 No. I believe that the commissioning of the Quadrex review reflects favorably on HL&P's character and competence. For all of the reasons set forth in my testimony, I believe that HL&P acted reasonably with respect to disseminating the Quadrex Report and not disclosing publicly that it was seeking an alternative to B&R. The fact that HL&P did not inform the Board of these subjects was the result of a different view as to the scope of the issues in this proceeding and of the substance and import of the Quadrex Report, and did not involve any willful or careless disregard of HL&P's obligation under the McGuire doctrine. Accordingly, none of HL&P's actions regarding such matters reflects adversely on its character or competence or its ability to manage the construction and operation of the STP.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL., OF RICHARD A. FRAZAR

Q.1 Please state your name and occupation.

A.1 I am Richard A. Frazar, Manager of the Engineering Assurance Department of Houston Lighting & Power Company (HL&P).

Q.2 Have you previously testified in this proceeding?

A.2 Yes, I testified in May and June 1981 and in February 1982.

Q.3 Please describe your educational and professional qualifications.

A.3 My educational and professional qualifications are generally described in my earlier testimony in Phase I of this proceeding.

Q.4 Has your position at HL&P changed since you last testified?

A.4 No.

Q.5 What is the purpose of your testimony?

A.5 In response to the request of the Atomic Safety and Licensing Board (Licensing Board or Board) at page 19 of its Memorandum and Order of February 26, 1985, the purposes of my testimony are (1) to describe my knowledge when I testified in 1981 of the report prepared by Quadrex Corporation (Quadrex) entitled "Design Review of Brown & Root Engineering Work for the South Texas Project" (Quadrex Report), as well as my view on the adequacy of Brown & Root (B&R) services at that time, and (2) to show that I was truthful and candid in my testimony before the Board at that time and that there was no occasion for me to mention either the Quadrex Report or the pendency of a far-reaching review of B&R design engineering services.

Q.6 Did you have any involvement in the initiation or performance of the review of B&R engineering by Quadrex in early 1981 or in HL&P's review of the Quadrex Report for reportability on May 8, 1981?

A.6 No. During that period and until June 22, 1981, I was stationed at the STP site performing the functions of Project QA Manager. I was aware that the Quadrex review

was being conducted because it was referred to in occasional discussions with Mr. Goldberg or other HL&P personnel or at meetings of HL&P staff. However, the Quadrex review of B&R engineering was being performed as an independent assessment for HL&P executive management and was not part of any of the required programmatic reviews or QA functions, and there was no need for any involvement by the HL&P QA Department. I did not attend any briefings by Quadrex concerning the Report.

Q.7 Have you reviewed the Quadrex Report?

A.7 No. I probably received a copy at the STP site after it was provided to HL&P on May 7, 1981, since my successor as HL&P Project QA Manager found one in the site office. However, I did not review it at that time or later. Until I left the site in June 1981, my attention was principally focused on the corrective actions being taken as a result of the problems identified in I&E Inspection Report No. 79-19 and the related Notice of Violation and Show Cause Order.

Q.8 Were you involved when personnel of NRC Region IV asked to see the Quadrex Report in August 1981?

A.8 Yes. I had left the STP site after June 22, 1981, and was stationed at HL&P's Baybrook offices near Houston. I recall that Mr. Richard Herr and Mr. Shannon Phillips asked to see a copy of the Quadrex Report. Since I did

not have a copy, I tried to reach Mr. Goldberg, who was not available that day. My recollection is not precise as to whom I reached, but I believe that I spoke to Mr. Oprea who assured me that the Report should be made available to the NRC. A copy of the Report was made available to them.

Q.9 Was it your understanding that the Quadrex Report was to be withheld from the NRC Staff?

A.9 No. I knew that copies of the Quadrex Report were available within HL&P and B&R, and I was aware of no restrictions on making it available to the NRC Staff.

Q.10 When you testified in 1981, what was your understanding of the import of the Quadrex Report?

A.10 Since I had not received any briefings on the Report and had not read it, I nad no knowledge of the substance of the Report. From conversations with HL&P staff, I knew that the NRC had been notified of three potentially reportable items under 10 CFR § 50.55(e), and there was no indication that the Report reflected generally on B&R's compliance with QA requirements.

Q.11 At that time, what was your opinion concerning B&R's services at STP?

A.11 I had worked very closely with B&R in the development and implementation of the improved QA program that applied to construction activities at the site. I had confidence that B&R would implement that program properly and could complete construction in accordance with applicable requirements. I was less familiar with B&R's engineering activities, but those activities had been audited by HL&P QA and inspected by the NRC for many years and I believed that applicable QA requirements were being generally observed. Thus, I had no significant concerns regarding B&R's performance of the engineering-related portions of the QA program either generally or based on the Quadrex Report.

Q.12 Between issuance of the Show Cause Order and your testimony in 1981, did you have any discussions with Mr. Oprea or Mr. Goldberg regarding removal of B&R or seeking alternatives to B&R?

A.12 No.

Q.13 Have you reviewed your 1981 testimony in this proceeding in preparation for this hearing?

A.13 Yes. To prepare myself to testify today, I have reviewed portions of my testimony that mentioned B&R engineering services.

Q.14 Do you now believe that you should have mentioned either the Quadrex Report or any concerns regarding B&R's engineering services in response to questions at the portions of your testimony cited in the Board's Memorandum and Order of February 26, 1985?

A.14 No. I had not read the Quadrex Report. Moreover, from my understanding of the Quadrex Report it had no relevance to the construction and construction QA matters that were the focus of my testimony. Apart from the matters already reported, as I mentioned previously, I had no significant concerns regarding the engineering-related portions of the B&R QA program, either generally or based on the Quadrex Report.

Q.15 Specifically, please explain why you did not mention those subjects at Tr. 3249-50?

A.15 At that point my testimony focused on the organizational structure for the STP QA function and related improvements made in response to 79-19 and the Show Cause Order. This is apparent both from that testimony itself and the line of questioning that it followed. (See, e.g., Tr. 3248). The Quadrex Report and engineering QA had no relationship to such matters. Moreover, even if I had thought that the questions encompassed engineering QA, I had no concerns to mention on those subjects.

Q.16 Please explain why you did not mention those subjects at Tr. 3527-28.

A.16 At Tr. 3527-28 I volunteered some information regarding implementation of the QA-QC program in the course of questioning addressed to Mr. Oprea which had begun on Tr. 3525 regarding a provision in the B&R contract entitled "Implementation of Site Quality Assurance Program." Although, at Tr. 3526, the questioning continued without reference to the contract, in context it is apparent that we were still addressing the site QA program. My own answer, of course, focused on problems of implementation identified in 79-19. Even if I had thought the question was broader, however, I would not have mentioned the Quadrex Report since, to my knowledge, it did not involve significant problems in QA implementation beyond those that had been reported.

Q.17 Please explain why you did not mention those subjects at Tr. 5419-22.

A.17 I am not sure that I understand the Board's reference to Tr. 5419-22. At that point, I was questioned concerning my concerns in 1978 regarding B&R's QA performance and how the improvements I perceived in early 1978 related to the problems found in late 1979. There were no engineering QA concerns at that time which were ignored either in Applicants' Exhibits Nos. 44 and 45 (upon which

the questioning was based) or in my response to questions. I do not see how the questioning could have called for any mention of the Quadrex Report.

Q.18 In your review of other portions of your testimony, did you find any answers that you now believe would have called for you to mention the Quadrex Report or your views at that time concerning B&R's engineering services?

A.18 No. In no instance do I believe that it would have been reasonable to expect me to mention the Quadrex Report, and I had no concerns regarding engineering QA which would have been responsive to any question. I believe that all of my testimony was truthful and candid and that I responded properly to the questions that I was asked.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL., OF SIDNEY A. BERNSEN AND FRANK LOPEZ, JR.*

Q.1 Dr. Bernsen, please state your name.

A.1 My name is Sidney A. Bernsen.

Q.2 Mr. Lopez, please state your name.

A.2 My name is Frank Lopez, Jr.

Q.3 Dr. Bernsen, please identify your present employment.

A.3 I am employed by Bechtel Power Corporation as the Corporate Manager of Quality Assurance.

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*/ Dr. Bernsen is sponsoring the answers in A.1, A.3, A.5, A.8, A.10, and A.11. Mr. Lopez is sponsoring the answers in A.2, A.4, A.6, A.9, A.12, and A.13. Both Dr. Bernsen and Mr. Lopez are sponsoring all of the remaining answers.

Q.4 Mr. Lopez, please identify your present employment.

A.4 I am employed by Bechtel Energy Corporation (Bechtel) as an Assistant Project Engineer assigned to the South Texas Project (STP).

Q.5 Dr. Bernsen, please describe your professional qualifications.

A.5 My professional qualifications are described in the Statement of Professional Qualifications of Sidney A. Bernsen, which is attached hereto and incorporated by reference.

Q.6 Mr. Lopez, please describe your professional qualifications.

A.6 My professional qualifications are described in the Statement of Professional Qualifications of Frank Lopez, Jr., which is attached hereto and incorporated by reference.

Q.7 What is the purpose of your testimony?

A.7 The purpose of our testimony is to address Citizens Concerned About Nuclear Power (CCANP) Contention 9, as set forth at page 24 of the Licensing Board's Memorandum and Order of February 26, 1985, which states:

> The Applicants' failure to notify the NRC (Region IV) of the Quadrex Report, and of many findings beyond those actually reported, within 24 hours from the time HL&P became aware of the findings or prospective findings of the Report (including drafts), violates 10 C.F.R. § 50.55(e)(2) and reflects adversely on

> the character and competence of the Applicants and on their ability to manage the construction and operation of a nuclear power plant.

More specifically, our testimony discusses whether the findings in the "Design Review of Brown and Root Engineering Work for the South Texas Project" (Quadrex Report) (May 1981), as identified by the Licensing Board in its Memorandum and Order of February 26, 1985, its Sixth Prehearing Conference Order of May 17, 1985, and its Memorandum and Order of May 24, 1985, represent a significant breakdown in any portion of the quality assurance (QA) program within the meaning of 10 CFR § 50.55(e)(1)(i).

Q.8 Dr. Bernsen, please describe any experience you may have in applying or interpreting 10 CFR § 50.55(e) and in applying or interpreting 10 CFR Part 50 Appendix B.

A.8 As Manager of Nuclear Standards and Quality Assurance for the Power Industrial Division of Bechtel Corporation during 1969-72 and Manager of Quality Assurance for the Thermal Power Organizaiton of Bechtel Power Corporation, I coordinated the corporate review of proposed 10 CFR § 50.55(e) and developed Bechtel Power Corporation's initial procedures for implementing 10 CFR § 50.55(e). Subsequently, I provided guidance to various divisions of Bechtel Power Corporation and their projects on specific reportability questions. Furthermore, as the

Project Licensing Manager and Assistant Project Manager-Systems for STP during 1982-83, I served as the Bechtel project management representative for determining the reportability of a number of Bechtel-identified design deficiencies.

I have also served for more than 14 of the last 16 years as Chairman or a member of the Nuclear Quality Assurance Standards Committees that produced various ANSI QA standards adopted in the NRC regulatory guides. Furthermore, I was responsible for developing Bechtel Power Corporation division and corporate QA programs which implement NRC requirements. Additional relevant QA experience is described in my statement of professional qualifications.

Q.9 Mr. Lopez, please describe any experience you may have in applying or interpreting 10 CFR § 50.55(e) and in applying or interpreting 10 CFR Part 50, Appendix B.

A.9 For the past eleven years, I have worked in various assignments on nuclear power plant projects. These include three domestic nuclear projects and two foreign projects. All of these projects were committed to the application of these U.S. federal regulations to the conduct of activities with which I was involved (although the foreign projects had no formal requirement to report deficiencies to the NRC). As a member or supervisor of the Nuclear Engineering discipline on

these projects, I was trained in the process of identifying, evaluating and dispositioning reportable deficiencies in accordance with 10 CFR § 50.55(e). In addition, each of these projects worked under the procedures established in its quality assurance program to meet the requirements of 10 CFR Part 50, Appendix B, and I was often called upon to assist in the determination of acceptable compliance with this regulation. In particular, on the South Texas Project, my duties have included supervision of the Quality Engineering discipline which is responsible for the development, monitoring and maintenance of all Engineering Department procedures related to meeting the project's QA commitments. This supervisory responsibility also included acting as the primary representative of the Bechtel Project Engineering Manager (PEM) in interfacing with other departments relative to quality matters, including the Bechtel and HL&P Quality Assurance Departments. With respect to reportability determinations under 10 CFR § 50.55(e), the Bechtel PEM designated me to act as his primary representative in reviewing, evaluating and dispositioning all Deficiency Evaluation Reports generated by the Project in order to assure complete and consistent application of the Project's procedures on

reportability. I held this responsibility from the beginning of the Bechtel involvement on the Project until approximately one year ago.

Q.10 Dr. Bernsen, in addition to the work you have done to prepare this testimony, have you conducted any reviews of the findings in the Quadrex Report?

A.10 Yes. In 1982, the Bechtel Power Corporation Task Force conducted an assessment of the findings in the Quadrex Report in order to recommend management and design actions to resolve the findings in a timely manner. The results of this assessment were presented in "An Assessment of the Findings in the Quadrex Corporation Report" (March 1982) (Applicants' Exhibit 63). Among other things, this report identified the discipline findings in the Quadrex Report which the Bechtel Power Corporation Task Force thought may be potentially reportable under 10 CFR § 50.55(e). I participated in a Bechtel Power Corporation management review of the draft report prepared by the Bechtel Power Corporation Task Force to confirm the accuracy and reasonableness of the conclusions presented in the draft. I also served as a member of the Bechtel STP Project management team with overview responsibility for EN-619, the "Review of the Quadrex Report" (Applicants' Exhibit 64).

Q.11 Dr. Bernsen, was the Bechtel Power Corporation Task Force report (Applicants' Exhibit 63) true and correct to the best of your knowledge, information and belief when the report was issued?

A.11 Yes. It may be noted that Bechtel has learned of additional information since the issuance of the Bechtel Power Corporation Task Force Report which has led Bechtel to a different conclusion with respect to findings 4.3.2.1(a) and 4.8.2.1(a) than is stated in the Report, as we discuss below.

Q.12 Mr. Lopez, in addition to the work you have done to prepare this testimony, have you conducted any reviews of the findings in the Quadrex Report?

A.12 Yes. In 1982, I was employed by Bechtel as the Nuclear Engineering Group Supervisor at STP. My responsibilities in this position included direction and supervision of preparation of various work packages associated with the transition from Brown & Root (B&R) as architect-engineer/constructor to Bechtel as architect-engineer/construction manager and Ebasco as constructor. Among those work packages was EN-619, entitled "Review of the Quadrex Report" (Applicants' Exhibit 64).

The purpose of EN-619 was to establish a program for the evaluation and disposition of the findings in the Quadrex Report. The primary purpose of EN-619 was not

to review the Quadrex findings to determine their reportability. However, Bechtel, in its overall design review, was alert to identify any reportable deficiency arising from the Quadrex Report (and in fact, EN-619 identifies relevant Deficiency Evaluation Reports). EN-619 did not focus upon Quadrex's comments on the practices, policies, and procedures of B&R because they were not applicable or germane to Bechtel's activities.

In some cases, the practices identified in the Quadrex Report were adopted by Bechtel. However, in other cases, EN-619 shows that Bechtel has not adopted the types of design practices apparently suggested by Quadrex but instead utilizes reasonable alternatives. Thus, EN-619 helps to indicate that a number of the findings in the Quadrex Report essentially state Quadrex's opinion as to good practice in accomplishing an efficient engineering process but do not identify practices which are required under Appendix B to 10 CFR Part 50.

Q.13 Mr. Lopez, was EN-619 (Applicants' Exhibit 64) true and correct to the best of your knowledge, information and belief when it was issued?

A.13 Yes. However, it should be noted that, among other things, EN-619 describes substantive activities to be undertaken by Bechtel to correct, prevent or address the

matters identified in the Quadrex Report. In a few cases, as the design has evolved, Bechtel's design activities and technical resolutions addressing matters raised in the Quadrex Report have been different than those projected in EN-619. None of these differences has any significance with respect to the reportability of the findings in the Quadrex Report.

Q.14 Please identify the Quadrex Report findings as to which you will be testifying.

A.14 The Quadrex Report findings on which we will be testifying may be divided into two groups. The first group consists of certain generic findings which the Licensing Board accepted for litigation at pages 12-13 of its Memorandum and Order of February 26, 1985, page 10 of its Sixth Prehearing Conference Order of May 17, 1985, and pages 1-2 of its Memorandum and Order of May 24, 1985. These findings are numbered 3.1(a) through 3.1(j). The second group consists of certain discipline findings identified in the Quadrex Report as "most serious" which the Licensing Board accepted for litigation at pages 13 and 16 of its Memorandum and Order of February 26, 1985, page 12 of the Sixth Prehearing Conference Order of May 17, 1985, and pages 1 and 2 of its Memorandum and Order of May 24, 1985. These findings are numbered 4.1.2.1(b), 4.3.2.1(a),

4.3.2.1(d), 4.3.2.1(n), 4.5.2.1(b), 4.6.2.1(n), 4.7.3.1(a), 4.7.3.1(b), 4.7.3.1(k), and 4.8.2.1(a) through 4.8.2.1(g).

Q.15 In performing your review for reportability under 10 CFR § 50.55(e), what information did you rely upon?

A.15 In a number of cases, we were able to determine that the findings, on their face, were not reportable under 10 CFR §50.55(e)(1)(i). In some cases, we also took into account the material in the Quadrex Report in determining whether the findings were reportable under 10 CFR § 50.55(e)(1)(i). Finally, in a few cases, we are aware of information, which Quadrex may not have possessed when it performed its review, which would indicate that Quadrex's findings were not reportable under 10 CFR § 50.55(e)(1)(i).

Q.16 What criteria did you utilize to determine whether the findings identified by the Licensing Board were reportable under 10 CFR § 50.55(e)(1)(i)?

A.16 A matter is reportable under 10 CFR § 50.55(e)(1)(i) only if it satisfies each of the following three criteria:

(1) a deficiency in design or construction must be identified;

(2) the deficiency must have the potential, if left uncorrected, to affect adversely the safety of plant operations; and

(3) the deficiency must represent a significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of Appendix B to 10 CFR Part 50.

In response to the Licensing Board's request to determine whether the findings identified by the Board identify a significant breakdown in any portion of the QA program for STP, we have focused primarily upon the third criterion listed above and have determined that none of the findings (except those actually reported to the NRC) identified by the Board satisfies this criterion. Consequently, we have concluded that no additional findings would be reportable under 10 CFR § 50.55(e)(1)(i). Finally, it may be noted that there may be reasons in addition to those discussed in this testimony why a particular finding is not reportable under 10 CFR § 50.55(e)(1)(i).

In determining whether a finding indicates the existence of a significant breakdown in any portion of the QA program for STP which may be reportable under 10 CFR § 50.55(e)(1)(i), it is important to keep the following consideration in mind. Appendix B to 10 CFR Part 50 sets forth general criteria governing quality

assurance for design, construction, and operation of structures, systems, and components which perform safety-related functions. Thus, while Appendix B identifies measures which must be established and implemented, it allows a licensee to exercise discretion in deciding which specific practices are most appropriate for its project. Accordingly, as long as a licensee has acceptable controls in place, the fact that a licensee does not utilize a particular procedure, document, or other specific method for controlling design activities does not indicate a significant breakdown in the quality assurance program.

It is also noted that the determination of whether a significant breakdown exists in any portion of the quality assurance program that could lead to a report to the Commission under 10 CFR ¶ 50.55(e)(1)(i) is not a straight-forward process, since there are no firm criteria available for making this determination. It is particularly difficult to make this determination with respect to deficiencies related to design, because of the iterative nature of the design process, the need to rely on preliminary assumptions or judgment that occasionally may be found nonconservative, the changing standards of performance, and the evolution of analytical techniques and documentation that have occurred over the past decade or more. If conditions are found where an explicit requirement of 10 CFR Part

50, Appendix B or an applicant's quality assurance program are clearly and significantly not implemented, or where required verification or checking processes are repeatedly ignored, the determination can be rather obvious. In other areas, such as questions regarding the adequacy of preliminary assumptions, the level of detail in criteria, the timeliness or degree of sophistication in analysis, or the relative effectiveness of organizational relationships, the determination is much more complex. We would recommend reporting questionable cases involving any deficiencies in the process of design that could adversely affect the safety of operations as measured by sound engineering judgment, whether or not the design had been released for construction. We believe this has been and continues to be the general philosophy applied on the South Texas Project and has formed the basis for our testimony.

Q.17 Please describe the format you will use in addressing each generic finding.

A.17 First, we will identify the primary concerns contai in the finding. Next, we will discuss whether these concerns indicate the existence of a significant breakdown in the QA program for STP. Finally, we will address the statements of CCANP with respect to the finding.

Q.18 What concerns are expressed in finding 3.1(a)?

A.18 Finding 3.1(a) primarily expresses two concerns of Quadrex. First, Quadrex was concerned that an effective systems integration and overview function and systems engineering function may not exist at the STP. Second, Quadrex was concerned about the absence of multidisciplinary design guidance at STP for separation and the single failure criterion and that each discipline was providing its own interpretation and acceptance criteria.

Q.19 What are a systems integration and overview function and a systems engineering function?

A.19 A systems integration and overview function generally refers to the responsibility for assuring that factors such as system interactions, the impacts which one system may have upon another system, and the compatibility of one system with an interfacing system are accounted for. For example, one systems integration function which nuclear projects address by one method or another is an analysis of the potential interactions which might exist between non-safety related systems and safety-related-systems. In such an analysis, one might evaluate the safety impact of the failure of non-seismically supported components as a result of postulated earthquakes. In order to perform this evaluation, the analyst would need to become familiar

with the design and relative locations of both safety-related and non-safety-related systems and components. Such an evaluation necessarily goes beyond the level of understanding needed to design an individual system or component.

Another example of a systems integration function which is common in power plant design is the interdisciplinary coordination which is needed to identify, design and verify the relationship between primary process systems and their support systems, such as HVAC, lighting, power supply and other services. In the initial phases of design activity, the required support services are identified and, in normal practice, assumptions are made about interface requirements such as heat loads, service conditions, and power requirements. As design of both the primary and support systems progresses, the need increases to confirm the validity of the assumptions made in the preliminary stages of design. That need is fulfilled by some method of interdisciplinary coordination, often referred to as a systems integration or systems engineering function.

Common between these two examples are the multi-disciplinary aspects of the design activity, and the iterative nature of the approach which involves some set of preliminary interfacing assumptions coupled with activities in the latter stages of design or construction to confirm the validity of the assumptions.

A systems engineering function generally refers to the responsibility for determining multidisciplinary design requirements applicable to a particular system. For example, individuals performing a systems engineering function would have responsibility for ensuring specification of the functional requirements applicable to a system, such as the operating temperatures, head requirements, and instrumentation requirements for a fluid system.

Q.20 Did B&R have a systems integration and overview function?

A.20 Yes. Among other things, we understand that B&R established a Systems Design Assurance Group at STP in February of 1980 to provide a systems integration and overview function. As indicated by Quadrex to the Bechtel Power Corporation Task Force, the Quadrex Report did not include a review of the activities of this group. The activities performed by the group may not have been evident to Quadrex because we understand that most of the reviews performed by the group had not yet been factored into revisions of the design documents being reviewed by Quadrex.

Q.21 Does the fact that B&R did not establish the Systems Design Assurance Group until 1980 indicate a significant breakdown in any portion of the QA program for STP?

A.21 No. Such a group is not a necessary element of a design control process. Other measures to assure adequate systems integration are often used. The need for a systems integration and overview function becomes more important as the design of a plant progresses. During the early stages of design, systems interactions are not well-defined due to the preliminary nature of the design. Consequently, at this stage of design, systems integration does not play a significant role, and the measures that we understand were employed by B&R (e.g., use of System Design Description (SDDs), Technical Reference Documents (TRDs), and multidisciplinary review and comment) provide appropriate methods of integration controls. As the design evolves and systems interactions can be determined with greater precision, the need for controls for systems integration becomes more acute since this function plays a greater role in design. B&R recognized this, and its approach to handling this need was the establishment of the Systems Design Assurance Group in 1980. The fact that this group was not established before that time does not indicate a significant breakdown in any portion of the QA program for STP, but simply reflects the iterative nature of the design process.

Q.22 Did B&R have a systems engineering function?

A.22 Yes. We understand that B&R did have a systems engineering function at STP. This consisted of such measures as designating engineers within various disciplines to coordinate the development of system descriptions, including System Design Descriptions (SDDs), Piping and Instrumentation Diagrams (P&IDs), and other documents which specified multidisciplinary requirements applicable to a system. These documents provide evidence of the existence of that function. Furthermore, B&R enhanced the systems engineering function through multidisciplinary review of and comment on design documents. These measures are typical of those used by the industry at that time.

In recent years, some architect-engineering companies have begun to establish systems engineering groups to significantly augment the systems engineering function. The Systems Design Assurance Group established by B&R in 1980 was in accord with this movement. However, Quadrex did not review the activities of this group.

Q.23 Does the Quadrex Report identify significant deficiencies in design related to B&R's systems integration and overview function and systems engineering function?

A.23 Yes, but the deficiencies were limited those reported to the NRC. We have reviewed the information in the Quadrex Report to determine whether Quadrex identified any other deficiencies in design related to systems integration and systems engineering. Quadrex did not identify any significant deficiencies in design with the exception of those which were reported to the NRC. Consequently, we conclude that the Quadrex Report does not identify a significant breakdown in B&R's systems integration and systems engineering beyond the deficiencies which were reported.

Q.24 In general, did B&R have multidisciplinary design guidance for STP?

A.24 Yes. We understand that, in general, B&R did have a program to provide multidisciplinary design guidance. In addition to its System Design Descriptions (SDDs), which pertained to individual systems, B&R also utilized Technical Reference Documents (TRDs), most of which applied across systems and disciplines. Additionally, B&R procedure STP-SD-005-B required the Systems Design Assurance Group to perform reviews encompassing several systems and disciplines in order to assure the compatibility of the design work performed by the various disciplines.

Q.25 Please explain whether Quadrex's concern about the absence of multidisciplinary design guidance for separation and single failure criterion indicates a significant breakdown in any portion of the QA program for STP.

A.25 Criterion III of Appendix B requires that measures "be established to assure that applicable regulatory requirements and the design basis... are correctly translated into specifications, drawings, procedures, and instructions." There are many acceptable methods of satisfying this requirement, including the use of multidisciplinary design guidance or the use of guidance applicable to a specific discipline. However, Appendix B does not require the use of multidisciplinary design guidance, nor does it require that each discipline utilize the same design criteria for its work as are being used by other disciplines on their work. As long as the criteria being utilized by each discipline are appropriately conservative for the work it is doing, and as long as the final designs of the systems are compatible, as confirmed during verification activities, the lack of multidisciplinary design guidance would not be indicative of a significant breakdown in any portion of the QA program.

We have reviewed the information in the Quadrex Report to determine whether Quadrex identified any deficiencies in design related to separation or the

single failure criterion. Quadrex did not identify any concerns in this regard with the exception of questioning the design of the common instrument air line in the Fuel Handling Building (FHB) HVAC system. Similarly, the Bechtel review of the B&R design during the transition period did not identify any significant problems related to separation or the single failure criterion. Consequently, we conclude that there was no significant breakdown concerning the design guidance provided by B&R related to separation or the single failure criterion.

Q.26 "Citizens Concerned About Nuclear Power Motion To File Additional Contentions Based On New Information And To Establish A Discovery And Hearing Schedule With Respect To New Contentions" (November 21, 1981) (CCANP's Motion), pp. 16 and 41, quotes three sentences from finding 3.1(a) as identifying a violation of Criterion III of Appendix B to 10 C.F.R. Part 50. These sentences are as follows:

> "There is no indication that an effective systems integration and overview function exists within the B&R design process."
>
> "HL&P has indicated that their organizational structure is closely aligned with that of B&R, and that no systems engineering function exists within the utility either."
>
> "A working interface relationship among the disciplines is not routine particularly regarding follow-through at the discipline input-output interface."

In particular, CCANP states that these sentences identify a violation of the requirement in Criterion III, which states that "[m]easures shall be established for the identification and control of design interfaces and for coordination among participating design organizations." See CCANP's Motion, p. 16. Did B&R have measures for controlling design interfaces?

A.26 Yes. For example, B&R had several procedures intended to control the interfaces that exist between various organizations. These included STP-SD-004, Engineering Procedure for Design Reviews, STP-SD-005, System Design Assurance Reviews, and STP-DC-014, Document Review Comment Procedure. In combination, these procedures established formal requirements for conducting interfacing activities, including a review and comment process for design and vendor documents and a process for conducting design review meetings. A separate process for performing design assurance reviews designed to assure that system design requirements and interfaces were properly identified and implemented was a part of this interface control. Each of these processes included requirements for documentation of the activities undertaken.

Q.27 Please explain whether the first two sentences quoted by CCANP indicate a significant breakdown in the interface controls for STP?

A.27 Criterion III of Appendix B to 10 CFR Part 50 requires that design interfaces be controlled. However, with the exception of requiring "procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces," Criterion III does not specify how design interfaces shall be controlled. Thus, the means by which design interfaces are controlled is left to the discretion of the licensee and its contractors.

Design interfaces may be controlled by various methods, such as assigning discrete responsibilities to various individuals and organizations, establishing lines of communication which identify responsibilities for decision-making and resolution of problems, and establishing procedures to control the flow and review of design information. Thus, a systems integration function and a systems engineering function in the form of discrete functional groups are not necessary means of controlling design interfaces.

As we have discussed above, B&R did have appropriate procedures to control design interfaces. Furthermore, B&R did have a systems integration function and a systems engineering function, and it had taken action to strengthen these functions by establishing the Systems Design Assurance Group (the activities of which Quadrex did not review). With the exception of the reported deficiencies, Quadrex did not identify any significant

deficiencies in design attributable to B&R's process for design interface control. Consequently, the two sentences quoted by Quadrex do not indicate a significant breakdown in the control of design interfaces for STP beyond the deficiencies actually reported.

Q.28 What is the basis for the sentence which states that "[a] working interface relationship among the disciplines is not routine particularly regarding follow-through at the discipline input-output interface"?

A.28 This sentence is part of a paragraph which pertains to systems engineering. It appears that Quadrex was seeking greater informal communication among disciplines designing a system so that each discipline knew what the other disciplines were doing. In particular, Quadrex observed that a discipline supplying data to another discipline was not checking to see that the data were being properly used.

Q.29 Does this indicate a significant breakdown in the design interface controls for STP?

A.29 No. As we discussed previously, B&R had appropriate procedures to control interfaces and had a systems engineering function, including the Systems Design Assurance Group which Quadrex did not review. There are

benefits in terms of efficiency in routine informal communication among disciplines. However, the QA program contained appropriate measures (such as design review meetings, document review and comment, reviews provided by the Systems Design Assurance Group, and design verification) designed to provide assurance that the multidisciplinary aspects of a system were properly accounted for and coordinated. In particular, it is not normal practice for a discipline supplying input data to ensure that the recipient of the data uses it correctly, although the discipline which supplies data may review the other disciplines' design output documents as part of the coordination process.

Q.30 CCANP's Motion, p. 42, quotes the following sentence from finding 3.1(a) as identifying a violation of Criterion VI of Appendix B to 10 C.F.R. Part 50:

> "A major concern is with the achievement of internal consistency among various design documents and the maintenance of that consistency over time with personnel turnover."

CCANP states that this sentence demonstrates a failure "to adequately control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto." Id. What was the nature of the concern expressed in this sentence?

A.30 As is apparent from the context in which it arises, this sentence relates to system integration. Additionally, this sentence appears to relate to Quadrex's concern that there was not a single set of multidisciplinary design criteria applicable to all disciplines, and that each discipline was establishing design criteria applicable to the work it was doing.

Q.31 Do these concerns indicate the existence of a significant breakdown in any portion of the QA program for STP?

A.31 No. It appears to have been Quadrex's concern that future design activities might not be as performed as efficiently or as consistently as they might be with a more effective systems integration and overview function. As we discussed previously, Quadrex's concern in this area did not indicate a significant breakdown in any portion of the QA program for STP.

Similarly, as we explained previously, use of multidisciplinary design guidance is not required by Appendix B. Furthermore, Criterion VI of Appendix B is not relevant to this concern, since Criterion VI only applies to the control of issuance and distribution of documents which prescribe activities affecting quality. Criterion VI does not require the issuance of a

particular type of design criteria, nor does it require that each design discipline use the same design criteria.

Q.32 CCANP's Motion p. 40, quotes the following sentences from finding 3.1(a) as identifying a violation of Criteria II and XVII of Appendix B to 10 C.F.R. Part 50:

> "There is no indication that an effective systems integration and overview function exists within the B&R design process . . . . A major concern is with the achievement of internal consistency among various design documents and the maintenance of that consistency over time with personnel turnover."

CCANP states that these sentences demonstrate a failure "to assure adequate documentation in an identifiable and retrievable manner of the safety-related design and engineering work" at STP. Id. What relevance, if any, do these sentences have to Criterion XVII?

A.32 These sentences do not relate to the maintenance of quality assurance records, which is the subject of Criterion XVII. In particular, these sentences do not indicate that B&R failed to maintain records for activities affecting quality. Consequently, these sentences do not establish that any violation of Criterion XVII occurred.

Q.33 Do these sentences indicate a significant breakdown in any portion of the quality assurance program for STP under Criterion II of Appendix B?

A.33 No. B&R had various procedures designed to provide a system integration function, including its newly established System Design Assurance Group. However, most of the activities of this group had not yet been factored into the design documents reviewed by Quadrex. As we discussed previously, this fact does not identify a significant breakdown in any portion of the quality assurance program for STP but only indicates that B&R had not yet completed this activity.

Similarly when read in context, the statement regarding consistency among design documents also reflects a concern about the lack of multidisciplinary design guidance. As we discussed previously, none of the criteria of Appendix B (including Criterion II) specifically requires the use of multidisciplinary design guidance, provided that other appropriate measures exist to ensure that applicable requirements and design bases are correctly translated into specifications, procedures, and instructions.

Q.34 Does finding 3.1(a) identify a significant breakdown in any portion of the QA program for STP?

A.34 No. As we have discussed previously, finding 3.1(a) does not identify a significant breakdown in any portion of the QA program for STP.

Q.35 What concerns are expressed in finding 3.1(b)?

A.35 Finding 3.1(b) primarily expresses four concerns. First, Quadrex was concerned that calculations containing errors were being verified as correct with a higher frequency than should be encountered. Second, Quadrex was concerned that design input was not being consistently reviewed for reasonableness by the recipient and that the use of design output was not being consistently checked by the group providing it. Third, Quadrex was concerned that B&R was not providing adequate guidance to vendors relative to acceptable analysis and testing methods, required data, and report format. Finally, Quadrex was concerned that B&R was not verifying work performed by subcontractors and vendors, was not reviewing and approving the analysis methods used by subcontractors and vendors, and did not have documented criteria governing the evaluation process for vendor reports.

Q.36 Please explain whether Quadrex's finding that calculations containing errors were being verified as correct with a higher frequency than should be encountered indicates a significant breakdown in any portion of the QA program for STP.

A.36 In order to determine the extent of this Quadrex concern, we have reviewed the information cited by Quadrex as support for its statement that calculations containing errors were being verified as correct with a higher frequency than should be encountered. The Quadrex Report cites Questions C-16, H-15, N-1, and N-17:

- Quadrex's assessment in C-16 states that B&R's design verification procedures "appeared to be adequate or above industry standards on paper." Nevertheless, Quadrex noted that it was "unable to evaluate the effectiveness of their procedure" and that there was "evidence" that a "significant number of mistakes" passed through the verification process.
- Quadrex's assessment in H-15 states that the reactor cavity cooling system pressure drop calculation "does not take into account the effects of restrictions to air flow within the reactor cavity."

- o Quadrex's assessment in N-1 is critical of B&R for accepting an analysis of a main steam line break (MSLB) which it knew had a large conservative error. With this exception, Quadrex found that the "verification sheets showed proper verification procedures."
- o Quadrex's assessment in N-17 states that "[t]here appears to be either an error in the calculation of ECP [essential cooling pond] initial temperature or an inconsistency with Heavy Civil calculations."

H-15 identifies only one error; however, this error had been identified prior to the Quadrex review and in fact was in part the subject of an earlier 50.55(e) report (see letter from G.W. Oprea to Karl Seyfrit (November 11, 1980)). N-1 also identifies only one error, but it was previously identified and was accepted because it was conservative. Quadrex was not able to determine in N-17 whether any error existed in a calculation (in fact, N-17 did not involve an error but only the use of different but conservative assumptions by different disciplines). C-16 does state that there was evidence of a "significant number" of mistakes, but Quadrex does not identify these mistakes, their number or the number of verified calculations it reviewed, nor does it describe the nature or significance of the mistakes it discovered. Furthermore, in C-16, Quadrex states that

it was unable to evaluate the effectiveness of B&R's verification procedure. Thus, the information provided by Quadrex in the C-16, H-15, N-1, and N-17 is not sufficient to support an independent determination that a significant breakdown occurred in verification of design at STP.

In this regard, it should be noted that, during the course of design and construction of any project as extensive and complex as a nuclear power plant, some calculational errors will inevitably occur. Quality assurance programs are designed to catch, minimize, and control calculational errors in design through such measures as checking, verification, inspections, tests, and audits. However, it is unreasonable to expect a QA program to preclude all calculational errors. Consequently, the fact that a few calculational errors are identified does not necessarily establish that there was a significant breakdown in any portion of the quality assurance program.

Furthermore, we have reviewed the Quadrex Report to identify whether other information in the report might indicate a significant breakdown in the process of performing or verifying calculations at STP. With the exception of the deficiencies which were reported to the NRC, no design errors with adverse safety implications were identified by Quadrex.

Finally, with respect to calculations in the civil area addressed in Question C-16, the civil/structural aspects of design and construction were the most advanced at the time of the transition from B&R to Bechtel. As a result, Bechtel civil/structural engineering personnel reviewed the existing B&R calculations to determine their technical adequacy to support the design of structures. These personnel generally observed that, although the analytical methods utilized by B&R were not the same as normal Bechtel practice, the relatively high degree of conservatism used in the B&R analyses produced an end product in the design which was technically acceptable without redesign or reanalysis.

Q.37 Does Quadrex's concern that a recipient does not consistently review the reasonableness of input data provided to it or that the provider of output data does not consistently check the use of that data indicate a significant breakdown in any portion of the QA program for STP?

A.37 No. The adequacy of data provided across design interfaces is assured through such measures as interdisciplinary document reviews and through design verification. As we discussed previously, B&R did have appropriate procedures for conducting these activities,

and Quadrex did not identify any significant deficiencies related to interfaces controls which were not reported to the NRC.

It is not normal industry practice to require a supplier of data to perform a formal review of the use of that data by the recipient, although the discipline which supplies data may review the other disciplines' design output documents as part of the coordination process. Although it is good practice to have the recipient of data perform an informal review of the reasonableness of input data, in many cases the recipient does not have either the knowledge or experience necessary to conduct such reviews. Accordingly, such reviews of input data are generally not part of a licensee's QA program.

Q.38 Does the absence of guidance to vendors relative to acceptable analysis and testing methods, required data, and report format indicate a significant breakdown in any portion of the QA program for STP?

A.38 No. Criterion IV of Appendix B requires that procurement documents include or reference "applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality." In general, the "other requirements" may include reference to specific drawings, specifications, codes, or test, inspection, and acceptance requirements.

Detailed guidance on "analysis and testing methods, required data, and report format," may be, but are not required under Criterion IV to be, included in procurement documents. Such details may be left to the discretion of the vendors since the vendors are often in the best position to know which types of methods or reports best satisfy the quality requirements of the purchaser. In other words, procurement documents generally specify the criteria which a product must meet, and the vendor usually has discretion to determine how to satisfy those criteria.

Specifically, B&R procedure STP-DC-005, Preparation and Control of Specifications, provided guidance to personnel responsible for developing the design documents which are issued for the purpose of identifying the technical requirements to be met by vendors and subcontractors. This procedure describes the types of information requirements which B&R engineers should provide to the vendor/subcontractor and the types of documents which are to be required from the vendor/subcontractor. The procedure provides the following the specific guidance with respect to special or unusual interface requirements or conditions for subcontracted engineering services: "Unless the requirement is essential to the performance of that task, the requirement <u>should not be</u> included." (Emphasis in Original) In our experience, the type of practice

embodied in this procedure has proven a generally satisfactory means of obtaining appropriate products in a cost-effective manner.

It may be noted that, in addition to the requirements specified in the procurement documents, for some types of procurements purchasers often provide guidance to vendors identifying one or more acceptable means by which the requirements in the procurement documents may be satisfied. Although such guidance is not required, it helps avoid a situation in which a vendor may satisfy all of the quality requirements in the procurement documents and yet not provide a product or service in a form that is useful to the purchaser.

Q.39 Does Quadrex's concern that B&R was not verifying work performed by subcontractors and vendors, was not reviewing and approving the analysis methods used by subcontractors and vendors, and did not have documented criteria governing the evaluation process for vendor reports indicate a significant breakdown in the QA program for STP?

A.39 No. It appears that Quadrex was concerned with the extent to which B&R was performing these functions rather than their total absence. Review of work performed by vendors and contractors is encompassed within the scope of Criterion VII of Appendix B. Criterion VII requires that measures be established to

assure that purchased services conform to procurement documents. Other than stating that "[t]hese measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery," Criterion VII does not identify which measures must be used to assure that purchased services conform to procurement documents, but instead allows the purchaser to select the measures it deems appropriate.

Typically, purchasers confirm the adequacy of the activities of their suppliers by conducting reviews of selected procedures, audits, surveillances, and reviews at vendor shops and inspections of products upon delivery. Suppliers of safety-related services are required to provide an approved quality assurance program to the extent necessary for their activities which affect quality. In general, review and monitoring of a supplier's QA program provides confidence in the quality of the work of the supplier.

Criterion VII does not require a purchaser to verify (in the sense of a detailed check or design review) work performed by subcontractors and vendors. Verification by the purchaser could be used as one means of satisfying Criterion VII. However, in many cases, it would not be possible for a purchaser to verify the work

performed by a subcontractor or vendor. Subcontractors or vendors often possess specialized knowledge and abilities which are necessary for verification but are lacked by the purchaser (which may be the very reason why the purchaser did not perform the design activities itself). In such cases, the subcontractor or vendor typically would verify its own work in accordance with its own QA program, and the purchaser would rely upon other measures to assure that the work satisfies the requirements in the procurement documents. In short, a purchaser is only required to assure that purchased services conform to procurement documents; the purchaser is not required to perform design verification of the work performed by subcontractors and vendors and in most cases it would be impracticable to do so.

Similarly, neither Criterion VII nor Appendix B in general requires that a purchaser review and approve the analysis methods used by subcontractors and vendors. As explained previously, purchasers are not required to specify analysis methods in procurement documents, and in many cases purchasers (including B&R) do not do so. Furthermore, although a purchaser may rely upon a review of a supplier's analysis methods as a means of assuring that purchased services conform with procurement documents, there are other acceptable alternatives for providing this assurance. These measures include the use of audits and surveillances and review of objective

evidence of conformance with the procurement document requirements, such as certificiations by appropriate registered engineers.

Finally, it may be noted that B&R did have documented procedures governing the reviews of vendor reports. B&R procedure STP-DC-004 required that vendor reports be reviewed in accordance with procedure STP-DC-014. Additionally, among other things, STP-DC-004 required that such reviews include a determination of whether the vendor has met the requirements of the procurement documents. This procedure is sufficient to satisfy the requirements of Appendix B. Also, it may be noted that the Quadrex Report did not identify significant safety deficiencies in the work performed by subcontractors and vendors. However, we would agree with Quadrex that it is good practice to provide additional guidance for the review of vendor reports.

Q.40 CCANP's Motion, p. 39, quotes the following sentence from finding 3.1(b) as identifying a violation of Criteria I and XVIII of Appendix B to 10 C.F.R. Part 50:

> "Input data to a technical group does not appear to be consistently reviewed by that group for its reasonableness prior to use."

CCANP states that this sentence demonstrates a failure "to adequately verify safety-related design and engineering work" at STP. Id. What relevance, if any, does this sentence, or design verification in general, have to Criteria I and XVIII?

A.40 This sentence, and design verification in general, are not relevant to Criteria I and XVIII. Criterion I requires the responsibilities of organizations performing activities affecting quality to be established in writing, and it sets forth certain requirements with respect to those responsibilities. Criterion I does not specify which organization shall verify or review design input. Similarly, Criterion XVIII requires that a comprehensive system of planned and periodic audits be carried out to verify compliance with and the effectiveness of the quality assurance program. Criterion XVIII does not impose any requirements with respect to verification or review of design input. To the extent any question about verification of design can be inferred from this sentence quoted by CCANP, it would be encompassed generally within Criterion III, not Criterion I or XVIII.

As is discussed above, the sentence quoted by CCANP does not indicate a significant breakdown in any portion of the QA program for STP. While Criterion

III requires that measures shall be established for verifying or checking the adequacy of design; it does not prescribe who shall perform the verification or check. Thus, under Criterion III, the organization which provides the design input may, and often does, verify the adequacy of the input without additional verification by the recipient organization.

Q.41 CCANP's Motion, p. 41, quotes the following sentence from finding 3.1(b) as identifying a violation of Criterion IV of Appendix B to 10 C.F.R. Part 50:

> "Brown and Root does not provide adequate guidance to vendors stipulating acceptable analysis and testing methods, required data, and report format."

CCANP states that this sentence demonstrates a failure "to assure that applicable regulatory requirements, design bases, and other requirements for design and engineering of the South Texas Project were included or referenced" in procurement documents. Id. Does the sentence quoted by CCANP indicate that B&R failed to specify applicable regulatory requirements, design bases, and other requirements in the procurement documents?

A.41 No. The sentence quoted by CCANP only provides Quadrex's view regarding guidance given to vendors. As we discussed previously, this sentence does not

identify any failure to specify applicable regulatory requirements, design bases, and other requirements in procurement documents.

Q.42 CCANP's Motion, p. 43, quotes the following sentences from finding 3.1(b) as identifying a violation of Criterion X of Appendix B to 10 C.F.R. Part 50:

> "No documented criteria exists governing the evaluation process for vendor reports."
>
> "Brown and Root continues to pursue a policy that work performed by major subcontractors or suppliers, such as EDS Nuclear and Westinghouse, is design verified by these firms and can therefore be assumed to be correct."

CCANP states that these sentences demonstrate a failure "to establish and execute effectively a program for inspection of safety-related design and engineering work." Id. Please explain whether these sentences indicate a significant breakdown in inspection of design work under Criterion X.

A.42 Inspection refers to examinations, observations, measurements, or tests to determine whether the physical characteristics of a material, structure, component, system, or process comply with applicable requirements. Consequently, Criterion X is generally understood to identify requirements pertaining to inspections of fabrication and construction activities and not to design activities.

The criteria of Appendix B which are most applicable to the statement by CCANP are Criteria III and VII. The conformance of a design with applicable criteria is determined by means of verification under Criterion III and review of vendor-furnished information under Criterion VII. As we previously explained, the sentences quoted by CCANP do not identify a significant breakdown in the QA program for STP under Criterion III and VII.

Q.43 Does finding 3.1(b) identify a significant breakdown in any portion of the QA program for STP?

A.43 No. As we have discussed previously, finding 3.1(b) does not identify a significant breakdown in any portion of the quality assurance program for STP.

Q.44 What concerns are expressed in finding 3.1(c)?

A.44 Finding 3.1(c) primarily expresses three concerns of Quadrex. First Quadrex was concerned about the lack of consistent treatment of plant operating modes and environmental conditions and noted the absence of written design bases to guide designers in what combination of events and plant modes must be considered. Second, Quadrex was concerned that the design criteria for STP appeared to reflect industry issues in the 1973-75 time frame but not more recent

issues. Finally, Quadrex was concerned that analyses of certain systems did not reflect appropriate plant operating modes and environmental conditions.

Q.45 What is the source of Quadrex's first concern?

A.45 Although the Quadrex Report does not specify the source of this concern, it appears to be predicated upon finding 4.3.2.1(i), which states that "there is no project-wide documented basis for [plant operating and environmental] conditions and their use."

Q.46 Would the absence of a project-wide documented basis for plant operating and environmental conditions violate the requirements of Appendix B?

A.46 No. There is no requirement in Appendix B that plant operating and environmental conditions be specified in a project-wide document. At STP, the design bases were provided for individual systems or disciplines by System Design Descriptions (SDDs) and Technical Reference Documents (TRDs). In fact, B&R procedure STP-SD-002-B required SDDs to address off-normal and post-accident operating conditions and to list the casualty events considered in the design of systems. This practice is sufficient to satisfy the requirements of Appendix B. In this regard, it should be noted that B&R had established the Systems Design Assurance Group to assure, among other things, that

plant operating modes and environmental conditions were being properly accounted for from system to system.

Q.47 Does Quadrex's concern that the design criteria for STP appeared to reflect industry issues in the 1973-75 time frame but not more recent issues identify a significant breakdown in any portion of the QA program for STP?

A.47 No. Based upon our review of the Quadrex Report and Bechtel's review of B&R design work during the transition period, we have determined that B&R was reviewing regulatory and industry developments since 1975, but that in some cases B&R had not yet performed the work necessary to revise its design criteria. Thus, Quadrex's observation that the design criteria did not account for more recent developments does not indicate that the controls provided by the QA program were not being properly implemented but instead indicated that B&R had not yet updated its design criteria -- which at most could be considered a productivity and scheduling concern. This is particularly true since Quadrex did not identify significant deficiencies in design output traceable to out-of-date criteria.

Q.48 What is the basis for Quadrex's concern that the analyses of certain systems did not reflect appropriate plant operating modes and environmental conditions?

A.48 Quadrex relied upon three examples in support of its conclusion. First, Quadrex pointed to deficiencies in the design basis for the HVAC system. These deficiencies were reported to the NRC pursuant to 10 CFR § 50.55(e). The other examples involved a purported failure to consider the worst case conditions (i.e., simultaneous shutdown of two units) in the assumptions used in the design of the Essential Cooling Pond (ECP) and the absence of postulated line cracks and breaks outside of containment. However, the design of the ECP did in fact consider two units shutdown as reflected in FSAR Section 9.2.5., and we understand that B&R had not yet begun design activities associated with line cracks and breaks outside of containment.

Q.49 With the exception of the HVAC system design deficiency which was reported to the NRC, do these examples indicate a significant breakdown in the QA program for STP?

A.49 No. The questions about the ECP and the pipe break analysis were of a different nature than the deficiency in the HVAC system and do not suggest any

systematic deficiency in the controls provided by the QA program or in the implementation of those controls. Thus, these examples do not indicate the existence of a significant breakdown in any portion of the QA program for STP.

Q.50 CCANP's Motion, p. 42, quotes the following sentences from finding 3.1(c) as identifying a violation of Criterion V of Appendix B to 10 C.F.R. Part 50:

> "No written design bases are provided to guide the designer in what combinations of events and plant modes must be considered."
>
> "Consideration of degraded equipment performance was also not evident."

CCANP states that these sentences demonstrate a failure "to adequately prescribe by documented instructions, procedures, or drawings the safety-related design and engineering activities at the South Texas Project." Id. Please explain whether these sentences quoted by CCANP identify a significant breakdown in any portion of the QA program for STP.

A.50 Procedure STP-SD-002-B required that SDDs provide design bases for off-normal and post-accident conditions and list casualty events to be considered in the design of systems. As explained previously, Quadrex was apparently seeking a project-wide document which provided design bases for plant operating modes and environmental conditions. Neither Criterion III

nor Criterion V requires that a project-wide document specify the design basis for all systems or disciplines; both criteria permit the design basis to be identified on a system or discipline level. Additionally, the degraded equipment performance identified by Quadrex refers to matters that had not yet been the subject of design activities at STP. Thus, the sentences quoted by Quadrex do not identify a significant breakdown in any portion of the QA program for STP.

Q.51 CCANP's Motion, p. 42, quotes the following sentence from finding 3.1(c) as identifying a violation of Criterion VI of Appendix B to 10 C.F.R. Part 50:

> "Design criteria provided in issued [System] Design Descriptions (SDDs) and Technical Reference Documents (TRDs) . . . do not adequately address more recent developments," particularly developments in the post-1975 period.

CCANP states that this sentence demonstrates a failure "to adequately control the issuance of documents, such as instructions, procedures, and drawings, and changes thereto, which prescribed safety-related design and engineering." Id. Does the sentence quoted by CCANP identify a violation of Criterion VI?

A.51 No. Criterion VI pertains to document issuance to assure that when design documents and any revisions are updated, the revision process be appropriately

controlled by assuring that the revisions "are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed." The sentence quoted by CCANP relates to the engineering design process of updating design documents relative to changing regulatory requirements, not the control process of issuing documents. Quadrex was expressing its view of the efficiency of B&R's design process in implementing new requirements.

Q.52 Does finding 3.1(c) identify a significant breakdown in any portion of the QA program for STP?

A.52 No. As we have discussed previously, finding 3.1(c) does not identify a significant breakdown in any portion of the quality assurance program for STP.

Q.53 What concerns are expressed in finding 3.1(d)?

A.53 Finding 3.1(d) primarily questions whether some design activities that were classified as non-safety-related should have been classified as safety-related, and it identifies seven examples in support of this conclusion.

Q.54 What were the seven examples identified in finding 3.1(d)?

A.54 The first example was stated as being "a lack of awareness of high energy piping in the MAB [Mechanical Auxiliary Building] (see Questions M-3, N-3, N-15, and R-5)." A review of the cited questions indicates that Quadrex was concerned that B&R had not analyzed postulated breaks in high energy lines in the MAB. This example does not involve an improper classification of a safety-related system but rather an activity which had not yet been performed by B&R.

The second example referred to shielding calculations that were not classified as safety-related. The NRC was notified that this was a potentially reportable deficiency under 10 CFR § 50.55(e). However, HL&P later determined that this was not reportable because the shielding calculations were not generally classified as safety-related in the industry and, more importantly, the shielding calculations were internally processed by B&R in the same manner as a safety-related calculation with respect to checking and verification of adequacy.

The third example involved "HVAC system requirements for off-normal conditions." Quadrex was concerned that B&R had not provided safety-related HVAC systems to account for off-normal conditions. This was reported to the NRC pursuant to 10 CFR § 50.55(e).

The fourth example involved "[c]omputer code CPVR status." Quadrex was concerned that users of computer codes could not determine whether the codes were safety-related or non-safety-related because some computer program verification reports (CPVR) were not in place. This was also reported to the NRC pursuant to 10 CFR § 50.55(e).

The fifth example involved "support systems (see Questions E-3, E-15, H-4, H-13, M-5, M-25, N-10, N-17, and R-6)." A review of the cited questions does not indicate any problem with safety-related classifications (with the exception of the HVAC problem mentioned previously), but instead generally indicates that Quadrex was concerned about various types of analyses which had not yet been completed or with analyses which Quadrex believed may have contained errors.

The sixth example involved "[o]perations performed at remote panels (see Questions E-13 and R-10)." A review of the cited questions does not indicate any problem with safety-related classifications of operations at remote panels but only a concern that environmental conditions (temperature, humidity, and radiation) at the remote panels may not have been properly accounted for. This example is related to

the reported deficiency in the HVAC systems, and pertained to activities which we understand had not yet been completed by B&R.

The final example involved "[s]ystems interaction (see Questions H-18, H-23, M-3, M-10, M-50, P-20, and R-12)." A review of the cited questions indicates that, with one exception (H-23), the questions do not involve improper safety-related classifications but instead analyses which we understand had not yet been completed or concerns by Quadrex regarding the adequacy of certain analyses. In Question H-23, Quadrex was questioning whether the leak detection instrumentation and sump pumps in the essential cooling water pump rooms should be classified as safety-related. Bechtel's review of this question revealed that level instrumentation was not the sole means of identifying leakage in the ECW system and as such did not have to be classified as safety-related. Furthermore, the operation of the sump pumps is not relied upon to mitigate against the consequences of postulated ECW system line breaks in such a way as to require their classification as a safety-related component.

Q.55 Do these seven examples indicate a significant breakdown in the safety-related classification system for STP?

A.55 No. Of the seven examples, only the one related to the HVAC system clearly involved a safety-related design activity that was improperly classified as non-safety-related. The other examples included analyses which we understand had not yet been completed and concerns about the adequacy of certain analyses. The isolated example involving the classification of portions of the HVAC system does not indicate a significant breakdown in the safety-related classification system for STP, and this example was in fact reported to the NRC pursuant to 10 CFR § 50.55(e).

Q.56 CCANP's Motion, pp. 39 and 41, quotes the following two passages from finding 3.1(d) as a basis for its contention that finding 3.1(d) violates Criteria I and II:

> "It was observed on many occasions that B&R uses a very sharp distinction between S/R and non-S/R categorizations for both equipment and calculations. A non-S/R designation results in the design outputs not being subjected to design verification. In several instances, design activities that affected plant safety were designated as non-S/R."
>
> "It was frequently stated during the design review that only NRC requirements must be met whether or not those requirements are accurate, reasonable, or even meet the intent of the regulations." (Emphasis as in the Quadrex Report).

CCANP states that these passages demonstrate a failure "to establish and effectively execute an acceptable quality assurance program" and a failure "to properly identify safety-related versus non-safety-related aspects of the design." Id. Do you have any comments regarding this contention?

A.56 Yes. Initially, it should be noted that drawing a sharp distinction between safety-related and non-safety-related classifications and failing to verify non-safety-related designs do not indicate any violation of Appendix B because Appendix B only applies to activities affecting the safety-related functions of structures, systems, and components. Furthermore, Criterion I of Appendix B is inapplicable to the quoted passages, since Criterion I only sets forth quality-related requirements for the organizations of a licensee and its contractors and does not specify any requirements regarding safety-related classifications. The criterion most directly applicable to the quoted passages is Criterion II, which requires among other things, that the "applicant shall identify the structures, systems and components to be covered by the quality assurance program. . . ."

Q.57 Do the passages cited by CCANP indicate a significant breakdown in quality assurance under Criterion II?

A.57 No. As previously explained, since Quadrex identified only one example of an improper designation of safety-related activities which was in fact reported to the NRC under 10 CFR § 50.55(e), there was no reasonable basis for notifying the NRC of a significant breakdown in any portion of the quality assurance program for STP.

Q.58 Does finding 3.1(d) identify a significant breakdown in any portion of the QA program for STP beyond the reported deficiency in the HVAC system?

A.58 No. As we have discussed previously, finding 3.1(d) does not indicate a significant breakdown in any portion of the quality assurance program for STP beyond the reported deficiency in the HVAC system.

Q.59 What concerns are expressed in finding 3.1(e)?

A.59 Finding 3.1(e) primarily expresses Quadrex's concern that written guidelines do not exist for the conduct of failure mode and effect analysis (FMEA) and that there is no documented evidence of satisfaction of the single failure criterion. Additionally, finding 3.1(e) identifies one case, involving the common instrument air line, which Quadrex indicated as a violation of the single failure criterion.

Q.60 Does this finding indicate a significant breakdown in any portion of the quality assurance program for STP?

A.60 No. First, it should be noted that, as we understand it, B&R had not begun to perform FMEAs for key systems (except for preparation of tables on single failures in the FSAR). Consequently, documented guidance for performance of FMEAs was not yet necessary, and therefore the absence of such guidance would not indicate a significant breakdown in any portion of the quality assurance program for STP.

It appears to have been Quadrex's opinion that a project-wide document should exist to provide guidance for the conduct of failure mode and effect analyses. See finding 4.3.2.1(i). As we explained previously with respect to finding 3.1(c), a project-wide document is not necessary as long as each discipline or group uses appropriate guidance for its specific type of work. Similarly, it is not necessary to have documented evidence solely for the purpose of demonstrating satisfaction of the single failure criterion provided that satisfaction can be determined from other documentation.

Finally, with respect to the single failure criterion violation reported by Quadrex in the common instrument air line, nothing in the Quadrex Report indicated that the situation involving the common instrument air line was attributable or related to a

significant breakdown in any portion of the QA program for STP. This matter is also the subject of findings 4.3.2.1(a) and 4.8.2.1(a), which are discussed below.

Q.61 CCANP's Motion, p. 42, quotes the following sentence as the basis for its contention that finding 3.1(e) identifies a violation of Criterion V of Appendix B to 10 C.F.R. Part 50:

> "No guidelines exist on what types of failures should be considered for various types of equipment."

CCANP states that this sentence demonstrates a failure "to adequately prescribe by documented instructions, procedures, or drawings the safety-related design and engineering activities at the South Texas Project." Id. Does the sentence quoted by CCANP identify a significant breakdown in any portion of the QA program under Criterion V?

A.61 No. As explained previously, Quadrex apparently was seeking a project-wide document which provided guidance for conducting FMEAs. Such a project-wide document is not required under Criterion V or under Criterion III. In any case, B&R had not yet begun to perform FMEAs for key systems. Consequently, guidance for this effort was not yet required to be in place.

Q.62 Does finding 3.1(e) identify a significant breakdown in any portion of the QA program for STP?

A.62 No. As we have discussed previously, finding 3.1(e) does not identify a significant breakdown in any portion of the quality assurance program for STP.

Q.63 What concerns are expressed in finding 3.1(f)?

A.63 Finding 3.1(f) primarily expresses three concerns by Quadrex. First, Quadrex was concerned that there was no documented evidence for assuring that commitments in the Final Safety Analysis Report (FSAR) were being systematically implemented. Second, Quadrex was concerned that there were inconsistencies between the FSAR and design documents. Finally, Quadrex was concerned that there did not appear to be any method to assure the timely updating of the FSAR.

Q.64 Did B&R have a method designed to assure that FSAR commitments were implemented?

A.64 Yes. We understand that coordination of implementation of the FSAR commitments was the responsibility of the B&R Licensing Group (the activities of which Quadrex did not review), and implementation of the commitments was the responsibility of the individual design disciplines. Additionally, we understand that the B&R Design Assurance Group had responsibility for reviewing the

design to assure that FSAR commitments were met. This is a reasonable method for assuring implementation of FSAR commitments.

B&R had two measures designed to assure that FSAR commitments were implemented. First, in accordance with the review and comment process described earlier, B&R issued design documents such as SDDs that reflected those regulatory and code requirements which the design organizations were to meet. Secondly, B&R committed to a formal design assurance process in accordance with procedure STP-SD-005 which, among other things, was intended to assure that regulatory/licensing commitments were fully implemented as reflected in the FSAR upon design completion.

In addition, B&R procedure STP-DC-015 required design verifiers to confirm that the designs being verified conformed with FSAR requirements and to initiate FSAR change notices for designs which did not conform. This procedure provided an additional method for assuring that the design conformed with the FSAR.

Q.65 What was the basis for Quadrex's concern that B&R did not have a method for assuring that FSAR commitments were systematically implemented?

A.65 Quadrex's concern in finding 3.1(f) is essentially the same as the concern in finding 4.3.2.1.(g), which states that a "systematic method to assure that FSAR commitments are implemented in the design does not appear to exist...." In turn, finding 4.3.2.1(g) cites four questions, none of which provides adequate information to support the conclusion that there was no documented method for assuring that FSAR commitments were being systematically implemented.

Q.66 Please explain whether Quadrex's concern that there were inconsistencies between the design and the FSAR indicates a significant breakdown in any portion of the QA program for STP.

A.66 In many projects, such as STP, the FSAR is not used to control design activities but instead is used to summarize pertinent information in the design documents which do govern the design activities. During construction, the design of a project evolves, as reflected by revisions to the controlled design documents, and the FSAR is often amended to incorporate these revisions. Since there is inevitably some delay between the time that the design is changed and the FSAR is amended to reflect that change, it is not unusual for some inconsistencies between the design and the FSAR to exist. As long as the differences between the FSAR and the design are

identified and controlled, and as long as design activities are being controlled by the appropriate design documents, inconsistencies with the FSAR do not pose a significant quality problem.

In the case of STP, B&R did have a procedure (STP-DC-012) for controlling changes to designs which necessitated amendments to the FSAR. Among other things, this procedure required that any changes in design which differed from the FSAR be documented on a change notice describing the change and identifying affected pages of the FSAR, and it required that a control log be maintained for these change notices. This is an appropriate procedure to control inconsistencies between the FSAR and design documents.

Q.67 Please explain whether Quadrex's concern that there was no method to assure the timely updating of the FSAR indicates a significant breakdown in any portion of the QA program for STP.

A.67 Failure to update the FSAR in a timely manner may result in some temporary inconsistencies between the FSAR and the design documents governing the design activities. As we explained in response to the previous question, such inconsistencies do not pose a significant quality problem as long as the entire process is controlled. However, timely updating of the FSAR is important in order to provide the NRC

Staff with proper information for the conduct of its functions. In this regard, B&R had a procedure (STP-DC-012) for control and processing of changes to the FSAR.

Q.68 Is there any other reason why Quadrex's concerns regarding inconsistencies between the FSAR and various design documents and regarding the need to update the FSAR would not be reportable under 10 CFR § 50.55(e)?

A.68 Yes. We have reviewed the Quadrex Report to identify examples related to Quadrex's concerns. The examples we identified generally involved a design or design practice which was technically adequate but which was either inconsistent with the FSAR or not reflected in the FSAR. In fact, in many cases, the Quadrex Report states that the design or design practice in question was acceptable or consistent with industry practice and NRC guidance. Consequently, Quadrex's concern also would not be reportable because it does not identify a condition which, if left uncorrected, could have adversely affected the safety of operations.

Q.69 CCANP's Motion, pp. 42-43, quotes the following sentences from finding 3.1(f) as a basis for its contention that finding 3.1(f) identifies a violation of Criterion VI:

> "There [were] many inconsistencies noted between the FSAR and other design and procurement documents."
>
> "There did not appear to be any method to assure that timely updating of the FSAR was being accomplished."
>
> "In a number of areas, the FSAR is now out-of-date."

CCANP states that these sentences demonstrate a failure "to adequately control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribed safety-related design and engineering." Id. Do these sentences identify a violation of Criterion VI of Appendix B to 10 C.F.R. Part 50?

A.69 No. As previously explained, Criterion VI requires that, if a document is issued or revised, it be accomplished in a controlled manner. Criterion VI does not require that any particular document, including the FSAR, be updated, nor does it prohibit inconsistencies between the FSAR and other types of documents as long as those inconsistencies are controlled. Furthermore, as we explained previously, the matters raised in these sentences do not indicate a significant breakdown in any portion of the QA program for STP.

Q.70 CCANP's Motion, p. 43, quotes the following sentence from finding 3.1(f) as a basis for its contention that finding 3.1(f) identifies a violation of Criterion X of Appendix B to 10 CFR Part 50:

> "These were numerous differences between EDS practices and FSAR promises."

CCANP states that this sentence demonstrates a failure "to establish and execute effectively a program for inspection of safety-related design and engineering work." Id. Please explain whether this sentence quoted by CCANP indicates a significant breakdown in inspection of design work under Criterion X.

A.70 As we explain previously, Criterion X is generally understood to apply to inspection of fabrication and construction activities rather than design or engineering work. Thus, the sentences quoted by CCANP would not indicate a significant breakdown in the QA program for STP under Criterion X.

Furthermore, as part of its subcontract responsibilities, EDS was directed by B&R to conform its design activities to the same Technical Reference Documents which were being used by B&R personnel in the performance of their duties with regard to piping stress analysis and pipe support design. These TRD's represent the primary method used by B&R to implement licensing commitments with respect to analytical methods.

Finally, it may be noted that while Quadrex identified differences between some of EDS's design activities and the then-current revision of the FSAR, Quadrex confirmed that these activities were technically adequate. See Quadrex's assessment of EDS's responses to Questions P-7, P-9, and P-24. Thus, the existence of these difference would not have adversely affected the safety of operations.

Q.71 Does finding 3.1(f) identify a significant breakdown in any portion of the QA program for STP?

A.71 No. As we have previously discussed, finding 3.1(f) does not identify a significant breakdown in any portion of the QA program for STP.

Q.72 What concerns are expressed in finding 3.1(g)?

A.72 Finding 3.1(g) primarily expresses Quadrex's concern that there was very little evidence of a well-thought-out and consistent basis for design, that much of the plant design basis was solely rooted in engineering judgment, and that the rationale for this judgment was not documented in a retrievable manner. Quadrex provided several observations in support of its concern. Some of these observations were also the subject of findings we have discussed previously. Others included observations that much of the design was based upon unverified preliminary data; that a

number of key front-end criteria documents had not yet been prepared; that work performed by one contractor was not being reviewed by other contractors; that B&R did not have a consistent requirement for design margins and allowed individual engineers to make this determination; and that B&R did not require the use of either design manuals that provide guidance on acceptable practices or individual engineer log-books.

Q.73 Please discuss whether the concern expressed by Quadrex in finding 3.1(g) identifies a significant breakdown in any portion of the QA program for STP.

A.76 When read in context, it appears to have been Quadrex's concern that each discipline was establishing its own design basis, that much of the design bases were rooted solely in engineering judgment, and that because the rationale for this judgment was not documented, new project personnel were not familiar with the reasons why their predecessors had selected certain design bases. However, as we explained previously with respect to findings 3.1(a), 3.1(b) and 3.1(c), it is acceptable for each discipline to develop its own design basis rather than relying upon a project-wide document or multidisciplinary guidance. Furthermore, use of engineering judgment in development of the design basis is appropriate, and the rationale for that

judgment need not be documented as long as the design basis itself is documented. Although we agree that it would have been beneficial if new project personnel were familiar with the rationale for the design basis established by their predecessors, the absence of such familiarity does not present a problem as long as the design basis is documented. In any case, Bechtel's own review of B&R's design basis indicated that the design basis was primarily rooted in the Safety Analysis Reports, regulatory guides, industry codes, and other standard sources for design bases. Consequently, Quadrex's concern does not indicate a significant breakdown in any portion of the QA program for STP.

The examples provided by Quadrex in finding 3.1(g) also do not identify a significant breakdown in any portion of the QA program for STP. Basing the design upon unverified preliminary data is generally necessary at the start of design and does not identify any quality assurance problems. Quadrex's concern in this area generally pertained to the over-conservatism incorporated in this data. Similarly, while it may have been desirable for B&R to have produced the key front-end criteria documents mentioned by Quadrex, many of these documents were not yet needed at that time given the status of design. More generally, many plants have been successfully completed without using

these types of documents in the design process. Additionally, as we have explained previously, Appendix B does not require that design assumptions (including the design margins) be consistent from discipline to discipline, nor does it require that one contractor review the work of other contractors, provided there is review to assure conformance with the procurement documents and compatibility at interfaces. Finally, there is no requirement that design manuals be prepared to provide uniform guidance to disciplines or designers or that designers use "individual engineer log-books," provided that other acceptable means of identifying the design input and assumptions are used in preparing a design. It may be noted that B&R in fact treated its collection of SDDs and TRDs as a design manual and had a procedure (STP-SD-001) to this effect.

Q.74 CCANP's Motion, pp. 39-40 quotes the following two sentences from finding 3.1(g) as identifying a violation of Criteria I and XVIII of Appendix B to 10 CFR Part 50:

> "Significant quality variations were also observed in the design review comments provided for internal documents prior to their initial issue or their subsequent revision."
>
> The current design includes design details "obtained from other PWR plants and used without confirming their" appropriateness for this application.

CCANP states that these sentences demonstrate a failure "to adequately verify safety-related design and engineering work at the South Texas Nuclear Project." Id. What relevance, if any, do these sentences, or design verification in general, have to Criteria I and XVIII?

A.74 These sentences, and design verification in general, are not relevant to Criteria I and XVIII. Criterion I requires that the responsibilities of organizations performing activities affecting quality be established in writing, and it sets forth certain requirements with respect to those responsibilities. Criterion I does not specify any requirements for reviewing, verifying, or commenting upon design documents or design details. Similarly, Criterion XVIII requires that a comprehensive system of planned and periodic audits be carried out to verify compliance with and the effectiveness of the quality assurance program. Criterion XVIII does not impose any requirements with respect to comments on or verification or review of design. Design verification is encompassed within Criterion III, not Criteria I or XVIII.

Q.75 Does the first sentence quoted by CCANP identify a violation of the verification requirements of Criterion III?

A.75 No. Providing comments on internal documents prior to their issuance is not encompassed within design verification as that term is used in Criterion III. Moreover, finding 3.1(g) only states that "quality variations" were observed in the comments. We assume this means that some comments were not as thoughtful as others and that the finding was not intended to identify a deficiency in the comments or in any quality assurance control measures required by Appendix B.

Q.76 What is the basis for the second sentence quoted by CCANP?

A.76 The statement that design details from other plants were used without confirming their applicability at STP appears to be based upon Quadrex's assessment of B&R response to Questions P-2 and M-28. Quadrex's assessment in P-2 explicitly states that reliance upon information provided by Westinghouse is "probably satisfactory" but that B&R "should be more involved in understanding similar plant operating experiences" to assure that components have adequate duty cycle life. Similarly, in its assessment of B&R's response to Question M-28, Quadrex observed that B&R had directly used Westinghouse plant design events without review for plant availability or economic considerations.

Q.77 Did these Questions indicate a significant breakdown in the verification process for STP?

A.77 No. Quadrex's concern in this area does not appear to be safety-related but instead related to matters of plant availability.

Q.78 CCANP's Motion, p. 40, quotes the following two passages from finding 3.1(g) as identifying a violation of Criteria II and XVII of Appendix B to 10 C.F.R. Part 50:

> "Much of the plant design basis is rooted solely in engineering judgment and the rationale for this judgment, has not been documented in a retrievable manner."
>
> "B&R does not require use of . . . individual engineer log-books to record key bases, assumptions or decisions. . . . Consequently, fundamental background information regarding the STP design is difficult to retrieve since many current B&R engineers are not sufficiently familiar with the STP design or its bases."

CCANP states that these passages demonstrate a failure "to assure adequate documentation in an identifiable and retrievable manner of the safety-related design and engineering work at the South Texas Nuclear Project." Id. Is Criterion II relevant to these passages?

A.78 No. Criterion II requires that licensees establish and implement a written quality assurance program. Criterion II does not identify any specific requirements applicable to the maintenance of records or documents.

Q.79 Do these passages identify a violation of Criterion XVII?

A.79 No. Criterion XVII establishes requirements for the preparation and maintenance of records that "furnish evidence of activities affecting quality." Criterion XVII also identifies various types of records which must be maintained. Engineer log-books and documentation of the rationale for engineering judgment are not explicitly identified as types of records which must be maintained under Criterion XVII. Furthermore, lack of documentation of the rationale for judgment in the selection of the design basis (as distinct from documentation of the design basis itself) is not inconsistent with the provisions of Criterion XVII. Finally, although engineer log-books may be one method by which the requirements of Criterion XVII can be satisfied, there are acceptable alternatives to the use of engineer log-books for recording design bases, assumptions and decisions, such as preparing a separate document for each calculation or design activity. For example, B&R

issued SDDs and TRDs and documented calculations on separate documents. Consequently, the absence of engineer log-books does not identify a violation of Criterion XVII.

Q.80 CCANP's Motion, pp. 41-42, quotes the following sentences from finding 3.1(g) as identifying a violation of Criterion V of Appendix B to 10 C.F.R. Part 50:

> "There was little evidence of a well-thought-out and consistent basis for design."
>
> "A number of key front-end criteria documents are missing [for] STP."
>
> "A plan to identify and develop these TRDs on the project was not evident."

CCANP states that these sentences demonstrate a failure "to adequately prescribe by documented instructions, procedures, or drawings the safety-related design and engineering activities at the South Texas Nuclear Project." Id. Please explain whether these sentences quoted by CCANP identify a significant breakdown in any portion of the QA program for STP.

A.80 As we explained previously, the first sentence quoted by CCANP does not indicate a significant breakdown in any portion of the QA program for STP. Furthermore, with respect to the other sentences quoted by CCANP, we have previously explained that Appendix B does not require the type of project-wide document sought by

Quadrex. Although such documents may be used to provide guidance to designers, there are other acceptable methods of communicating such guidance. Thus, for the reasons previously discussed, these sentences quoted by Quadrex do not indicate a violation of either Criterion V or Criterion III.

Q.81 CCANP's Motion, p. 43, quotes the following sentence from finding 3.1(g) as identifying a violation of Criterion VII:

> "It was noted that the Materials Group does not review subcontractor material selection[s]."

CCANP states that this sentence demonstrates a failure "to adequately establish measures to assure that purchased safety-related engineering and design services conformed to procurement documents." Id. What is the nature of the concern expressed by Quadrex by this sentence?

A.81 This sentence in finding 3.1.(g) appears to be based upon Quadrex's assessment of B&R's response to Question C-39, which states that "Brown & Root Materials Group does not review material selections by [design] contractors prior to vendor release for manufacture." In other words, B&R would hire a subcontractor, such as EDS, to perform design work and to select the material type, and the vendor would be

authorized to commence manufacture of the item using that material type without any provision for prior review by the B&R Materials Group.

Q.82 Does such a practice identify a violation of Criterion VII?

A.82 No. Criterion VII requires that measures "be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents." A review by B&R of the material selections of its subcontractors was not the only acceptable means to assure that the subcontractors' design work satisfies the procurement documents between B&R and the subcontractors.

It should be noted that the absence of a review of the materials selections of its subcontractors by the B&R Materials Group does not mean that the materials selections were going unreviewed. Criterion III requires that these selections be reviewed and verified. Review and verification by the subcontractors satisfies the requirements of Appendix B and assures that the materials selection is appropriate. Our discussion with respect to finding 3.1(b) provides additional information regarding the controls for assuring conformance with procurement documents.

In fact, the procedures for reviewing pipe support subcontractor documents did not require review by the Materials Group. It is our understanding that material selections (even those made by B&R disciplines) were not, as a normal practice, required to be reviewed by the Materials Group. This group was utilized by B&R as a specialized technical support staff whose primary function was to assist the design disciplines in establishing general material requirements and in resolving specific material problems. The group did not function as a reviewer of all material selections, but rather only of those material questions directed to it.

Q.83 Does finding 3.1(g) identify a significant breakdown in any portion of the QA program for STP?

A.83 No. As we have discussed previously, finding 3.1(g) does not identify a significant breakdown in any portion of the QA program for STP.

Q.84 What concerns are expressed in finding 3.1(h)?

A.84 Finding 3.1(h) primarily expresses Quadrex's concern that reliability requirements had not been established for equipment.

Q.85 Does this concern indicate a quality assurance problem?

A.85 No. There is no explicit requirement in Appendix B to 10 CFR Part 50 that the procurement documents for equipment include specific reliability requirements. Furthermore, it is not general industry practice for procurement documents to include specific reliability requirements for all equipment. B&R's program for obtaining satisfactory performance of most equipment consisted of such measures as specification of a quality level consistent with the intended function of the equipment, reliance on historical data and experience, and qualification tests or analysis. This is consistent with industry practice. Additionally, for certain components, such as the ESF sequencer, requirements for performance of reliability analyses or demonstration tests may also be specified (which is what B&R had done for the ESF sequencer).

Q.86 CCANP's Motion, pp. 15-16, 39, and 40-41, quotes the following sentence as identifying a violation of Criteria I and II:

> "The absence of specific reliability requirements in both mechanical and electrical equipment specifications, and the inability to produce a standard checklist of postulated failures to be considered casts doubt on the rigor of the safety-related evaluation process."

CCANP states that this sentence demonstrates a failure "to establish and effectively execute an acceptable quality assurance program" and a failure "to properly

identify safety-related versus non-safety-related aspects of the design." Id. Does this sentence identify a violation of Criteria I or II?

A.86 No. Criteria I and II are obviously inapplicable since they only set forth quality-related requirements for the establishment of a QA program and for the organizations of the licensee and its contractors. Neither specifies reliability requirements or requirements for the use of standard checklists of postulated failures. Furthermore, as we have explained previously, it is not necessary that reliability requirements be explicitly specified. Although a standard checklist of postulated failures can be useful in the safety-related evaluation process, this process can be successfully completed without such a checklist.

Q.87 Does finding 3.1(h) identify a significant breakdown in any portion of the QA program for STP?

A.87 No. As we have discussed previously, finding 3.1(h) does not identify a significant breakdown in any portion of the QA program for STP.

Q.88 What concerns are expressed in finding 3.1(i)?

A.88 Finding 3.1(i) (which mistakenly is designated as 3.1(j) in the Quadrex Report) primarily expresses two concerns by Quadrex. First, Quadrex was concerned

about the fact that certain nuclear-related analyses had not yet been completed, about the technical adequacy of the nuclear-related analysis methods and assumptions, and about the high error rate in these calculations. Second, Quadrex was concerned that a large amount of nuclear-related analysis was subcontracted and that the technical guidance provided to the subcontractors and the review of the subcontracted analyses by B&R did not appear to be adequate.

Q.89 Does the first concern indicate a significant breakdown in any portion of the quality assurance program for STP?

A.89 No. The thrust of Quadrex's concern regarding analyses which had not yet been completed was to indicate a productivity or scheduling problem and not a significant breakdown in any portion of the QA program.

The concerns raised by Quadrex regarding inadequate analysis methods or high error rates could relate to quality assurance matters. We have reviewed the discipline findings cited by Quadrex as support for its finding that B&R nuclear-related analysis methods were inadequate and contained a high error rate. The discipline findings do not identify a large number of inadequate calculations and, with the

exception of the deficiencies which were reported to the NRC, the findings do not identify any safety-significant deficiencies. Consequently, Quadrex's finding does not support a conclusion that there was a significant breakdown in any portion of the QA program for STP.

Some of the "errors" related to calculations which were not inadequate, but needed to be updated. For example, Quadrex cited as an inadequacy in the methods used by B&R's Nuclear Analysis Group the use of a computer code, RELAP3, which at the time of the Quadrex review was being replaced in general usage by the NRC and the industry with later, more realistic (i.e., less conservative) modelling methods. Quadrex indicated that B&R and its subcontractor, NUS, were using these modern methods, but cited as an inadequacy the use of RELAP3 in older calculations.

In general, Quadrex's concerns regarding Nuclear Analysis calculations appear to be largely based, not on specific errors, but on the impression that Nuclear Analysis personnel were not as knowledgeable of certain design assumptions or factors as Quadrex believed they should have been. In fact, Quadrex assessments of the B&R responses in the Nuclear Analysis area often explicitly pointed out that no errors had been found, although they did indicate a concern about the relative lack of understanding by

some B&R personnel of the factors affecting these analyses. Where specific errors or inconsistencies in calculations were noted by Quadrex, a complete reading of the Quadrex assessment and an understanding of the related circumstances reveals that Quadrex was mostly concerned with the timeliness of certain analyses the changing regulatory acceptance of certain analytical methods or the overconservatisms to be found in some older calculations.

The disciplines mentioned in this finding other than Nuclear Analysis were HVAC, Piping and Supports and Special Stress. The significant deficiencies in the HVAC area were covered by HL&P's 50.55(e) report.

In the pipe support analysis area, Quadrex appears to have been primarily concerned about what they believed were inappropriate methods. For the most part, the "inappropriate methods" consisted of differences between methods used by B&R and its subcontractors, differences between the methods being used and those described in the FSAR, and differences between the methods being used and those currently being recommended by the NRC Staff. In general, the "inappropriate methods" did not involve actual errors in calculations. In the area of pipe rupture analysis, Quadrex expressed similar concerns regarding the analytical methods being used and identified analyses which had not yet been completed, but in

general it did not identify actual errors in calculations. In fact as to the Piping and Supports and Special Stress areas, Quadrex found that the EDS design analysis appeared to be "technically adequate," that a "limited amount of actual STP piping design and analysis work" had been accomplished by B&R, and that "[m]any of the design practices and analytical methods examined were . . . consistent with industry practice." See Quadrex Report (Applicants' Exhibit 60), pp. 4-74 and 4-77. Since the few errors identified by Quadrex were either of limited scope (i.e. HVAC) or did not represent safety significant design errors, this concern does not represent a significant breakdown in any portion of the quality assurance program for STP.

Q.90 Please explain whether the second concern indicates a significant breakdown in any portion of the quality assurance program for STP?

A.90 Initially, it should be noted that Appendix B to 10 CFR Part 50 does not prohibit a licensee from contracting or subcontracting for design work. In fact, Criterion I of Appendix B explicitly authorizes the delegation of the work of establishing and excuting the QA program as long as the licensee retains responsibility. Thus, Quadrex's finding that

B&R had subcontracted a large amount of nuclear-related analysis does not identify a significant breakdown in any portion of the QA program for STP.

We have already addressed Quadrex's concern about the technical guidance provided by B&R to subcontractors and vendors and the review of their analyses by B&R with respect to finding 3.1(b). For the reasons which we previously stated, this concern does not identify a significant breakdown in any portion of the QA program for STP.

Q.91 CCANP's Motion, p. 39, quotes the following sentence from finding 3.1(i) as identifying a violation of Criteria I and II of Appendix B to 10 CFR Part 50:

> An "abnormally high error rate was observed" in Brown & Root calculations for the nuclear, as opposed to the conventional, aspects of the engineering work.

CCANP states that this sentence demonstrates a failure "to establish and effectively execute an acceptable quality assurance program." Id. Does this sentence identify a significant breakdown in any portion of the QA program for STP?

A.91 No. As we have previously discussed, the calculational errors or inconsistencies identified by Quadrex do not represent a significant breakdown in any portion of the QA program for STP.

Q.92 CCANP's Motion, p. 43, quotes the following passage from finding 3.1(i) as identifying a violation of Criterion VII of Appendix B to 10 CFR Part 50:

> "The amount of nuclear-related analysis that is subcontracted by B&R is higher than a typical A/Es practice. The technical guidance provided by some of these Groups for subcontracted consultants, such as EDS and NUS, does not appear to be adequate."

CCANP states that this passage demonstrates a failure "to adequately establish measures to assure that purchased safety-related engineering and design services conformed to the procurement documents." Id. Does this passage quoted by CCANP identify a violation of Criterion VII?

A.92 No. What "technical guidance" must be provided to suppliers is not the subject of Criterion VII, which pertains to the purchaser's measures to verify conformance of supplied material, equipment, and services with procurement documents. The criterion of Appendix B which is most relevant to this passage is Criterion IV, which pertains to procurement document control. As we previously explained with respect to finding 3.1(b), Criterion IV does not require that procurement documents include the type of detailed guidance suggested by Quadrex, especially for experienced contractors such as EDS and NUS.

Q.93 Is finding 3.1(i) reportable under 10 CFR § 50.55(e)(1)(i)?

A.93 No. As we have expressed, finding 3.1(i) would not be reportable under 10 CFR § 50.55(e)(1)(i) because it does not identify a significant breakdown in any portion of the QA program for STP.

Q.94 What is the subject of finding 3.1(j)?

A.94 Finding 3.1(j) primarily expresses four concerns of Quadrex regarding the design verification process. First, Quadrex was concerned that B&R's design verification process permitted the use of preliminary data up to the point of fuel loading. Second, Quadrex was concerned that there were no documented standards regarding the minimum qualifications for a design verifier. Third, Quadrex was concerned that the only evidence of a completed design verification was a signature. Finally, Quadrex was concerned that errors were not detected by design verifiers.

Q.95 Does the fact that B&R permitted use of preliminary data up to the point of fuel loading indicate a quality or safety concern?

A.95 No. Initially, it should be noted that, while B&R did not plan to perform final verification of a design until final input was available and design was nearing completion, B&R's procedure (STP-DC-015) required a

check of preliminary designs prior to release for construction or procurement. This check was intended to confirm that the preliminary designs were acceptable based upon the preliminary input then available.

Design verification is encompassed within the scope of Criterion III of Appendix B to 10 CFR Part 50. Criterion III does not include specific requirements regarding the timing of verification activities. Nevertheless, when possible, it is good practice to verify a design prior to release for construction or procurement.

It is not uncommon to defer final verification of some types of structures, systems, and components until after construction is well-underway or in some cases completed. For example, plant structures are often built in accordance with a preliminary design which is based upon conservative estimates of expected loads. As design and construction of the structure are completed, it becomes possible to determine the actual loads on the structure, and the design of the structure is then verified using these loads. By using a conservative preliminary design subject to later verification, the possibility for design changes to account for final loads is minimized, construction can proceed in a timely manner, and the design is confirmed to be acceptable.

Q.96 Does the absence of documented standards for the qualifications of design verifiers indicate a significant breakdown in any portion of the QA program for STP?

A.96 No. Criterion III only states that design verification "shall be performed by individuals or groups other than those who performed the original design, but who may be from the same organization." As long as the verification is performed by individuals who are competent, appropriately trained, and qualified, Criterion III and Appendix B in general do not require that the specific qualifications of a verifier be spelled out in a document. Quadrex itself acknowledged this fact in finding 3.1(j) and stated that B&R's approach (as embodied in procedure STP-DC-015) of having the Discipline Project Engineer select the design verifier from within the discipline "does not violate NRC requirements." In fact, this approach was consistent with industry practice.

Q.97 Does Quadrex's concern that the only evidence of a completed verification was a signature and that B&R did not require the use of a design verification checklist indicate a significant breakdown in any portion of the QA program for STP?

A.97 No. There are many acceptable methods for satisfying the requirements in Criterion III for suitable design controls governing verifications. One method includes the use of design verification checklists; other acceptable methods include the use of procedures to prescribe how the verification shall be conducted and what elements should be addressed (which was the method discussed in B&R procedure STP-DC-015) or the use of individually-prepared documents which record how the verification was conducted. Consequently, use of design verification checklists is a permissible, but not a required, means of providing an auditable record of design verifications. Furthermore, B&R's procedure for design verification does identify documentation requirements (i.e., comment forms and input list) in addition to the verifier's signature on the design document.

Q.98 What was the basis for Quadrex's concern that errors were not detected by design verifiers?

A.98 Quadrex cites its assessment of B&R's response to Question C-16 as a basis for its conclusion that errors were not detected by design verifiers. Although this assessment does state that a "significant number of mistakes" passed through the verification process, it does not identify the significance or the number of those mistakes or the

number of calculations reviewed by Quadrex. Furthermore, the assessment states that Quadrex was "unable to evaluate the effectiveness" of the B&R design verification procedure, which Quadrex found to be adequate on paper.

Q.99 Does this indicate a significant breakdown in the QA program for STP?

A.99 As we discussed prevously with respect to finding 3.1(b), the information provided by Quadrex in C-16 is not sufficient to support an independent determination that a significant breakdown occurred in the verification process at STP.

Q.100 CCANP's Motion, pp. 39-40, quotes the following passages from finding 3.1(j) as identifying a violation of Criteria I and XVIII of Appendix B to 10 CFR Part 50:

> "There [are] no documented standards regarding the minimum qualifications required for a design verifier."
>
> "The only evidence of a completed design verification is a signature, since B&R does not require either the use or completion of design verification checklists. Consequently, there is evidence that the key design verification questions are not being adequately [considered]."

CCANP states that these passages demonstrate a failure "to adequately verify safety-related design and engineering work at the South Texas Nuclear Project." Id. Do these quoted passages, or design verification in general, have any relevance to Criteria I and XVIII?

A.100 No. Criteria I and XVIII do not specify requirements that directly relate to these passages or design verification in general. Criterion I requires that the responsibilities of organizations performing activities affecting quality be established in writing, and it sets forth certain requirements with respect to those responsibilities. Criterion I does not contain any requirements regarding design verification. Similarly, Criterion XVIII requires that a comprehensive system of planned and periodic audits be carried out to verify compliance with the effectiveness of the quality assurance program. Criterion XVIII does not impose any requirements with respect to verification or review of design. Design verification is encompassed within Criterion III, not Criteria I or XVIII.

Q.101 Please explain whether these passages identify a violation of Criterion III?

A.101 Quadrex does not provide support for its conclusion that key design verification questions were not being adequately considered. We have previously explained that the remainder of these passages do not identify any violation of Criteria II and III.

Q.102 Does finding 3.1(j) identify a significant breakdown in any poriton of the QA program for STP?

A.102 No. As we have previously discussed, finding 3.1(j) does not identify a significant breakdown in any portion of the QA program for STP.

Q.103 What does finding 4.1.2.1(b) state?

A.103 Finding 4.1.2.1(b) states as follows:

> There was no evidence of Civil/Structural evaluation of the reasonableness of postulated internal missiles or that the criteria for internal missiles presented in TRD IN209RQ013-A had been implemented in the design (see Question C-9).

Q.104 Does finding 4.1.2.1(b) identify a significant breakdown in any portion of the QA program for STP?

A.104 No. This finding does not identify a significant breakdown in any portion of the QA program for STP. Evaluation of internal missiles is generally deferred until late in the design process after the design is largely complete. Thus, the fact that B&R had not yet evaluated the criteria for internal missiles or implemented the criteria into the design was

consistent with industry practice. Additionally, it should be noted that Quadrex found in its assessment of the B&R response to Question C-9 that Civil/Structural "was handling the missile penetration problem in accordance with industry practice and the state-of-the-art." In short, finding 4.1.2.1(b) does not identify any problem or deficiency in the work being performed by B&R or a significant breakdown in any portion of the QA program for STP.

Q.105 Does finding 4.1.2.1(b) identify a significant breakdown in any portion of the QA program for STP?

A.105 No. As we have discussed above, finding 4.1.2.1(b) does not identify a significant breakdown in any portion of the QA program for STP.

Q.106 What does finding 4.3.2.1(a) state?

A.106 Finding 4.3.2.1(a) states as follows:

> The common instrument air line, as depicted in FSAR drawing 9.4.2-2 attached to Question R-6, does not meet the single failure criterion required by IEEE 279-1971 and 10 CFR 50 (see Question E-15). The occurrence of this design error in the late 1970's in concert with the B&R response to other single failure criterion questions suggests that B&R is not sufficiently experienced in the performance of a Failure Mode and Effects Analysis that crosses discipline boundaries. (5) In most organizations, the I&C discipline would detect and immediately correct this type of design error by performing

a rigorous examination of the separation provided between redundant divisions in the safety-related portions of the plant for all involved disciplines.

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(5) Instrument line blockage was identified as a potential concern for single failure analyses in the 1970 period when an early B&W plant had three instruments connected to two piping taps. Technicians repeatedly replaced the instrument connected to one tap because it read differently than the other two instruments connected in common to the other tap; only later did they discover that a blocked instrument line was causing the two common instruments to read erroneously.

Q.107 Does this finding indicate a significant breakdown in any portion of the QA program for STP?

A.107 No. Although this finding does identify a design feature as a violation of technical requirements applicable to the common instrument air line, there is no indication in the finding itself or in the questions which it cites that the selection of this design feature was related to or caused by a significant breakdown in any portion of the QA program for STP.

It should be noted that, after Bechtel reviewed the Quadrex Report in 1982, the NRC was notified that the subject of this finding was potentially reportable under 10 CFR § 50.55(e) as a deficiency in design. It was later determined that failure of the

air line would not result in a safety hazard and that the design of the common instrument air line had not been released for construction. Accordingly, the NRC was informed that this was not a reportable deficiency.

As a result of the evaluation of this finding, a review was conducted by Bechtel of all safety-related piping and instrumentation diagrams (P&IDs) for application of the single failure criterion to instrument air lines. Based upon the results of this review, Bechtel determined that finding 4.3.2.1(a) did not reflect a generic condition or a significant safety issue.

Q.108 Does this finding identify a significant breakdown in any portion of the QA program for STP.

A.108 No. As we have discussed above, finding 4.3.2.1(a) does not identify a significant breakdown in any portion of the QA program for STP.

Q.109 What does finding 4.3.2.1(d) state?

A.109 Finding 4.3.2.1(d) states as follows:

> No formal methodology or documentation exists to verify adequate separation or the single failure criterion (see Questions E-1, E-8, and E-19).

Q.110 Did B&R have a formal methodology for performing and documenting verification of separation requirements and the single failure criterion?

A.110 Yes. B&R had a procedure for design verification (STP-DC-015) which required that designs be verified for failure analysis and separation and that this verification be documented. This procedure satisfied the requirements of Criterion III for design verification.

Q.111 Did B&R have a formal methodology for demonstrating how design documents incorporated separation requirements and the single failure criterion?

A.111 No. However, it may be noted that many projects have been successfully completed without this type of methodology (although Bechtel does have such a formal methodology for STP). Instead, it is common practice for each designer or design group to determine how to document incorporation of the separation requirements and the single failure criterion in its design documents. This practice is acceptable. Furthermore, a uniform methodology or approach for demonstrating satisfaction of separation requirements or the single failure criterion is not required even though it may be desirable.

Q.112 Does finding 4.3.2.1(d) identify a significant breakdown in any portion of the QA program for STP?

A.112 No. As we have discussed above, finding 4.3.2.1(d) does not identify a significant breakdown in any portion of the QA program for STP.

Q.113 What does finding 4.3.2.1(n) state?

A.113 Finding 4.3.2.1(n) states as follows:

> It is planned that various types of isolation devices will be used. Actual devices are still under evaluation and qualification. There is no existing document that provides guidance to the designers on the circuit application of these various types (e.g., optical couplers vs. fuses vs. relays, etc.). It is our opinion that lack of such a document (TRD) could result in design errors and licensing problems (see Question E-14).

Q.114 Does finding 4.3.2.1(n) identify a significant breakdown in any portion of the QA program for STP?

A.114 No. As this finding explicitly states, the use of isolation devices was still under evaluation when Quadrex conducted its review, and isolation devices had not yet been designed, purchased, or installed. Consequently, the type of document identified by Quadrex was not needed at that time. Such a document could be useful when selection of the isolation devices was actually being made.

Q.115 What does finding 4.5.2.1(b) state?

A.115 Finding 4.5.2.1(b) states as follows:

> EDS did not perform a design review or design verification of preliminary loads transmitted to B&R; these loads have, however, been used as a basis for plant design (see Questions C-4 and M-8).

Q.116 Does finding 4.5.2.1(b) identify a significant breakdown in any portion of the QA program for STP?

A.116 No. As we explained previously with respect to finding 3.1(j), use of preliminary loads is acceptable and not uncommon. Furthermore, it may be noted that, in the questions cited in finding 4.5.2.1(b), Quadrex itself stated that the preliminary loads transmitted by EDS were conservative. In fact, a "major concern" of Quadrex was the "potential overconservatism in the design" of EDS. See Quadrex Report (Applicants' Exhibit 60), p. 4-38.

Q.117 What does finding 4.6.2.1(n) state?

A.117 Finding 4.6.2.1(n) states as follows:

> Assumptions regarding the availability of various heat sinks under varying plant conditions should be re-examined (see Question N-17).

Question N-17 provides further details, stating that B&R should have analyzed the temperature of the water in the Essential Cooling Pond (ECP) under conditions of normal shutdown of two units as well as the

condition which Quadrex believes was the only one analyzed by B&R (normal shutdown of one unit and a loss of coolant accident (LOCA) in the other unit).

Q.118 Does finding 4.6.2.1(n) identify a significant breakdown in any portion of the QA program for STP?

A.118 No. Finding 4.6.2.1(n) does not identify a significant breakdown in any portion of the QA program for STP. In fact, an analysis of the ECP had been conducted under conditions of normal shutdown of two units. This analysis was reflected in FSAR Section 9.2.5. Consequently, finding 4.6.2.1(n) does not identify a deficiency.

Q.119 What does finding 4.7.3.1(a) state?

A.119 Finding 4.7.3.1(a) states as follows:

> B&R has not yet developed a criteria for jet impingement protection on unbroken piping systems (see Question P-20). A future TRD is planned.

Q.120 Does finding 4.7.3.1(a) identify a significant breakdown in any portion of the QA program for STP?

A.120 No. B&R had not yet begun design analysis of jet impingement on unbroken piping systems. Since this analysis had not begun, there was no need for B&R to have in place criteria to govern this analysis.

Q.121 What does finding 4.7.3.1(b) state?

A.121 Finding 4.7.3.1(b) states as follows:

> Approximately 50% of the reviewed SDDs do not yet contain system operating temperatures (see Question P-1).

Question P-1 provides further details in support of this finding. Question P-1 states that, of the sixteen SDDs which were reviewed by Quadrex, eight identified system design temperatures, seven did not identify a design temperature directly but did provide a cross-reference for enabling the designer to determine the temperature, and one did not identify either a system design temperature or a cross-reference for obtaining the temperature. These temperatures were used in performing preliminary stress analyses.

Q.122 Does finding 4.7.3.1(b) indicate a significant breakdown in any portion of the QA program for STP?

A.122 No. As Question P-1 states, all but one of the sixteen SDDs reviewed by Quadrex either identified a design temperature or identified a cross-reference for obtaining the temperature. Either approach is an acceptable means of providing guidance to designers for the performance of preliminary stress analyses. Consequently, finding 4.7.3.1(b) and Question P-1 do not identify any pattern of deficient SDDs, but instead identify only an isolated case where an SDD

did not yet provide guidance regarding design temperatures. Furthermore, this SDD was still in draft form and had not yet been issued for control of design activities.

Q.123 What does finding 4.7.3.1(k) state?

A.123 Finding 4.7.3.1(k) states as follows:

> B&R assumptions for seismic to nonseismic boundary anchors are probably unconservative and difficult to technically justify as adequate (see Question P-29).

Q.124 Does finding 4.7.3.1(k) identify a significant breakdown in any portion of the QA program for STP?

A.124 No. Bechtel agrees that the boundary anchor design should be analyzed with a different approach than that taken by B&R. However, it is common when one engineer reviews the work of another, that differences in approach will occasionally arise. Such differences, while generally requiring resolution particularly with respect to degrees of conservatism of the analytical methods, do not indicate the existence of a significant breakdown in any portion of the QA program.

Q.125 What does finding 4.8.2.1(a) state?

A.125 Finding 4.8.2.1(a) states as follows:

> The instrument air piping, between the valves actuated by redundant radiation monitors and the valves that divert air flow through safety-related filter

> trains in the FHB HVAC exhaust subsystem, does not meet the single failure criterion (see Question R-6).

Q.126 Does this finding indicate a significant breakdown in any portion of the QA program for STP?

A.126 No. Finding 4.8.2.1(a) is the same as finding 4.3.2.1(a). As we have previously discussed with respect to finding 4.3.2.1(a), finding 4.8.2.1(a) does not identify a significant breakdown in any portion of the QA program for STP and therefore would not be reportable under 10 CFR § 50.55(e)(1)(i).

Q.127 What does finding 4.8.2.1(b) state?

A.127 Finding 4.8.2.1(b) states as follows:

> No procedures exist that define the minimum qualification requirements for ALARA reviewers. Some design drawings have been reviewed and signed off for ALARA. There is limited evidence that proper follow-up has occurred to verify incorporation of ALARA specified designs (see Question R-1).

Q.128 Does the absence of a document defining minimum qualifications for ALARA reviewers indicate a significant breakdown in any portion of the QA program for STP?

A.128 No. Appendix B to 10 CFR Part 50 only applies to activities affecting the safety-related functions of structures, systems and components. A safety-related activity is an activity which assures the integrity of the reactor coolant pressure boundary, the

capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those specified in 10 CFR Part 100. ALARA activities are obviously not activities which affect these safety-related functions. Consequently, ALARA activities are not encompassed within Appendix B, and therefore failure to apply the QA program under Appendix B to ALARA would not be reportable under 10 C.F.R. § 50.55(e)(1)(i). However, for the purpose of this testimony, the findings were analyzed the same as if Appendix B was applicable to ALARA.

Appendix B to 10 CFR Part 50 does not require documentation of specific requirements for reviewers. However, it should be noted that B&R did have a procedure (STP-DC-016) which required the Engineering Project Manager to designate a qualified individual to perform ALARA reviews. This provision would be sufficient under Appendix B.

Q.129 Does the fact that design drawings were reviewed and signed off for ALARA with limited evidence of follow-up to verify incorporation of ALARA specified designs indicate a significant breakdown in any portion of the QA program for STP?

A.129 No. Apparently, Quadrex was concerned that, with the exception of a drawing sign-off, there was an absence of documented evidence that the comments of the ALARA reviewers were in fact incorporated into the applicable design drawings. Although such documentation is one means of satisfying the requirements of Criterion III for assuring that regulatory requirements and design bases are correctly translated into specifications, drawings, instructions, and procedures, there are other means of satisfying this requirement. For example, B&R identified requirements of the ALARA review in a procedure (STP-DC-016) which required the ALARA reviewer to provide comments to the cognizant engineer and then sign-off on the relevant drawings verifying compliance with the procedure. This is a reasonable measure for documenting acceptable incorporation of the ALARA reviewer's comments.

Q.130 Does finding 4.8.2.1(b) identify a significant breakdown in any portion of the QA program for STP?

A.130 No. As we have discussed above, finding 4.8.2.1(b) does not identify a significant breakdown in any portion of the QA program for STP.

Q.131 What does finding 4.8.2.1(c) state?

A.131 Finding 4.8.2.1(c) states as follows:

> Modification of the MAB HVAC system to eliminate filter media need to be re-examined (see Questions R-5 and R-29).

Q.132 Does finding 4.8.2.1(c) identify any deficiency?

A.132 No. With the exception of the Radiochemistry Lab and the Sample Room, exhaust filter media were not provided in the HVAC design for the Mechanical Auxiliary Building (MAB). Finding 4.8.2.1(c) simply expresses Quadrex's recommendation that this design be re-examined. However, the design complied with the requirements of Appendix I to 10 CFR Part 50. Consequently, there was no deficiency in the design, and finding 4.8.2.1(c) does not indicate anything to the contrary.

Q.133 Does finding 4.8.2.1(c) identify a significant breakdown in any portion of the QA program for STP?

A.133 No. As we have discussed above, finding 4.8.2.1(c) does not identify a significant breakdown in any portion of the QA program for STP.

Q.134 What does finding 4.8.2.1(d) states?

A.134 Finding 4.8.2.1(d) states as follow:

> B&R's position that shielding calculations are not-safety-related needs to be re-examined (see Question R-7). Several shielding analyses were performed by NUS; however, there is no indication that B&R has verified this

> work. Standard models and codes have been used in analyses performed by B&R, yet B&R exhibited a lack of familiarity with and understanding of the codes. A re-review of plant shielding is necessary to ensure that analysis results are properly reflected in design (see Questions R-11, R-12, and R-14).

Q.135 Was the NRC notified that finding 4.8.2.1(d) was potentially reportable?

A.135 Yes. On May 8, 1981, the NRC was notified that the substance of finding 4.8.2.1(d) was potentially reportable. Subsequently, this finding was determined not to be reportable for the reasons discussed with respect to finding 3.1(d).

Q.136 What does finding 4.8.2.1(e) state?

A.136 Finding 4.8.2.1(e) states as follows:

> B&R has not correlated radiation zones to the shielding design and shielding design has not adequately considered ISI requirements or the potential locations for temporary shielding (see Question R-10).

Q.137 Does finding 4.8.2.1(e) identify a significant breakdown in any portion of the QA program for STP?

A.137 No. It should be noted that the shielding design was subject to ongoing reviews by B&R and that in-service inspection (ISI) requirements were still being developed at the time Quadrex conducted its review. Thus, this finding simply identifies an activity

which had not yet been performed by B&R and not a significant breakdown in any portion of the QA program for STP.

Q.138 What does finding 4.8.2.1(f) state?

A.138 Finding 4.8.2.1(f) states as follows:

> Radiation zone drawings based on accident conditions have not been prepared (see Question R-30).

Q.139 Does finding 4.8.2.1(f) identify a significant breakdown in any portion of the QA program for STP?

A.139 No. The need for radiation zone drawings based on accident conditions is an outgrowth of the NRC's position in Item II.B.2 of NUREG-0737, "Clarification of TMI Action Plan Requirements" (November 1980). B&R had not yet prepared these drawings at the time Quadrex conducted its review. Thus, finding 4.8.2.1(f) does not identify a significant breakdown in any portion of the QA program for STP but only a matter which needed to be completed.

Q.140 What does finding 4.8.2.1(g) state?

A.140 Finding 4.8.2.1(g) states as follows:

> A design basis governing removable concrete block walls was not evident (see Question R-11).

Q.141 Does finding 4.8.2.1(g) identify a significant breakdown in any portion of the QA program for STP?

A.141 No. At the time Quadrex conducted its review, the design basis for removable concrete block walls was still being developed by B&R. Thus, finding 4.8.2.1(g) does not identify a significant breakdown in any portion of the QA program for STP but only a matter which needed to be completed.

Q.142 Please explain whether the Quadrex Report as a whole would be reportable under 10 CFR § 50.55(e)?

A.142 The Report itself is not an analysis of the adequacy of the design QA program for STP nor does it conclude that there is a widespread breakdown in the design QA program. Although the Report is critical of B&R's engineering practices and includes suggestions for their improvement, Quadrex identified relatively few significant deficiencies in the design product or significant failures of the design process to meet NRC requirements. Our review of the findings has not identified a significant breakdown in any portion of the QA program for STP, except to the extent previously reported to the NRC. Having reviewed the report as a whole, as well as its individual findings, we do not regard the Report itself as "reportable" under 10 CFR § 50.55(e).

STATEMENT OF PROFESSIONAL QUALIFICATIONS
OF SIDNEY A. BERNSEN

POSITION

Corporate Manager of Quality Assurance, Bechtel Power Corporation/Bechtel Construction, Incorporated Manager, Division Quality Assurance Eastern Power Division, Bechtel Power Corporation

EDUCATION

BSME, Purdue University MSME, Purdue University PhD, Purdue University

SUMMARY

7 Years	Quality assurance management 3 Years Project management
11 Years	Engineering management
4 Years	Chief engineer, nuclear and other disciplines
5 Years	Engineering supervision
3 Years	Nuclear and mechanical engineering

EXPERIENCE

Dr. Bernsen has been employed by Bechtel for 23 years. He is currently the corporate manager of quality assurance, Bechtel Power Corporation and Bechtel Construction, Incorporated. He also holds the position of manager of division quality assurance for the Eastern Power Division. He is responsible for overall Bechtel Power Corporation quality program policy and management of Eastern Power Division quality assurance. Activities under his cognizance include quality assurance functions associated with design, construction and operation support services.

Dr. Bernsen previously served as assistant project manager for quality activities on the Midland Project and manager of quality on the Zimmer Project. The Zimmer Project assignment included responsibility for all Bechtel quality assurance, quality control, quality engineering and supplier quality functions associated with the verification and construction completion programs. Earlier, Dr. Bernsen served as assistant project manager-technical, for the South Texas Project. In this capacity, he had management oversight over the

licensing, systems design, project procedures and coordination with the project quality assurance group.

As a member of the Bechtel power management group, Dr. Bernsen held a number of assignments including manager of nuclear engineering, chief nuclear engineer and manager of quality assurance. Earlier, Dr. Bernsen served as an engineering manager and manager of quality assurance in the San Francisco Power Division of Bechtel Power Corporation and held a number of project management, engineering management and chief engineering assignments in the Scientific Development Department. In addition, he has had experience in quality assurance, nuclear power plant design and construction, plant siting and engineering on a variety of power, aerospace and other advanced technology projects.

Prior to joining Bechtel Power Corporation Dr. Bernsen participated in and managed analysis, design and experimentation associated with boiling, pressurized and gas cooled reactors while at the Advanced Technology Laboratory of American Standard, General Atomic and Argonne National Laboratory.

Dr. Bernsen has actively participated in codes and standards activities serving as the initial chairman of: American National Standards Institute (ANSI) N45 Working Group 7, in preparing the initial version of ANSI N45.2 pertaining to quality assurance requirements for nuclear facilities; N45 Subcommittee 2, the committee responsible for N45.2 and the daughter QA standards; and the ASME Nuclear Quality Assurance Committee. He served as the vice chairman of ANSI Committee N45 on reactor plants and their maintenance and is currently chairman of the Nuclear Technical Advisory Group reporting to the American National Standards Institute Nuclear Standards Board. He participated on the International Standard Organization's Committee TC-85, Subcommittee 3, Working Group 8, in preparation of IS06215, "Nuclear Power Plants - Quality Assurnce" and the special task group formed under ANS 3 for the preparation of the revision of the N18.7 Standard to incorporate quality assurance provisions for operation. He was the U.S. technical expert in the drafting of the International Atomic Energy Agency (IAEA) Safety Guide on QA for operation.

Dr. Bernsen has participated in a number of industry activities. He served as a member of the Atomic Industrial Forum (AIF) Committee on Reactor Licensing and Safety, organized and served as the initial chairman of the Subcommittee on Cost Impact, and as chairman of the Subcommittee on Load Combinations. He is the Bechtel Power Corporation member of the IDCOR Policy Committee and served as a member of the IDCOR Steering Committee.

PROFESSIONAL MEMBERSHIPS

American Society of Mechanical Engineers
American Nuclear Society - Past member of the Board of Directors
American Society for Quality Control

REGISTRATION

Registered Nuclear Engineer, California

PUBLICATIONS AND PRESENTATIONS

Dr. Bernsen has published or presented a number of pertinent papers on a variety of subjects. The following lists some of these in the area of quality assurance:

"Nuclear Codes, Standards, and Quality Assurance in the United States," paper published in British Nuclear International, August 1971

"Nuclear Power Plant Quality Assurance Standards - the Status and Application of ANSI N45.2 Standards," a special report published by Nuclear Standards News, January 1973

"Quality Assurance in the Construction of Nuclear Power Plants," paper published in Nuclear Safety, March-April 1975

"Quality Assurance Education Requirements in the Engineer/Constructor Organization," presented at 21st Annual Meeting, American Nuclear Society, New Orleans, L.A., June 8-13, 1975

"Nuclear QA Standards: A Coordinated Effort," article published in Nuclear News, March 1976

"Quality Assurance Experience and Viewpoint From the U.S. Industry," presentation to Norwegian Petroleum Society, Oslo, Norway, April 1978

"The Consolidated U.S. Nuclear Quality Assurance Standard - Present Status and Application," prepared for presentation at Europeon Nuclear Conference, April 1979

STATEMENT OF PROFESSIONAL QUALIFICATIONS
OF FRANK LOPEZ, JR.

Education

B.A., Mathematics and B.S., Physics, Texas A & M University
M.S., Nuclear Engineering, Texas A & M University Graduate Studies: Industrial Engineering Management, University of Houston
M.B.A., Program and Management and Financial Management, West Coast University

Employer

Mr. Lopez has been employed by Bechtel Power Corporation or Bechtel Energy Corporation since graduation from college.

Summary

Present: Project Engineer, Material & Configuration Management

3 Years: Project Engineer, Systems/Licensing

5 Years: Engineering Supervisor in analysis, design, licensing, and evaluation of nuclear power stations, international and domestic

3 Years: Engineer, Nuclear Analysis

Employment Experience

In his current assignment on the South Texas Project, Mr. Lopez is responsible for project coordination of the Configuration Management Program including interface between the Engineering Department and other entities with respect to design freeze activities leading to systems and area completion, configuration control of design document releases, and startup interfaces. In addition, he is responsible for the Engineering Department scope of services for material management including material delivery requirements in support of system and area completion activities in the field. As an additional duty, he supervises design office Engineering personnel responsible for ASME Code activities.

Mr. Lopez previously served as the Assistant Project Engineer, Systems/Licensing on the South Texas Project. His duties have involved direct managment of design, licensing and quality activities for the project, including the transition of responsibilities from the previous architect/engineer. He has directly supervised the Mechanical, Nuclear, Architectural, Quality Engineering and Codes and Standards disciplines on the project, and been directly responsible for the development of the FSAR and project Design Criteria Manual.

Mr. Lopez was previously assigned as the Nuclear Engineering Group Supervisor on the Korea Nuclear Units 5 and 6 project being designed by Bechtel Power Corporation for the Korea Electric Company. His duties included the planning and administration of all nuclear-related design and procurement support activities within the Bechtel Power Corporation scope of services for the project, as well as the coordination of all project licensing activities. In this position, he supervised assigned Bechtel Power Corporation nuclear engineering personnel as well as assigned Korean trainees participating in a technology transfer program.

Mr. Lopez was previously assigned as the Deputy Nuclear Group Supervisor on the Palo Verde Nuclear Generating Station project. This project consisted of three nuclear units under construction by Bechtel Power Corporation for the Arizona Nuclear Power Project, a group of participating utilities. In this assignment, Mr. Lopez had the primary responsibility for the development of the Final Safety Analysis Report, which was submitted to the NRC.

Mr. Lopez was previously assigned as the Nuclear Analysis Group Supervisor for the Los Angeles Power Division. His responsibilities included supervision of a technical staff of engineers and specialists in nuclear and environmental assessment. Further, he was responsible to the Chief Nuclear/Environmental Engineer for the technical adequacy of nuclear analysis tasks performed on all nuclear projects in the LAPD scope, representing twelve domestic and foreign projects.

Mr. Lopez was previously assigned as an Engineer responsible for shielding and dose assessment analysis on both foreign and domestic nuclear power projects. These included the Maanshan Nuclear Power Station project for the Taiwan Power Company and the Blue Hills Station for Gulf States Utilities. He also had responsibilities with respect to the preparation of pertinent portions of the Preliminary Safety Analysis Reports (PSAR), and for numerous environmental analysis performed for inclusion in Environmental Reports (ER).

Professional Affiliations

Registered Professional Engineer, Texas
Member, American Nuclear Society

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL.,
OF MARK R. WISENBURG

Q.1 Mr. Wisenburg, please state your full name and current position.

A.1 My name is Mark R. Wisenburg and I am currently Manager, Nuclear Licensing for Houston Lighting & Power Company (HL&P).

Q.2 Please describe your educational background and professional experience.

A.2 I received my B.S. degree from the United States Naval Academy in 1964 and completed the United States Naval Nuclear Propulsion Training Program in 1965. After serving eleven years in the United States Navy on active nuclear submarine duty, including one year as Executive Assistant to the Deputy Chief of Naval Operations (Submarine Warfare), I joined the Tennessee

Valley Authority (TVA) as Principal Licensing Engineer for the Browns Ferry Nuclear Plant in 1975. I served in that capacity until 1976 when I was promoted to Supervisor, PWR Projects Section, Regulatory Staff, responsible for licensing activities for the Sequoyah, Watts Bar, Bellefonte and Yellow Creek Nuclear Plants. I became Staff Nuclear Engineer in 1979, and acted as assistant licensing manager for TVA from that time until 1982. In May 1982, I joined HL&P as Special Assistant to the Manager, Nuclear Licensing and was promoted to my current position in September, 1982.

Q.3 During your professional career what involvement have you had with 10 C.F.R. § 50.55(e)?

A.3 I have had considerable experience with the requirements of that regulation. Throughout my employment at TVA, I was involved in evaluating numerous matters for reportability, and prepared or supervised the preparation of written reports required by 10 C.F.R. § 50.55(e) for the Yellow Creek, Bellefonte, Watts Bar and Sequoyah nuclear plants.

In my current position, I review all reportability determinations under 10 C.F.R. § 50.55(e) by the South Texas Project (STP) Incident Review Committee (IRC) and often participate in the technical reviews of individual matters. I prepared Revision 1 of the

current HL&P reporting procedure which, among other things, established the Deficiency Evaluation Form (DEF), and supervised the preparation of subsequent revisions. I have also participated in the training of HL&P Engineering and Quality Assurance (QA) personnel in the applicable procedures and regulatory requirements.

Q.4 What is the purpose of your testimony?

A.4 The purpose of my testimony is to describe HL&P's current program for the evaluation and reporting of deficiencies pursuant to 10 C.F.R. § 50.55(e), changes in that program since 1981, and, in particular, the method by which conditions are evaluated in order to determine whether they represent significant breakdowns in the STP QA program which may be reportable under 10 C.F.R. § 50.55(e)(1)(i).

Q.5 What is the current STP procedure governing the conduct of reportability reviews under 10 C.F.R. § 50.55(e)?

A.5 Project Licensing Procedure (PLP)-02, originally issued on May 18, 1982 and updated through Revision 5 on May 21, 1985, specifies the process by which HL&P identifies and evaluates conditions which may be reportable pursuant to 10 C.F.R. § 50.55(e). PLP-02

also governs the review for reportability of conditions under 10 C.F.R. Part 21. Applicants' Exhibit 66 is a copy of the current procedure. While HL&P is responsible for evaluating and reporting conditions pursuant to 10 C.F.R. § 50.55(e), procedures are also in place defining the responsibility of Bechtel Energy Corporation (Bechtel), Ebasco Services Inc., and Ebasco Constructors Inc., (Ebasco) under the regulation.

Q.6 How are conditions which need to be evaluated for reportability under 10 C.F.R. § 50.55(e) identified at STP?

A.6 Any HL&P employee becoming aware of a condition which he believes may constitute a significant deficiency is required to promptly prepare a DEF describing the condition. Once the DEF is prepared, it is evaluated by HL&P Engineering. If Engineering determines that a significant deficiency exists, the DEF is promptly provided to the IRC for evaluation for reportability under 10 C.F.R. § 50.55(e). If HL&P Engineering determines that no significant deficiency exists, the basis for that determination is documented and the DEF is, nevertheless, transmitted to the IRC Chairman.

A similar process is in place for Bechtel employees which provides for the initiation of a Deficiency Evaluation Report (DER) whenever a significant

deficiency is identified, and notification of HL&P, regardless of whether Bechtel's evaluation finds that such a deficiency exists. Finally, Ebasco employees are responsible for bringing conditions which may represent significant deficiencies to Bechtel's attention and Bechtel, as appropriate, may generate a DER.

Whether or not a particular condition is determined to be a significant deficiency within the meaning of 10 C.F.R. § 50.55(e), deficient conditions are, of course, dispositioned and corrected using appropriate Project procedures.

Q.7 Who serves on the IRC?

A.7 The IRC is chaired by Mr. Michael Powell, P.E., HL&P's Supervising Engineer-STP Licensing. Mr. Paul W. Ratter, HL&P's Project QA Supervisor, also sits on the Committee. In addition, the IRC includes an Engineering representative cognizant in the discipline affected by the particular condition being evaluated, and other individuals, designated by the IRC Chairman on a case-by-case basis, who are familiar with the matters to be evaluated. Both the Chairman and the Project QA Supervisor may designate others to sit on the Committee in their stead when they are not available during the 24 hour period within which the IRC must make its determination and notify the NRC.

Q.8 May HL&P executive management also convene a committee to evaluate an item for reportability?

A.8 Yes. The Group Vice President - Nuclear may also convene a committee to perform an evaluation under 10 C.F.R. § 50.55(e).

Q.9 Please describe Mr. Powell's background and qualifications?

A.9 Mr. Powell has a Bachelor of Engineering in Electrical Engineering from the State University of New York at Stony Brook, and a M.S. in Nuclear Engineering from Georgia Institute of Technology. He was employed by Sargent & Lundy Engineers as an engineer in the Nuclear Safety and Licensing Division from 1978 until 1979, and joined HL&P in 1980 as an Associate Engineer in the Nuclear Safety and Licensing Section. He was promoted to Engineer and Team Leader of the STP licensing group in that same year. Mr. Powell was promoted to Lead Engineer, Licensing for STP in 1981 and to his current position in 1984. In that capacity, he is responsible for planning and directing the work of the STP licensing section. Mr. Powell has served as IRC Chairman since 1980. He is a Registered Professional Engineer in Texas and a Member of the American Nuclear Society, the Institute of Electrical and Electronics Engineers, and the Health Physics Society.

Q.10 Please describe Mr. Ratter's background and qualifications.

A.10 Mr. Ratter has 14 years of commercial nuclear QA/QC experience, including work for J.A. Jones Construction Company/Livsey Company, United Engineers and Constructors, Bechtel Power Corporation, and Gilbert/Commonwealth Associates. He joined HL&P in 1979 as a Lead QA Specialist - Audits, and was promoted to Supervisor, Technical Services and Vendor Surveillance in 1981. He was appointed to his present position in March 1984, in which he is responsible for the supervision of audits and surveillance, and quality program development for design and procurement activities. From March, 1982 until September, 1982, Mr. Ratter was on loan to the Institute of Nuclear Power Operations (INPO) as a utility representative participating in the development of INPO's Performance Objectives and Criteria for Construction Project Evaluations. Mr. Ratter has obtained certificates as an ANSI Level III Inspector in Procurement, a Lead Auditor, a Quality Specialist - Mechanical and as a Level II Inspector for a number of non-destructive examination techniques.

Q.11 Once the IRC is notified of a significant deficiency is an IRC meeting initiated?

A.11 Yes. The IRC is required to conduct an initial evaluation to determine whether or not the condition is reportable or potentially reportable pursuant to 10 C.F.R. § 50.55(e), and if so, to report it to the NRC within 24 hours of such notification. The IRC Chairman is responsible for promptly notifying Mr. Goldberg, HL&P's Group Vice President-Nuclear, myself and the NRC.

Q.12 Once the NRC is notified of a reportable or potentially reportable condition, what does the IRC do?

A.12 The Chairman will initiate a technical evaluation in order to confirm the determination as to the reportability of the condition. That technical evaluation is performed by a group with the expertise to perform the evaluation, designated on a case by case basis by the Chairman. During both the initial and technical evaluations, the IRC Chairman completes an IRC evaluation checklist, documenting its determinations with respect to the specific criteria of 10 C.F.R. § 50.55(e).

Q.13 What happens if the technical evaluation confirms that the condition is reportable?

A.13 A written report is prepared, to be forwarded to the NRC within 30 days of the initial notification to the NRC. It contains all of the information required by 10 C.F.R. § 50.55(e), including a description of the deficiency, an analysis of the safety implications and the corrective actions taken, and sufficient information to permit analysis and evaluation of the deficiency and the corrective action by the NRC. I am responsible for reviewing the IRC's completed evaluations and the written reports prior to their submission to the NRC, and Mr. Goldberg reviews and signs the written reports to the NRC.

Q.14 What happens if the technical evaluation discloses that the condition is not reportable?

A.14 The finding of non-reportability is confirmed by the IRC. The determination of the IRC, including the justification for concluding that the condition is not reportable, is documented and the NRC is verbally notified within 30 days. A written report is subsequently prepared informing the NRC of the results of the evaluation.

Q.15 What happens if the technical evaluation cannot be completed within the 30 days required for submission of the written report to the NRC?

A.15 The condition is considered to be reportable and an interim report is prepared for submission to the NRC.

Q.16 Is there any mechanism to verify that those matters which were determined not to require IRC review, do not, in fact, represent reportable deficiencies?

A.16 Yes. As indicated above, all DEFs are forwarded to the IRC Chairman, regardless of whether IRC review is recommended. Periodically, the Chairman convenes the IRC to review those DEFs previously determined not to warrant IRC review in order to provide additional assurance that all significant items have been adequately considered for reportability. Additionally, Bechtel DERs determined not to identify significant deficiencies are informally reviewed by HL&P Licensing and Engineering.

Q.17 How does HL&P's current procedure for evaluating conditions for reportability compare to the procedure in effect on May 8, 1981?

A.17 Although in May, 1981, there was no requirement for the preparation of a DEF, both procedures require any individual becoming aware of a condition which may require evaluation for reportability to promptly bring that information to the attention of appropriate

supervisory personnel who initiate the IRC review process as appropriate. Both procedures provide for an IRC determination to be made when it is informed of a matter that may be reportable. IRC review, and initial and written notifications to the NRC must be performed in accordance with the time limits provided in 10 C.F.R. § 50.55(e). Differences include the designated individuals responsible for reviews, and a provision in the former procedure for notification of the Resident Reactor Inspector (RRI), in addition to the Region IV office. HL&P, however, continues to keep the RRI informed regarding reportable items.

Q.18 Were there any significant modifications of the applicable reporting procedure between May 8, 1981 and May 21, 1985, when the current revision of the procedure was issued?

A.18 Yes. PLP-02 Revision 1 enhanced the evaluation process by, among other things, adding the requirement for the preparation of a DEF, clarifying the responsibility of individuals identifying conditions warranting evaluation, providing for periodic IRC review of all DEFs, adding the requirement that IRC evaluation checklists be completed and providing for the concurrence of the Manager, Nuclear Licensing in all reportability determinations.

Q.19 Did the procedure in effect in May, 1981 provide a satisfactory mechanism for identifying and reporting deficiencies pursuant to 10 C.F.R. § 50.55(e)?

A.19 Yes. The procedure required individuals identifying conditions warranting review for reportability to promptly call such matters to the attention of management, and placed responsibility on appropriate personnel to make a determination of reportability in a time frame consistent with the requirements of 10 C.F.R. § 50.55(e).

Q.20 In reviewing DEFs and DERs, does the IRC routinely determine whether conditions represent a significant breakdown in the STP QA program which may be reportable under 10 C.F.R. § 50.55(e)(1)(i)?

A.20 Yes. The evaluation checklist used by the IRC requires that it determine whether matters before it may represent a significant breakdown in the STP QA program, pursuant to 10 C.F.R. § 50.55(e)(1)(i), regardless of whether the other criteria for reportability have been satisfied. Thus, all conditions presented for IRC review are evaluated in light of their implications on the STP QA program, even if no deficiency in design or construction has been found.

Q.21 How is the evaluation under 10 C.F.R. § 50.55(e)(1)(i) performed?

A.21 It is important to recognize that there are no objective standards for determining whether a specific condition represents a significant QA breakdown. The determination that a particular matter represents such a breakdown is a subjective determination that must be made on the basis of sound judgment by knowledgeable persons.

It is difficult, if not impossible, to provide a hard and fast rule as to what represents a significant breakdown of the QA program. While the mere existence of a deviation from the QA program (such as an inadequate, incomplete or erroneous inspection record) may not rise to the level of a significant QA breakdown, the nature, extent and ramifications of the specific condition being evaluated must be considered.

Q.22 Please provide an example of how the current 10 C.F.R. § 50.55(e) reporting procedure has been applied under circumstances in which a condition with QA implications has been evaluated by the IRC.

A.22 The Atomic Safety and Licensing Board, in its May 17, 1985 Sixth Prehearing Conference Order at 8, has identified an item related to NRC I&E Unresolved Item 83-12-01 which can serve as an example.

Q.23 What was the nature of the condition which was evaluated for reportability?

A.23 The condition which was evaluated was identified in two HL&P audits of Bechtel Engineering, and was documented in two HL&P Corrective Action Reports (CAR) issued against Bechtel, in October 1982 and June 1983, for the omission of references to specific QA standards (certain ANSI and other industry standards) in three procurement specifications.

Q.24 Please describe, more specifically, the conditions addressed in the two CARs.

A.24 CAR G-165, issued in October, 1982, indicated, among other things, that HL&P QA's review of two procurement specifications during an audit found that "seemingly applicable" ANSI N45.2 daughter standards had not been invoked in the specifications, and that Bechtel's technical and QA reviews for quality content had not identified the apparent deficiencies. The second CAR, G-278, was issued in June, 1983 and indicated, among other things, that, apparently contrary to Project requirements, certain industry standards had not been referenced in a procurement specification. It also indicated that Bechtel QA's review of the specification had not identified the absence of the standards.

Q.25 How was this matter brought to the attention of the IRC?

A.25 When the NRC Inspector, during the course of Inspection 83-12, noted that the apparent omission of the QA standards in the procurement specifications may have been indicative of a reportable breakdown in the STP QA program, HL&P's Project QA Manager prepared a DEF citing the results of the two HL&P audits which had identified the omission of the QA standards. After the DEF was reviewed by HL&P Engineering, it was forwarded to the IRC for review.

Q.26 Did the IRC conclude that the matter represented a significant breakdown in the STP QA program?

A.26 No. The IRC determined that the two CARs did not represent a significant breakdown in the STP QA program and did not meet the criteria for reportability of 10 C.F.R. § 50.55(e).

Q.27 Please describe how the IRC determined that the condition did not represent a significant QA breakdown.

A.27 After consultation with the appropriate Bechtel Engineering and QA personnel in order to review Bechtel's actions in response to the CARs, the IRC determined that, in both cases, Bechtel had, in fact, evaluated the specifications in question in order to determine which QA standards ought to be imposed on the

vendors. Although HL&P's standard practice was somewhat different than Bechtel's practice and would have resulted in the selection of a somewhat different set of standards, Bechtel had followed its NRC approved QA program, and the IRC determined that there had been no QA breakdown.

Q.28 What action was taken in response to the CARs?

A.28 After discussion between Bechtel Engineering and HL&P QA, it was determined that the appropriate QA standards had, in fact, been referenced in the specifications. However, because the scope of work under one of the specifications had subsequently changed, that specification was modified to reference the additional, applicable standards.

Q.29 While a specific condition may be determined not to represent a significant QA breakdown, is there any effort to determine whether a number of such conditions, taken together, represent such a breakdown?

A.29 Yes. HL&P's trending program provides for the review of all deficiency documents generated on the Project (including all DEFs and DERs) against the criteria of 10 C.F.R. § 50.55(e), in order to determine if a number of such conditions, taken together, may be reportable.

Under that program, all deficiency documents generated by HL&P, Bechtel and Ebasco are collected, coded and analyzed in order to determine whether any of the conditions reported in such documents, taken together, constitute a trend. Whenever a trend is identified, the condition is evaluated for reportability pursuant to 10 C.F.R. § 50.55(e) by HL&P QA. If there appears to be a reportable condition, a DEF is initiated and transmitted to the IRC for evaluation.

In order to determine if a trend exists, deficiency documents are coded by company, organization, discipline or group, activity (such as soils, receiving or Cadwelding) and deficiency type (such as drafting deficiencies, fabrication errors or interferences). Deficiencies are normalized against criteria such as manhours, quantity installed and hours of inspection, and analyzed to determine if any immediate corrective action or further review is warranted.

A summary of new trends identified and actions taken on previously identified trends is included in monthly reports and a formal, detailed Trend Report is prepared quarterly and distributed to, among others, the Group Vice President-Nuclear, QA Manager, Project QA Manager, Bechtel Project QA Manager and Ebasco

Quality Program Site Manager. Quarterly Trend Reports and other documentation of trends are maintained and controlled as formal QA records.

Q.30 Does HL&P's current program provide a satisfactory mechanism for the identification and reporting of deficiencies under 10 C.F.R. § 50.55(e) and, in particular, for the identification and reporting of reportable QA deficiencies under 10 C.F.R. § 50.55(e)(1)(i)?

A.30 The program in effect at STP requires that Project employees promptly call matters warranting review for reportability to the attention of appropriate management personnel, provides for prompt evaluation by appropriate individuals of conditions which may be reportable, and includes a mechanism to assure that matters determined not to require IRC review have received adequate consideration. In each case in which the IRC evaluates a condition for reportability, a determination is made as to whether the condition may represent a significant QA breakdown, regardless of whether the other criteria for reportability have been satisfied. Finally, HL&P's trending program provides additional assurance that conditions which may be insignificant standing alone, but which, taken together, may represent a significant QA breakdown, are

evaluated for reportability. Accordingly, HL&P's current reporting program is more than satisfactory and provides assurance that HL&P will continue to meet its obligations under 10 C.F.R. § 50.55(e).

HOUSTON LIGHTING & POWER COMPANY

SOUTH TEXAS PROJECT
PROCEDURE MANUAL

SUMMARY OF REVISIONS

PROC. NO. PLP-02	SUBJECT REPORTING DESIGN AND CONSTRUCTION DEFICIENCIES TO NRC

REVISION NUMBER	Quality Related - Yes — REVISION DESCRIPTION
0	Changed procedure number from PEP-4.01 to PLP-02. In addition, changed the lead responsiblity for initial notification of all deficiencies solely to the Team Leader, Nuclear Licensing; removed distinction between site and home office handling of deficiencies and clarified engineering's role in the evaluations.
1	Complete revision to procedure.
2	Change to Section 5.6 changing Project Manager to Manager, South Texas Project. Editorial changes to Attachment 9.3. Revision to Attachment 9.5.
3	Changed "incident" to deficiency. Added new sections 4.2.10, 5.4, 6.5, 6.6 and re-renumbered existing Sections. Added new Attachments 9.8 and 9.9. Attachments 9.5 and 9.7 were revised.
4	Changed Manager, STP Site to Deputy Project Manager in Attachment 9.8 on Page 23. Added Deputy Project Manager Attachment 9.9, page 24.
5	Changed Executive Vice President, Nuclear to Group Vice President, Nuclear in Sections 4.2.9, 4.3.4 and 5.8. Deleted reference to Vice President, Nuclear Engineering and Construction in Section 5.8 since this position no longer exists. Added the word boundary to attachment 9.5, item B.1 to identify "the integrity of the reactor coolant pressure boundary." These changes are editorial in nature.

REVISION AUTHORIZATION

REVISION NUMBER	0	1	2	3	4	5
DATE ISSUED	05-18-82	08-04-82	01-27-83	08-03-83	07-01-84	05-21-85
PREPARED BY	M.E. Powell	L.J.Klement	M.E. Powell	M.E. Powell	M.E. Powell	M. E. Powell
APPROVED BY	L.J.Klement	L.J.Klement	L.J.Klement	L.J.Klement		M. E. Powell
APPROVED BY						

STP 60 (5-80)

1.0 PURPOSE

1.1 To establish the procedure for identifying and evaluating conditions which could potentially affect the safety functions of STP and for reporting deficiencies, defects and noncompliance to NRC in accordance with 10 CFR 50.55(e) and 10 CFR 21.

2.0 SCOPE

2.1 This procedure applies to conditions identified during the design, engineering, and construction phases of each unit of the STP, prior to the issuance of the operating license for each respective unit.

2.2 This procedure also applies to conditions reported to STP by its architect-engineers, constructors, suppliers and any other contractors or consultants.

3.0 REFERENCE DOCUMENTS

3.1 NRC I&E Information Notices 80-28, "Prompt Reporting of Information in Accordance with 50.55(e)." 79-30, "Reporting of Defects and Noncompliance, 10 CFR Part 21."
3.2 10 CFR 50.55(e) - Attachment 9.1
3.3 10 CFR 21
3.4 NRC I&E Inspection Manual, "Guidance - 10 CFR 50.55(e) Construction Deficiency Reporting", 4-01-80.
3.5 Corporate Procedure, Handling of Conditions Potentially Reportable under 10CFR21
3.6 Reporting of Safety-Related Defects and Non-Compliancies - Attachment 9.2

4.0 DEFINITIONS

4.1 10 CFR 50.55(e) Definitions - As used in this procedure

4.1.1 Significant - Having an effect or likely to have an effect on, or influence, the safe operation of the facility in an adverse manner.

4.1.2 Extensive - Expenditure of resources (time, manpower, or money) to a degree disproportionate with the original design, test or construction expenditure.

4.1.3 Final Design - Denotes those drawings, specifications, or other engineering documents that have been reviewed, approved and released for fabrication, installation or construction.

4.1.4 Potentially Reportable Deficiency - A deficiency in design or construction which could be significant but for which additional time is required (in excess of 24 hours) to determine if the criteria for a reportable deficiency have been met.

4.1.5 Reportable Deficiency - A deficiency in design or construction, which, were it to have remained uncorrected, could have adversely affected the safety of operations of the nuclear power plant at anytime throughout the expected lifetime of the plant, and which represents at least one of the following criteria:

(i) A significant breakdown in any portion of the Quality Assurance Program conducted in accordance with the requirements of 10 CFR 50, Appendix B.

(ii) A significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria and bases stated in the Safety Analysis Report (SAR) or construction permit.

(iii) A significant deficiency in construction of or significant damage to a structure, system, or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in the Safety Analysis Report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

(iv) A significant deviation from performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of the structure, system, or component to meet the criteria and bases stated in the Safety Analysis Report or construction permit or to otherwise establish the adequacy of the structure system or component to perform its intended safety function.

4.2 10 CFR 21 Definitions - As used in this procedure

4.2.1 Basic Component - A nuclear power plant structure, system, component, or part thereof, necessary to assure:

(1) The integrity of the reactor coolant pressure boundary; or

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition; or

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 100.11.

In all cases, the term "basic component" includes design, inspection, testing, or consulting services, important to safety, that are associated with the component hardware, whether these services are performed by the component supplier or others.

Those plant structures, systems, or components, or parts thereof, at a minimum, which are identified as either Safety Class 1, 2, or 3 or Seismic Category I, are basic components.

4.2.2 Commercial Grade Item - An item that is (1) not subject to design or specification requirements that are unique to facilities or activities licensed by NRC, and (2) used in applications other than facilities or activities licensed by NRC, and (3) able to be ordered from a manufacturer/supplier on the basis of specifications set forth in his published product description (e.g., a catalog).

A commercial grade item becomes a basic component after receipt when it is dedicated (designated for use as a basic component) by the recipient.

4.2.3 Deviation - A departure from the technical requirements of a procurement document for a basic component.

4.2.4 Procurement Document - A contract which defines the requirements which the facility or basic component must meet in order to be considered acceptable by the purchaser. This includes specifications, purchase orders and other documents that establish the requirements for purchaser acceptance and includes code requirements, drawings and procedures that are referenced as part of the procurement document.

4.2.5 Delivery - Transfer of control of a basic component. Delivery occurs upon acceptance of a basic component made subsequent to a test or inspection which takes place within a reasonable time after receipt. If no test or inspection is performed within a reasonable time, the basic component will be deemed to have been delivered. If a component is rejected on the basis of a deviation identified during a receipt test or inspection, delivery has not occurred.

4.2.6 Substantial Safety Hazard - A loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety (including employee health and safety). Criteria which are appropriate for the determination of the creation of a substantial safety hazard include:

- Moderate exposure to, or release of, radioactive effluents or materials;
- Major degradation of essential safety-related equipment;
- Major deficiencies in design, construction, use of, or management controls for licensed facilities or material.

4.2.7 Defect -

(1) A deviation in a basic component delivered to a purchaser for use in a facility or activity subject to 10 CFR 21, if, on the basis of an evaluation, the deviation could create a substantial safety hazard; or

(2) The installation, use, or operation of a basic component containing a defect as defined in (1) above; or

(3) A deviation in a portion of a facility subject to the construction permit requirements of 10 CFR 50, provided the deviation could, on the basis of an evaluation, create a substantial safety hazard and the portion of the facility containing the deviation has been offered to the purchaser for acceptance; or

(4) A condition or circumstance involving a basic component that could contribute to the exceeding of a safety limit, as defined in the technical specifications of a license for operation issued pursuant to 10CFR Part 50.

4.2.8 Noncompliance - The failure of a basic component activity, or facility to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order or license of the NRC relating to substantial safety hazard.

4.2.9 Responsible Officer - The Group Vice-President, Nuclear is that individual in HL&P who is vested with executive authority over the activities subject to 10 CFR 21.

4.2.10 Responsible Individual - Those individuals within HL&P who may become cognizant of 10CFR21 reports made by STP architect-engineers, constructors, suppliers and any other

contractors or consultants. See Attachment 9.8 for a listing of STP responsible individuals.

4.2.11 Constructing or Construction - The design, manufacture, fabrication, placement, erection, installation, modification, inspection, or testing of a facility or activity, and consulting services related to the facility or activity that are important to safety.

4.3 Procedure Definitions

4.3.1 Significant Deficiency - An event or condition which has an effect or is likely to have an effect on, or influence, the safe operation of the facility in an adverse manner.

4.3.2 Initial Evaluation - Evaluation of a significant deficiency to determine if it is a reportable or potentially reportable deficiency under 10 CFR 50.55(e) or if there is a need to consider it further under 10 CFR Part 21.

4.3.3 Technical Evaluation - The technical, including safety, evaluation of a significant incident to determine if the criteria for reportable deficiency under 10 CFR 50.55(e) or a defect or noncompliance under 10 CFR 21 are met. The technical evaluation is performed subsequent to the initial evaluation.

4.3.4 Incident Review Committee (IRC) - The project committee responsible for conducting the initial evaluation and subsequent technical evaluation of significant deficiencies. Unless an incident review is conducted by a committee under the direction and supervision of the Group Vice President, Nuclear as a minimum, the IRC shall consist of the following members or their designees:

1. Project Licensing Engineer (Chairman)
2. Project QA Supervisor
3. Cognizant Supervising Project Engineer, Houston Engineering
4. Other cognizant individual(s) as designated by the Chairman.

4.3.5 Notification - A telephone, telegraphic or verbal report.

5.0 RESPONSIBILITIES

5.1 Originator

5.1.1 Any HL&P employee, except those individuals carrying out their responsibility as required by Section 5.4, who becomes aware of a condition which he or she believes constitutes a substantial safety hazard or a significant deficiency has the responsibility to prepare a Deficiency Evaluation Form (DEF) in accordance with this procedure. A DEF must be prepared even under circumstances where the information is known to be covered by a NCR.

5.1.2 The originator has the responsibility to provide accurate and sufficient data or information to the extent known.

5.2 Responsible Supervising Project Engineer (SPE)

5.2.1 The SPE is responsible for reviewing deficiencies documented by a DEF and making recommendations relative to their significance to the Manager, Engineering.

5.3 Manager, Engineering

5.3.1 The Manager, Engineering is responsible for performing preliminary screening of documented deficiencies to determine if they are significant deficiencies.

5.3.2 The Manager, Engineering is responsible for notifying the IRC Chairman of significant deficiencies.

5.3.3 The Manager, Engineering is responsible for technical interface with the major contractors regarding technical support in evaluation of 10 CFR 50.55(e) and 10 CFR 21 items.

5.4 Responsible Individuals

5.4.1 Those designated responsible individuals (see attachment 9.8) are responsible for immediately informing the IRC Chairman once they become aware that any STP supplier, contractor or consultant has notified the NRC of a 10CFR21 item that may be applicable to the STP.

5.4.2 Those individuals responsible for the interface with the STP architect-engineer and/or NSSS supplier are responsible for immediately informing the IRC Chairman once they become aware that the STP architect-engineer and/or NSSS supplier has notified the NRC, or HL&P of potentially reportable deficiencies. See attachment 9.9.

5.5 Incident Review Committee (IRC)

5.5.1 The IRC is responsible for conducting the initial evaluation of significant deficiencies and, if applicable, for initiating and reviewing the technical evaluation.

5.5.2 The IRC Chairman is responsible for drafting the written reports to NRC.

5.5.3 The IRC Chairman is responsible for publishing minutes of each IRC meeting. Minutes shall include, as a minimum, identification of participants, listing of deficiencies considered, and an explanation of findings, as applicable.

5.5.4 The IRC Chairman is responsible for notifying the NRC of potentially reportable deficiencies and reportable deficiencies. The initial notification (if appropriate) shall be made within 24 hours of the time that the IRC Chairman is informed that there exists a significant deficiency.

5.5.5 The IRC Chairman is responsible for maintaining files pertaining to 10 CFR 50.55(e) and 10 CFR 21 evaluations.

5.5.6 The IRC Chairman is responsible for notifying the originator of the disposition of those items referred to the IRC. This may be accomplished by sending the originator a copy of the IRC meeting minutes.

5.6 Manager, Nuclear Licensing

5.6.1 The Manager, Nuclear Licensing is responsible for reviewing the IRC's completed evaluations and the written reports before submission to the NRC.

5.7 Manager, South Texas Project

5.7.1 The Manager, South Texas Project ensures that appropriate resources are made available to assure that evaluations and reports are completed in a timely manner.

5.8 Group Vice-President, Nuclear

5.8.1 The Group Vice-President, Nuclear is responsible for submitting the written reports to the NRC.

6.0 PROCEDURE

6.1 Any HL&P Employee who identifies an event or condition that may be a significant deficiency, or who obtains information of such an event or condition, shall prepare a Deficiency Evaluation Form (DEF) (Attachment 9.3) and forward it directly to the responsible Supervising Project Engineer (SPE) in Engineering. If the originator is unsure who the responsible SPE is, he shall forward it directly to the Manager, Engineering for distribution. The DEF should be prepared in as short a time frame as possible, and should include sufficient information to facilitate preliminary assessment.

6.2 The responsible SPE shall log in the DEF and confirm that the DEF is accurate and contains sufficient information to facilitate preliminary assessment. He shall then review the DEF expeditiously to determine if it should be recommended for IRC review. If the SPE determines that a reported condition or event does not constitute a significant deficiency he shall document the basis for that determination on the DEF.

6.2.1 If recommended for review by the IRC, it is so noted on the DEF and forwarded (hand-carried) to the Manager, Engineering.

6.2.2 If not recommended, it is so noted on the form and copies sent to:

1) Originator
2) Manager, Engineering
3) IRC Chairman

6.2.3 In either case, DEF's should be processed expeditiously and without delay to reach the Manager, Engineering as soon as possible.

6.3 If the Manager, Engineering is not available, the responsible SPE shall act for the Manager to accomplish the activities described in 6.4.

6.4 For a DEF which the SPE has recommended for IRC review, the Manager, Engineering shall immediately evaluate the DEF to determine if the condition or event reported constitutes a significant deficiency. If he determines that a significant deficiency exists he shall send the DEF to the IRC for review.

6.4.1 If the DEF is to be reviewed by IRC, it is so noted on the DEF and immediately forwarded (hand-carried) to the IRC Chairman.

6.4.2 If the DEF is not to be reviewed by IRC, it is so noted on the form along with an appropriate explanation and copies sent to:

1) Originator
2) IRC Chairman
3) Responsible SPE

6.5 In the event that a responsible individual (see attachment 9.8) becomes aware that any STP supplier, contractor or consultant has notified the NRC of a 10CFR21 item that may be applicable to STP, he shall immediately so inform the IRC Chairman.

6.6 In the event that any of those individuals responsible for the interface with the STP architect-engineer and/or NSSS supplier becomes aware that the STP architect-engineer and/or NSSS supplier has notified the NRC, or HL&P, of a potentially reportable deficiency, he shall immediately so inform the IRC Chairman.

6.7 The IRC Chairman, upon notification by the Manager, Engineering, of a significant deficiency; or by a responsible individual becoming aware of a 10CFR21 item reported by a vendor (per Section 6.5); or after being informed of a potentially reportable deficiency as required by Section 6.6; shall initiate an IRC meeting.

6.7.1 The IRC shall conduct an initial evaluation to determine if the significant deficiency is a potentially reportable deficiency, a reportable deficiency, or not reportable, under provisions of 10 CFR 50.55(e) and to determine if there is a need to further consider the deficiency under the provisions of 10 CFR 21.

6.7.2 The determination of the IRC shall be documented on an IRC Evaluation Form (Attachment 9.4). Minutes of the IRC meeting shall be available as soon as practicable. A copy of the IRC Evaluation Form shall be sent to the originator.

6.7.3 If the IRC determines that a reportable or potentially reportable deficiency exists the IRC Chairman shall notify the NRC. The initial evaluation and notification to NRC shall be accomplished within 24 hours from the time that the IRC Chairman was informed that a significant deficiency exists. The notification to NRC must be documented in telephone minutes.

6.8 If the NRC is notified of a potentially reportable deficiency or the IRC has determined that 10 CFR 21 might be applicable, the IRC Chairman shall initiate a technical evaluation.

6.8.1 The technical evaluation will be conducted to make a final determination of reportability under 10 CFR 50.55(e) and to determine reportability under 10 CFR 21.

6.8.2 The IRC Chairman shall assign a cognizant group with expertise related to the incident to perform the technical evaluation.

6.8.3 If the technical evaluation as reviewed by the IRC indicates the matter is reportable, the IRC Chairman will prepare a written report per Section 7.0 for submittal to the NRC.

6.8.4 The written report shall contain, as a minimum, the known information required by 10 CFR 50.55(e). If the determination is made that the incident is reportable under 10 CFR 21, the information required by 10 CFR 21.21 shall also be included.

6.8.5 If the technical evaluation indicates the matter is not reportable, the IRC Chairman will convene the IRC to verify the finding of non-reportability. Meeting minutes shall be available as soon as practical, and shall document the determination with justification.

6.8.6 If the NRC was notified of a potentially reportable deficiency, but the technical evaluation determines that the deficiency is not reportable, the technical evaluation will document such determination with justification. Once the IRC has concurred that the item is not reportable, the IRC Chairman shall notify the NRC, document the notification on the IRC Evaluation Form and prepare a written report to inform the NRC of the results of the evaluation.

6.8.7 Normally, if the technical evaluation cannot be completed on a schedule consistent with the preparation of the written report, the deficiency is considered reportable and an interim report shall be submitted to NRC per Section 7.0. An item can be maintained as potentially reportable after the 30 day report, if the technical evaluation is ongoing and is expected to be routinely completed soon after the 30 day period. In such a case, a followup report will be submitted to the NRC upon completion of the technical evaluation.

6.9 For reportable or potentially reportable deficiencies that are also determined to be reportable under 10 CFR 21, NRC shall be notified by including the appropriate information in the report described in Section 7.0. However, the Notification process and other subsequent requirements of this procedure shall be invoked as if the defect or noncompliance were a reportable deficiency under 10 CFR 50.55(e). For deficiencies determined reportable under 10 CFR 21 but not otherwise reportable under 10 CFR 50.55(e), the NRC shall be notified in accordance with 10 CFR 21. 10 CFR 21 requires initial notification within 48 hours of completion of IRC's determination that 10 CFR 21 applies.

6.10 The IRC shall also be convened from time to time by the IRC Chairman to review those DEF's that Engineering determined were not significant. The purpose of this review is to provide added assurance that all significant items are being considered by the IRC. Meeting minutes should include a listing of those DEF's considered and conclusions reached.

7.0 REPORTS TO NRC

7.1 For those deficiencies determined to be reportable under 10 CFR 50.55(e) the written report will be submitted to NRC within 30 calendar days of the initial notification to NRC. This report shall contain the pertinent elements identified in Attachment 9.6. For those items called into the NRC as potentially reportable but subsequently determined not to be reportable, verbal notification must be made to the NRC within 30 calendar days followed by written confirmation.

7.2 For those deficiencies determined to be reportable under 10 CFR 21 but not under 10 CFR 50.55(e), the written report shall be submitted to NRC within 5 days of the completion of IRC's determination that 10 CFR 21 applies.

8.0 MAINTENANCE OF RECORDS

8.1 In addition to any other files maintained by applicable procedures, a file of each deficiency evaluated by an IRC subsequent to the effective date of this procedure shall be maintained under the cognizance of the IRC Chairman.

8.2 Each file shall contain the documentation associated with the deficiency including the IRC Evaluation Form with all supporting documentation, copies of minutes of IRC meetings, and all copies of written reports to NRC.

8.3 A copy of those items described in 8.2 shall be forwarded to Records Management.

9.0 ATTACHMENTS

9.1 10 CFR 50.55(e)

9.2 Reporting of Safety-Related Defects and Non-Compliance

9.3 Deficiency Evaluation Form

9.4 IRC Evaluation Form

9.5 10 CFR 21 Evaluation Form

9.6 Contents of Written Report

9.7 Procedure Flow Chart

9.8 List of Responsible Individuals

9.9 List of Individuals responsible for the architect-engineer/NSSS supplier interface

ATTACHMENT 9.1 - 10 CFR 50.55(e)

(e) (1) If the permit is for construction of a nuclear power plant, the holder of the permit shall notify the Commission of each deficiency found in design and construction, which, were it to have remained uncorrected, could have affected adversely the safety of operations of the nuclear power plant at any time throughout the expected lifetime of the plant, and which represents:

(i) A significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of Appendix B to this part; or

(ii) A significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria and bases stated in the safety analysis report or construction permit; or

(iii) A significant deficiency in construction of or significant damage to a structure, system, or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function; or

(iv) A significant deviation from performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of a structure, system, or component to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

(2) The holder of a construction permit shall within 24 hours notify the appropriate Nuclear Regulatory Commission Inspection and Enforcement Regional Office of each reportable deficiency.

(3) The holder of a construction permit shall also submit a written report on a reportable deficiency within thirty (30) days to the appropriate NRC Regional Office shown in Appendix D of Part 20 of this chapter. Copies of such report shall be sent to the Director of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. The report shall include a description of the deficiency, an analysis of the safety implications and the corrective action taken, and sufficient information to permit analysis and evaluation of the deficiency and of the corrective action. If sufficient information is not available for a definitive report to be submitted within 30 days, an interim report containing all available information shall be filed, together with a statement as to when a complete report will be filed.

(4) Remedial action may be taken both prior to and after notification of the Division of Inspection and Enforcement subject to the risk of subsequent disapproval of such action by the Commission.

ATTACHMENT 9.2 - 10 CFR 21

10 CFR 21 - "Reporting of Defects and Noncompliances"

See the following page for a statement of the provisions of 10 CFR Part 21.

Attachment 9.2
Page 15 of 24
05-21-85

Reporting of Safety-Related Defects and Non-Compliances

HOUSTON LIGHTING & POWER

The Nuclear Regulatory Commission requires directors and responsible officers of certain firms and organizations to report defects in components and failures to comply with regulatory requirements that may result in a substantial safety hazard. The new regulations are identified as *Title 10 Chapter 1 Code of Federal Regulations - Energy - Part 21*. They apply to firms that:

- Build, operate or own NRC licensed facilities or conduct NRC-licensed or regulated activities
- Supply safety-related components for NRC licensed facilities
- Supply safety-related design, testing, inspecting or consulting services for NRC licensed facilities

The following documents provide information relative to the reporting of safety-related defects and non-conformance

A COPY OF 10 CFR PART 21 is LOCATED AT THE MAIN FACILITY ENTRANCE AND AT SUPPLEMENTARY LOCATIONS THEREIN ON VARIOUS EMPLOYEE BULLETIN BOARDS, LOUNGE AREAS, ETC.

A COPY OF THE PROCEDURE FOR IMPLEMENTING 10 CFR PART 21 IS LOCATED

1) SUPERVISING PROJECT ENGINEER'S OFFICE/STP SITE
2) ENGINEERING DEPARTMENT, MANAGER'S OFFICE 8400 WESTHEIMER (HOUSTON)

ANY DEFECTS OR NONCOMPLIANCES WHICH COULD POTENTIALLY AFFECT THE SAFETY FUNCTIONS OF THE NUCLEAR POWER PLANT SHOULD BE REPORTED TO

1) SUPERVISING PROJECT ENGINEER/STP SITE (512) 972-8466 X2200
2) MANAGER, ENGINEERING/ 8400 WESTHEIMER (Houston) (713) 993-1346

Parts of the federal law and regulation concerning the requirements to report safety-related defects and non-compliances are

PUBLIC LAW 93-438
ENERGY REORGANIZATION ACT OF 1974

"Sec 206(a) Any individual director, or responsible officer of a firm constructing, owning, operating, or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or pursuant to this Act, who obtains information reasonably indicating that such facility or activity or basic components supplied to such facility or activity

(1) Fails to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards, or
(2) Contains a defect which could create a substantial safety hazard, as defined by regulations which the Commission shall promulgate,

shall immediately notify the Commission of such failure to comply, or of such defect, unless such person has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.

(b) Any person who knowingly and consciously fails to provide the notice required by subsection (a) of this section shall be subject to a civil penalty in an amount equal to the amount provided by section 234 of the Atomic Energy Act of 1954, as amended

(c) The requirements of this section shall be prominently posted on the premises of any facility licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended

(d) The Commission is authorized to conduct such reasonable inspections and other enforcement activities as needed to insure compliance with the provisions of this section."

PUBLIC LAW 86-295
CRIMINAL PENALTIES FOR CERTAIN VIOLATIONS OF THE ATOMIC ENERGY ACT

"b. Any individual director, officer or employee of a firm constructing, or supplying the components of any utilization facility required to be licensed under section 103 or 104 b. of this Act who by act or omission, in connection with such construction or supply, knowingly and willfully violates or causes to be violated, any section of this Act, any rule, regulation, or order issued thereunder, or any license condition, which violation results, or if undetected could have resulted, in a significant impairment of a basic component of such a facility shall, upon conviction, be subject to a fine of not more than $25,000 for each day of violation, or to imprisonment not to exceed two years, or both. If the conviction is for a violation committed after a first conviction under this subsection, punishment shall be a fine of not more than $50,000 per day of violation, or imprisonment for not more than two years, or both. For the purposes of this subsection, the term 'basic component' means a facility structure, system, component or part thereof necessary to assure -

"(1) the integrity of the reactor coolant pressure boundary,
"(2) the capability to shut-down the facility and maintain it in a safe shut-down condition, or
"(3) the capability to prevent or mitigate the consequences of accidents which could result in an unplanned off-site release of quantities of fission products as established by the Commission."

This notice is required by Federal Law. Do not remove.

ATTACHMENT 9.3

DEFICIENCY EVALUATION FORM

The purpose of this Form is to provide a mechanism for HL&P employees to identify to Engineering conditions suspected to be considered as Deficiencies, pursuant to PLP-02. The initiators should give as complete a description as possible. Use additional sheets as necessary

To be filled in by Supervising Project Engineer

DEF NO. _____ REV. _____

DATE RECEIVED _____

Affected Units	Safety Class of Component or System in Question	Seismic Category of Component, System or Structure in Question	Governing Design Documents
☐ Unit 1 ☐ Unit 2 ☐ Both Units	☐ SC-1 ☐ SC-2 ☐ SC-3 ☐ IE ☐ NNS	☐ Cat. I ☐ Non-Cat. I	SDD _____ SPEC. _____ OTHER _____

Requirements of Component, System or Structure as Related to this Concern:

Description of Condition: _____

How Discovered: _____

DEF Initiator _____ Date _____

SPE EVALUATION:

☐ Refer to IRC

☐ Referral to IRC considered not necessary. Discussion _____

SPE _____ Date _____

MANAGER ENGINEERING

☐ Refer to IRC

☐ Referral to IRC considered not necessary. Discussion _____

MANAGER _____ Date _____

STP-0140 (05-82)

ATTACHMENT 9.3
INSTRUCTION FOR COMPLETING A
DEFICIENCY EVALUATION FORM

LINE NO.	INSTRUCTION
1	The responsible SPE should assign and record form and revision number; enter date report received.
*2	Record the unit number(s) affected. Record the safety class and seismic category of the system, structure, or component.
3	Give a brief description of how the deficiency was discovered. Reference any deficiency related documents.
4	Record the title of the governing documents.
5	Record the requirement stated in the governing documents.
6	Describe the deviation and hazard as accurately and completely as possible.
7	Signature of the initiator and the date the form was prepared.
8	The SPE marks the appropriate "yes" or "no" block, signs and dates the DEF. Provide a short discussion of the basis for the determination. Distribution is made in accordance with Section 6.2.
9	The Manager, Engineering, marks the appropriate "yes" or "no" block, signs and dates the DEF. Provide a short discussion of the basis for the determination. The Manager, Engineering may simply concur with the reason provided by the SPE. Distribution is made in accordance with Section 6.4.

* Steps 2 through 7 apply to DEF originator.

ATTACHMENT 9.4
IRC EVALUATION FORM

IRC EVALUATION FORM

IRC CHAIRMAN _____ DATE _____.

BRIEF DESCRIPTION OF INCIDENT: _____.

INITIAL REPORTABILITY DETERMINATION (10CFR50.55(e)):	YES	NO	INSUFFICIENT INFORMATION
There exists a deficiency in design or construction	____	____	N/A
AND			
Deficiency represents a significant			
(i) Breakdown in any portion of the QA Program (per 10CFR50, Appendix B)	____	____	____.
OR			
(ii) Deficiency in final design as approved and released for construction (does not conform to SAR or CP)	____	____	____.
OR			
(iii) Deficiency in construction or construction damage which requires extensive evaluation, redesign or repair	____	____	____.
OR			
(iv) Deviation from performance specifications which requires extensive evaluation, redesign or repair	____	____	____.
AND			
Were it to remain uncorrected could have adversely affected the safety of operations	____	____	____.

The incident is:

_____ Not reportable under 10CFR50.55(e)

_____ Reportable under 10CFR50.55(e) (Reportability criteria are met)

_____ Potentially reportable under 10CFR50.55(e) (Further evaluation is necessary to determine if reportability criteria are met)

This incident:

_____ Must be further evaluated with respect to 10CFR21 (Use Attachment 9.5)

_____ Need not be further evaluated with respect to 10CFR21

_____.
IRC Chairman

ATTACHMENT 9.4

NRC NOTIFICATION

Date _____. Time _____.
Individual notified at NRC _____.
Notified by _____ of HL&P.

FINAL REPORTABILITY DETERMINATION (10CFR50.55(e)): YES NO

There exists a deficiency in design or construction

AND

Deficiency represents a significant

(i) Breakdown in any portion of the QA Program (Per 10CFR50 Appendix B) ____ ____.

OR

(ii) Deficiency in final design as approved and released for construction (does not conform to SAR or CP) ____ ____.

OR

(iii) Deficiency in construction or construction damage which required extensive evaluation, redesign or repair

OR

(iv) Deviation from performance specifications which requires extensive evaluation, redesign or repair ____ ____.

AND

Were it to remain uncorrected could have adversely affected the safety of operations ____ ____.

There exists a reportable deficiency: ____ ____.

- Attach all necessary supporting documentation -

Comments: _____.

NRC notification (if required by step 6.6.6)
Date _____ Time _____
Individual notified at NRC _____ Notified by _____.

_____. _____.
IRC Chairman Date

Reviewed _____ _____
Manager, Nuclear Licensing Date

ATTACHMENT 9.5

10CFR21 Evaluation

10CFR21 REPORTABILITY DETERMINATION:	Yes	No
A. Does the problem involve:		
1. A failure of a basic component or activity to comply with the Atomic Energy Act of 1954, as amended, or any applicable NRC rule, regulation, order or license. Example: The failure to comply with 10CFR50.55(a) regarding ASME Code commitments or a failure to have a supplier to have a QA program per 10CFR50 Appendix B requirements.	___	___
NOTE: If "Yes" Go To D; if "No" proceed with B.		
B. Is the item a basic component which is necessary to ensure:		
1. The integrity of the reactor coolant pressure boundary	___	___
2. The capability to shut down the reactor and maintain it in a safe shutdown condition	___	___
3. The capability to prevent or mitigate the consequences of accidents	___	___
NOTE: Answer all 4 questions. If all "No's", the item is not reportable, Go To E and check "No". If any "Yes's", Go To C.		
C. Does the problem involve:		
1. A deviation in a basic component delivered to a purchaser for use in the STP. Example: A crack in the body of a safety class valve.	___	___
or		
2. The installation, use or operation of a basic component containing a deviation. Example: A safety class pump which is found to be defective during startup testing.	___	___
or		
3. A deviation in a portion of a facility subject to the Construction Permit licensing requirements which has been "offered to the purchaser for acceptance". The portion of the facility to be constructed shall be considered "offered to the purchaser for acceptance" only after it has been given final construction sign-off. Example: A deviation in a sytem turned over to HL&P for use during testing or operation.	___	___
or		
4. A condition or circumstance involving a basic component that contributes to the exceeding of a safety limit as defined in technical specifications. Example: A condition that could lead to the exceeding of a safety limit as defined in Appendix A, Section 2.0 of the Technical Specifications for the plant.	___	___
NOTE: If all "No's", the item is not reportable, Go To E. If any "Yes's", Go To D.		
D. Could the problem have created a substantial safety hazard, or is the problem related to a substantial safety hazard?	___	___
NOTE: If "No", this item is not reportable and Go To E and check "No". If "Yes", this item is reportable pursuant to 10CFR21.		
E. Is this item reportable pursuant to 10CFR21?	___	___
NOTE: If "Yes" answered to A & D or B & C & D, item is reportable pursuant to 10CFR21		

- Attach all necessary supporting documentation -

_____ _____
(IRC CHAIRMAN) (DATE)

Reviewed _____ _____
Manager, Nuclear Licensing (DATE)

ATTACHMENT 9.6
CONTENTS OF WRITTEN REPORT TO NRC

If it is determined that the deficiency is reportable under 10CFR50.55(e), the written report will contain all of the information, to the extent known, required
by regulation. The report shall include a description of the deficiency, an analysis of the safety implications and the corrective action taken, and sufficient information to permit analysis and evaluation of the deficiency and of the corrective action. If sufficient information is not available for a definitive report to be submitted within 30 days, an interim report containing all available information shall be filed, together with a statement as to when a complete report will be filed.

If it is determined that Part 21 is applicable, then the report shall contain the following information to the extent known:

(i) Name and address of individual informing the Commission.

(ii) Identification of the facility and the basic component which contains a defect or fails to comply.

(iii) Identification of the firm supplying the basic component which contains a defect or fails to comply.

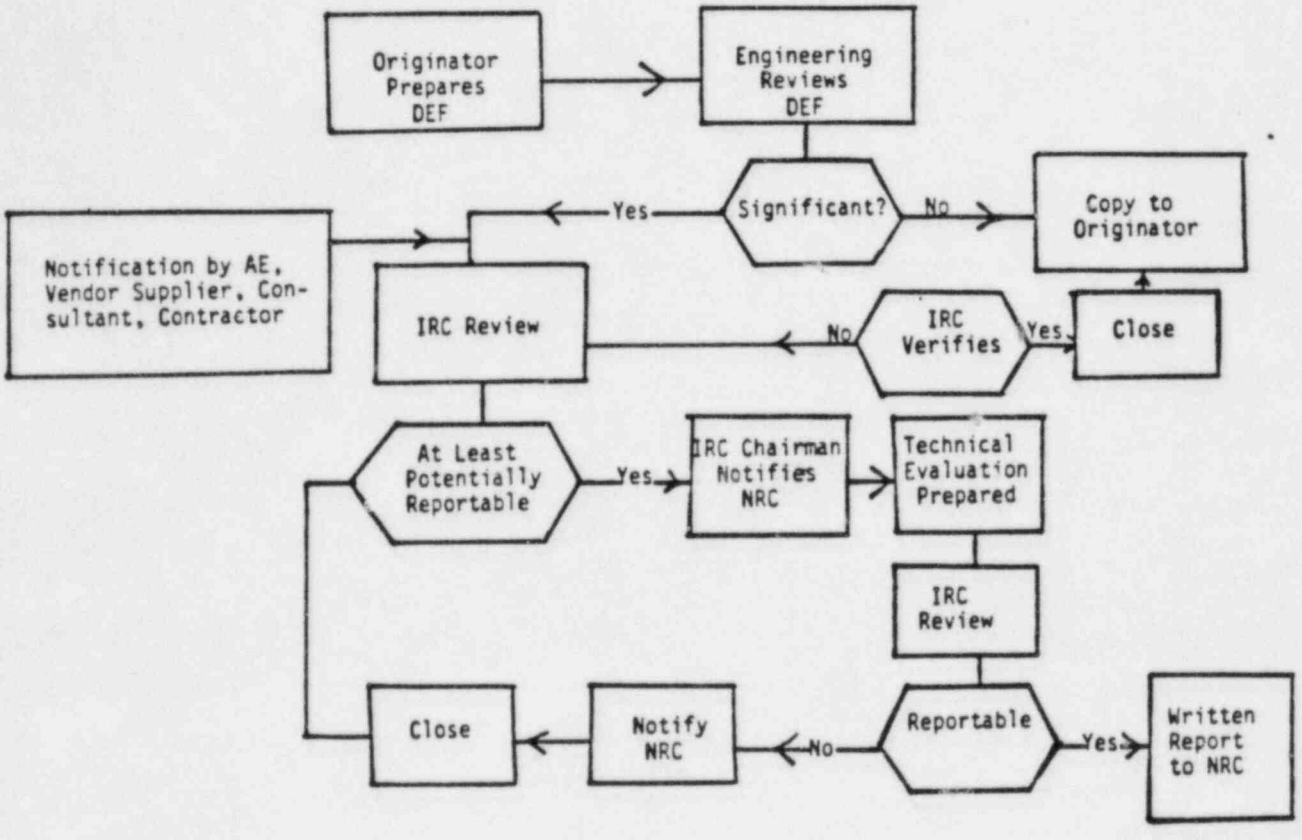
(iv) Nature of the defect or failure to comply and the safety hazard which could be created.

(v) Date on which information on the defect or failure to comply was obtained. (i.e., date the determination of reportability pursuant to 10CFR Part 21 was completed.)

(vi) Number and location of all such components (includes other HL&P nuclear plants).

(vii) Corrective action taken/to be taken, including responsibility for corrective action, schedule for corrective action or length of time taken to correct.

ATTACHMENT 9.7
PROCEDURE FLOW CHART



ATTACHMENT 9.8
List of Responsible Individuals

Manager, STP

• Deputy Project Manager

General Manager, Nuclear Engineering

• Manager, Engineering (STP)

Manager, Nuclear Purchasing

• Manager, QA

• Manager, Project QA

Manager, Nuclear Services

Manager, Nuclear Fuel

Manager, Nuclear Licensing

Principal Engineer, STP

Special Coordinator

Supervising Project Engineer (Systems)

Supervising Project Engineer (Physical Design)

Supervising Engineer, STP Licensing

Supervisor, Project Design/Procurement QA

IRC Chairman

ATTACHMENT 9.9
Listing Of Those Individuals Responsible For
The Architect-Engineer and/or NSSS Supplier Interface

Manager, STP

Deputy Project Manager

Manager, Engineering

Principal Engineer, STP

Supervising Project Engineer (Systems)

Supervising Engineer, STP Licensing

Supervisor, Project Design/Procurement QA

IRC Chairman

Licensing Engineer, STP

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. STN 50-498 OL STN 50-499 OL
	)	
(South Texas Projects, Unit 1 and 2	)	

TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY, ET AL.,
OF
THOMAS J. JORDAN, ALFREDO LOPEZ AND WALTER R. FERRIS

Q.1 Mr. Jordan, please state your full name and current position.

A.1 (TJJ) My name is Thomas J. Jordan, and I am currently South Texas Project (STP) Quality Assurance (QA) Manager for Houston Lighting & Power Company (HL&P).

Q.2 Please describe your educational background and professional experience.

A.2 (TJJ) I received my B.S. in Nuclear Engineering from Texas A&M University in 1975. While an undergraduate, I participated in the cooperative education program as a Construction Inspector for the U.S. Army Corps of Engineers, performing QA inspections on the Port Arthur Hurricane and Flood Protection Project, and conducting surveillance, surveying activities and other quality

control activities. I also performed field laboratory testing on, among other things, moisture and density characteristics of soils.

In 1976 I joined HL&P as a Junior Engineer. I became an Associate Engineer - STP Mechanical QA Group in 1977, and was responsible for performing formal and informal surveillance of a variety of site construction activities, as well as procedure review and interface with the NRC during inspections. In 1978, I was promoted to Lead Engineer-STP Mechanical QA Group, and provided technical and administrative direction to the Mechanical QA Group. In 1980, I was promoted to Supervisor - Quality Systems, and was responsible for directing the development and implementation of, among other things, the STP QA program and procedures, NRC QA commitment tracking system, Project QA training system, QA trend analysis system, and the review and approval of contractor QA programs.

I became Project QA Supervisor, Design/Procurement in 1982 and provided direction to the Project Design/Procurement Group. That Group conducted audits, surveillance and implementation reviews of design, procurement, records management and QA monitoring activities performed in the architect-engineer's design office, and monitored the transition process from Brown & Root to Bechtel Energy Corporation (Bechtel) in those areas. In 1984, I was promoted to my current position

in which I have responsibility for ensuring the proper planning, development, implementation, coordination and administration of the STP QA program.

Q.3 Mr. Lopez, please state your full name and current position.

A.3 (AL) My name is Alfredo Lopez and I am currently Bechtel Civil/Structural Engineering Group Supervisor for the STP.

Q.4 Please describe your educational background and professional experience.

A.4 (AL) I received my B.S. in Civil Engineering in 1964 and my M.S. in Structural Engineering in 1966, both from the University of California, Berkeley. From September, 1966 until May, 1972 I served as a senior structural engineer for Fluor Corporation, involved in steel and reinforced concrete structural design, and dynamic analysis of structures for heavy machinery related to petrochemical facilities.

I joined Bechtel Power Corporation in May, 1972 and served as an Engineering Group Leader, first for the auxiliary and fuel handling buildings and subsequently for seismic Category I structures, at the San Onofre Nuclear Generating Station, Units 2 and 3. In that capacity I was responsible for seismic dynamic analysis, general structural analysis and design, and

technical interface with fabricators and equipment suppliers. I was subsequently promoted to Civil/Structural Engineering Group Supervisor, and was responsible for supervising and directing the Civil/Structural discipline, including programming of work, development of design criteria and technical specifications, interface with the owner, vendors and other engineering disciplines, and the overall structural engineering design.

I was assigned to my current position at STP in July, 1982 and I am responsible for activities similar to those which I performed at San Onofre as Civil/Structural Engineering Group Supervisor. I am a Registered Professional Engineer in California.

Q.5 Mr. Ferris, please state your full name and current position.

A.5 (WRF) My name is Walter R. Ferris and I am currently a consultant to Bechtel Civil & Minerals, Inc., on geotechnical matters.

Q.6 Please describe your educational background and professional experience.

A.6 (WRF) I received my B.S. in Civil Engineering from Queens University, Belfast, Northern Ireland in 1951, and my S.M. in Soil Mechanics from Harvard University in 1955. From 1951 to 1952, I served as a junior

engineer for Sir William Halcrow & Partners, London, England and worked on the design of several dams in Scotland. In 1952, I joined Power Corporation of Canada, participating in the design of several dams and providing remedial design services for various existing hydroelectric plants in Canada.

From 1953 to 1954, I served as a civil engineer for H. G. Acres & Company, Niagara Falls, Canada during which I was in charge of field exploration, and later design, of the Bersimis I rockfill dam in Quebec, and field inspection of earth embankments for the McArthur Falls hydroelectric plant. I also established a soils laboratory for H. G. Acres.

From 1955 until 1959, I lectured in soil mechanics at Harvard University and taught courses in soil testing, applied soil mechanics and engineering geology. I also assisted Drs. Casagrande and Terzaghi in their consulting practices on embankment dam projects in Brazil, Kenya, Canada, Utah Connecticut and California.

From 1959 until March, 1985 I was employed by Bechtel Civil & Minerals Inc., and was Chief Soil Engineer for the last 12 years. In that capacity, I was responsible for the design of earth and earthrock dams, tailings dams, foundations of major power plants and heavy industrial structures, airfields and highways.

I have consulted on and participated in the preparation of foundation reports and earthwork studies for numerous nuclear and fossil fuel plants in the U.S.A., Korea, Taiwan, and Spain. Nuclear plants in the U.S.A. included Pilgrim, Hope Creek, Vogtle, Monticello and Palisades. Earth dams designed under my direction during this period include the Ruth Dam, Aurora Rampart Dam, Skookumchuck Dam, Carmen Smith Dams, three earth dams for the Oroville-Wyandotte Irrigation District, Turner Dam, Wells Dam, Ute Dam, and others. I also participated in the design of a number of rockfill dams during this period, including Round Butte Dam in Oregon, Little Grass Valley Dam in California, the Homestake asphalt-faced dam for the City of Aurora in Colorado, and the Ok Ningi water supply dam in Papua New Guinea, as well as a feasibility study for the Xialongdi dam in the People's Republic of China. I have also been involved in the design of numerous tailings dams and mining facilities for tar sands, gold, copper, iron, and molybdenum projects in the United States, Canada, South Africa, Papua New Guinea, Brazil and Colombia.

I am a Registered Civil Engineer in Minnesota and California, and a member of the American Society of Civil Engineers, the U.S. Committee on Large Dams, the International Society for Soil Mechanics and Foundation Engineering, and the Deep Foundation Institute.

Q.7 Gentlemen, what is the purpose of your testimony?

A.7 (TJJ, AL, WRF) The purpose of our testimony is to respond to Issue B/D-1 which states:

> Is there reasonable assurance that the backfill placed at STP by Ebasco is in conformity with the construction permits and the provisions of Commission regulations in light of the two violations in the area of "soils and foundation" discussed in I&E Rept. 83-26 (dated April 20, 1984) and findings 23 and 24 in the programmatic audit filed by HL&P on May 25, 1984 (ST-HL-AE-1095)?

Our testimony will show that such reasonable assurance exists and that the Category I backfill placed by Ebasco will adequately perform its structural function.

Q.8 Please describe the organizations that participate in the placement, testing and inspection of Category I backfill at STP.

A.8 (TJJ) There are four organizations at STP that participate in the placement, testing and inspection of Category I backfill. HL&P is responsible for ensuring that backfill-related activities are performed in accordance with applicable regulatory and Project requirements. HL&P carries out that responsibility by providing programmatic direction and overview to Project contractors, and by performing QA audits, surveillance and inspections.

Bechtel issues design documents, approves contractors' work procedures, and performs audits and surveillance of implementation. Bechtel Quality Control (QC) verifies the performance of the testing contractor in testing backfill material upon receipt.

Ebasco Constructors, Inc., and Ebasco Services, Inc., (Ebasco) place and inspect backfill and coordinate the efforts of the testing contractor. Ebasco performs these functions by supervising construction work, conducting audits, inspections and surveillance, providing direction to the testing contractor regarding the number and location of tests to be performed, and accepting the results of relative density testing.

Finally, Pittsburgh Testing Laboratory (PTL), the testing contractor, is responsible for performing field and laboratory tests and submitting its results to Ebasco.

Throughout the process of receiving, placing, inspecting and testing Category I backfill, appropriate controls have been established to provide adequately compacted backfill.

Q.9 Please describe the nature and scope of STP Category I backfill work performed by Ebasco to date.

A.9 (AL) Category I backfill at STP is designated for all the buildings and foundations within the power block (main plant area), the essential cooling water (ECW) pipe trench, and the ECW intake and discharge structures. Approximately 2,200,000 cubic yards of Category I backfill have been procured for STP to date. Of that total, almost 2,000,000 cubic yards were placed by the previous contractor and about 200,000 cubic yards were placed by Ebasco.

The backfill which has been placed by Ebasco is essentially limited to the ECW pipe trench, localized areas around the ECW intake and discharge structures, and small excavations for piping connections into buildings and for miscellaneous facilities (ductbanks, manholes, equipment, etc.,) within the power block. The backfill for Category I buildings within the power block of both units was placed by the previous contractor.

Q.10 Please describe the nature and scope of STP Category I backfill work remaining to be performed by Ebasco.

A.10 (AL) Only about 106,000 cubic yards of Category I backfill remain to be placed by Ebasco. This backfill is to be placed in small amounts around manholes, ductbanks, auxiliary feedwater tanks and isolated areas of the ECW pipe trench. Most of the ECW work is beyond the power block, though small portions of that work may

be performed at locations within the power block. There is no single area where future backfill work is expected to exceed 5,000 cubic yards, and no Category I backfill remains to be placed under any major structures of the power block.

Q.11 Please describe the "first" violation in the area of soils and foundation which is mentioned in Issue B/D-1.

A.11 (TJJ, AL) The first violation mentioned was Notice of Violation 83-24-02, a severity level IV violation, issued by NRC Region IV on January 30, 1984. It cited HL&P for failure to comply with an aspect of American Society for Testing and Materials (ASTM) Standard D2049-69, which had been incorporated by reference into a Bechtel specification.

In particular, ASTM D2049-69 specifies that a funnel pouring device be utilized for determining the minimum density of soil samples where soil particles from such samples have a maximum size of 3/8 inch, and that a scoop pouring device be utilized where soil particles may exceed 3/8 inch in size. Contrary to the specification, Bechtel authorized PTL to utilize a scoop, rather than a funnel, for determining the minimum density of all Category I backfill at STP, regardless of the actual maximum size of the particles present in the sample.

Q.11 Can you identify Applicants' Exhibit 67?

A.11 (TJJ) Yes. Applicants' Exhibit 67 is a letter dated March 23, 1984 from Mr. George W. Oprea to Mr. John T. Collins, and its enclosure, HL&P's response to Notice of Violation 83-24-02.

Q.12 What action was taken in response to this violation?

A.12 (TJJ) PTL was directed to perform future minimum density testing in strict conformance with the ASTM standard, and a review was initiated of the technical adequacy of utilizing the scoop, rather than the funnel, for testing STP Category I backfill. That review demonstrated that the scoop provides a more representative and consistent method for determining the minimum density of STP Category I backfill material than the funnel, and that the actual relative density of such soil is more than adequate.

In addition, HL&P management was extremely concerned that deficiencies may have occurred in the backfill area which were reminiscent of deficiencies that had been corrected after the 1980 Show Cause Order. As a result of discussions between Mr. J. H. Goldberg, HL&P's Vice President-Nuclear Engineering and Construction, Mr. J. L. Barker, HL&P's Principal Engineer Site Engineering and myself, it was determined that, in addition to responding to the specific violation, a comprehensive programmatic/technical audit

of Category I backfill activities at STP would be performed by a joint QA and Engineering team. That audit included a review of licensing and criteria documents, specifications, testing procedures, test data results and QC procedures and covered every organization involved in STP Category I backfill activities (Bechtel, Ebasco and PTL). A letter dated May 25, 1984 from Mr. George W. Oprea to Mr. John T. Collins, and its enclosure, a summary of the audit findings, is Applicants' Exhibit 68.

Q.13 What is minimum density?

A.13 (WRF) The minimum density of soil, as understood in soil engineering, is the loosest possible state of density the soil can achieve, with the particles in grain to grain contact, and without segregation of particle sizes or arching.

Q.14 What is the purpose of determining minimum density?

A.14 (WRF) The minimum density of Category I backfill is determined in order to calculate the "relative" density of compacted backfill. Relative density is calculated based upon the minimum density, in-place density, and maximum density and is evaluated to verify that the backfill meets the design criteria for structural adequacy.

Q.15 What are the criteria for relative density governing STP Category I backfill?

A.15 (AL) For STP, the criteria governing Category I "structural" backfill, including backfill within the power block and around the ECW intake and discharge structures (which are outside the power block), are a minimum relative density of 80% and a running average relative density of 84%. The criterion for Category I "yard" backfill outside the power block is a minimum relative density of 70%.

Q.16 How do variations in the determination of minimum density affect the calculated relative density?

A.16 (WRF) If the minimum density is increased (and the maximum and in-place densities remain constant), one would compute a lower relative density. Accordingly, use of a test method that yields higher "minimum" density values will result in a lower relative density. For example, given an in-place density (D) of 120 pounds per cubic foot, a maximum density (D Max) of 124 pounds per cubic foot, and a minimum density (D Min) of 104 pounds per cubic foot, relative density (R) would be calculated as follows:

$$\frac{D\ Max}{D} \times \frac{D - D\ Min}{D\ Max - D\ Min} \times 100 = R(\%) \text{ or}$$

82.7%

If, however, the calculated minimum density (D Min) is 102 pounds per cubic foot, relative density would be calculated to be 84.5%.

Q.17 Why does ASTM D2049-69 specify use of the funnel pouring device for determining the minimum density of backfill with a maximum particle size of 3/8 inch?

A.17 (WRF) The funnel pouring device is specified in the ASTM standard in order to provide a procedure that can be readily used by different technicians to achieve determinations of the minimum density of soil in a repeatable manner and with an acceptable range of error.

Q.18 Does the scoop method produce an unreliable or invalid minimum density value for samples which do not contain particles in excess of 3/8 inch?

A.18 (WRF) No. On the contrary, so long as the method of soil placement in the test mold does not result in segregation of the soil, and the procedure can be readily repeated with essentially the same result, the method which provides the lowest density should be judged the most representative of the actual minimum soil density. With the Category I backfill at STP, the funnel pouring device has been found to yield mean minimum density values 1.3 to 3.3 pounds per cubic foot higher than those obtained using the scoop method.

Therefore, although the relative density values using the funnel device will be slightly lower than those determined with the scoop, the values determined with the scoop more closely reflect actual minimum densities.

In fact, I have reviewed and concur with the conclusions of the independent committee of soils experts in Applicants' Exhibit 6, ("Expert Committee's Final Report on Adequacy of Category I Structural Backfill, South Texas Project Electric Generating Station," January 30, 1981, at 32), that "there is considerable evidence that the minimum density [of STP Category I backfill] may actually be somewhat lower than determined by [the scoop] method." Furthermore, another study of eleven different methods for determining minimum density, determined that "the scoop method is a valid method for determining minimum density without segregation."

Accordingly, it is my opinion that the actual relative density of STP Category I backfill is higher than calculated with either the scoop or funnel method, and that the scoop method provides technically valid, consistent and more representative minimum density values than the funnel method.

Q.19 Have you reviewed the analysis of the scoop method described in Applicants' Exhibit 67?

A.19 (WRF) Yes.

Q.20 Do you concur with the conclusions of that analysis?

A.20 (WRF) Yes. In order to confirm the validity of those conclusions, I have had a separate evaluation undertaken, in which the minimum density values obtained between April 6, 1983 and February 3, 1984 -- the period during which the scoop was exclusively utilized -- have been increased by 3.3 pounds per cubic foot, in order to account for the higher values which may have resulted if the funnel had been utilized. Although the minimum density values were increased by 3.3 pounds per cubic foot, actual differences between values obtained with the scoop and the funnel are likely to be lower. Thus, 3.3 pounds was selected as a conservative adjustment. After the minimum densities were so adjusted, new relative density values were calculated and compared to the criteria governing STP Category I backfill.

For the Category I "structural" backfill within the power block, of 1,134 test values, 185 fell below the 80% minimum relative density criterion and 122 (many, the same values which fell below the minimum relative density criterion) fell below the 84% running average relative density criterion. Of 2,351 test values for Category I "yard" backfill, 255 fell below the minimum relative density criterion.

Q.21 Is there any technical significance to the test values which fell below the minimum criteria?

A.21 (WRF) No. With respect to the "structural" backfill, the purpose of the design criteria is to provide a stable foundation support for Category I buildings under all loading conditions, in order to assure satisfactory performance of such buildings during the life of the plant. None of the lower test values, however, were directly below STP Category I buildings.

Since none of the low values were directly below building foundations, bearing capacity and settlement are not a concern. Accordingly, the principal design consideration for both the "structural" and "yard" Category I backfill is the margin of safety against liquefaction of the fill during a Safe Shutdown Earthquake (SSE) event. Since the values below the design criteria are randomly located and represent a very limited volume of the backfill, there would be negligible impact on liquefaction potential.

In fact, even when the test values are adjusted for densities obtained by use of the scoop, the factor of safety against liquefaction for all of the test values at STP exceeded 1.6, and over 99% of the values exceeded 1.7. A factor of safety against liquefaction, which is well established in the nuclear industry as

conservative, is 1.5. Thus, there is an ample margin of safety against liquefaction of the STP Category I structural backfill.

Accordingly, since the minimum density values obtained with the scoop more accurately reflect the actual minimum densities of STP Category I backfill, the scoop method provides a more appropriate basis for determining the actual relative density of the backfill. However, even if the values obtained with the scoop were conservatively adjusted to account for use of the funnel, the resulting relative density of the STP Category I backfill would have been demonstrated to be adequate to provide the necessary structural integrity.

Q.22 What is the status of violation 83-24-02?

A.22 (TJJ) HL&P's corrective actions have been completed and submitted to the NRC Staff for its review.

Q.23 Please describe the second "violation" which is referred to in Issue B/D-1.

A.23 (TJJ) Although Issue B/D-1 refers to "two violations in the area of 'soils and foundations' discussed in I&E Rept. 83-26," the second item identified as a "violation" in I&E Report 83-26 was issued as an Unresolved Item, rather than as a violation. Unresolved Item 83-24-01 related to the frequency of QC inspection of

backfill placement. It noted, in particular, that Ebasco's QC procedure only required daily monitoring of such activities, and that accordingly, the potential for inadequate QC inspection existed.

Q.23 Were backfill placement inspections being performed only on a daily basis?

A.23 (TJJ) No. Although the procedure required only daily monitoring, Ebasco QC had been inspecting virtually every significant lift on every workshift.

Q.24 What actions were taken in response to this Unresolved Item?

A.24 (TJJ) The applicable QC inspection procedure was modified to more closely conform to Ebasco's practice by requiring that inspection of backfill placement be conducted on at least one lift per area, per work shift, and by clarifying that for each backfill lift being evaluated, the inspection characteristics reviewed be identified.

Q.25 As to the soil which was placed before the procedure was changed, is its adequacy in question as a result of Unresolved Item 83-24-01?

A.25 (TJJ,WRF,AL) No. Since Ebasco was adequately monitoring the placement and compaction process, and the only responsive action necessary was to modify the

procedure to more closely reflect actual practice, there is no basis for questioning the adequacy of the soil placed prior to the procedural change.

Q.26 Did the NRC Staff review the actions taken by HL&P in response to Unresolved Item 83-24-01?

A.26 (TJJ) Yes. Region IV verified that each of the changes had been incorporated in the QC inspection procedure and conducted a subsequent inspection of earthwork and testing laboratory activities and in-process backfill inspection reports. That inspection (Inspection 85-04) indicated that Unresolved Item 83-24-01 had been addressed satisfactorily, and the Item was closed.

Q.27 Please identify the audit referenced in Issue B/D-1.

A.27 (TJJ) As indicated earlier in my testimony, in response to Notice of Violation 83-24-02, HL&P performed a comprehensive, programmatic/technical audit of backfill-related activities at STP. That audit was conducted in March-April, 1984. (See Applicants' Exhibit 68).

Q.28 Please describe audit finding 23 which is referred to in Issue B/D-1.

A.28 (TJJ) That finding stated that:

> "[t]he Soils Inspection Procedure [QCP-10.10] does not provide criteria on density variation with depth to enable QC to determine the correct location for testing as required by Specification . . . and the FSAR. Therefore, the field test evaluation selection process does not give representative density information for all depth intervals within the lift.

HL&P's concern was that, contrary to the FSAR and the applicable specification, the inspection procedure did not provide sufficient instruction to QC Inspectors as to the depth within an individual lift at which testing of in place soil density should be performed in order to obtain representative in place density information for depth intervals within the lifts.

Q.29 What is a lift?

A.29 (WRF) A lift is a term utilized in soil engineering to define the individual layers of soil that are placed, spread and compacted in the backfill.

Q.30 What did the FSAR provide regarding the determination of representative in place density information for depth intervals within each lift?

A.30 (TJJ) The FSAR required that possible variations in density with depth be considered in determining test locations, and that the testing depths be selected such

that a series of consecutive tests will provide representative density information for all depth intervals within the lifts.

Q.31 What did the specification provide regarding the determination of representative in-place density information for depth intervals within each lift?

A.31 (TJJ) The Bechtel specification generally required that variations in density with depth depending on lift thickness, placement and compaction methods be considered, and that the test depths be distributed to obtain the true condition of the backfill.

Q.32 What guidance did the inspection procedure provide regarding the determination of representative in-place density information for depth intervals within each lift?

A.32 (TJJ) The procedure simply stated that testing should be performed in accordance with the specification.

Q.33 What is the technical significance of this finding?

A.33 (WRF) Since the variation of in-place density within the backfill lifts at STP is small (if overlayed by another lift), the determination of in-place density at any depth within a lift will be representative of that lift. Furthermore, in-place density testing at STP has

been performed at varying depths within the lifts, providing further assurance that representative information is being obtained.

In any event, the judgment as to the adequacy of the STP Category I backfill is based on the overall distribution of test sample locations (both vertically and horizontally) within the backfill, rather than on density variations within individual lifts. Accordingly, a failure to obtain information regarding the depth of samples within each lift would not cast doubt on the adequacy of the STP Category I backfill.

Q.34 What action was taken to address this finding?

A.34 (AL,TJJ) Because it was determined that the requirement to obtain density information for all depth intervals within each lift was unnecessarily conservative, the FSAR was amended to require that testing be conducted such that representative density information is provided for all lifts within the fill, rather than for specific depth intervals within individual lifts. Similarly, the specification was modified to provide that test locations be selected such that the distribution of tests both laterally and vertically within the fill provides a record that demonstrates the true condition of the backfill, and by eliminating the requirement for consideration of variations in density with depth depending on lift thickness.

Q.35 Please describe audit finding 24 referred to in Issue B/D-1.

A.35 (TJJ) That finding states:

> The Soils Inspection Procedure does not require test depths to be recorded and thus no evidence, in general, can be provided to demonstrate backfill installed by Ebasco has been tested at the required depth. Specifically, no evidence exists to demonstrate tests below the 30-inch diameter ECW pipes are taken at a depth of 7 inches below the invert. Additionally, test depth information has not been provided by PTL.

HL&P's concern, in this finding, was that the Ebasco inspection procedure did not require that test depths be recorded, and that test depth information was not being provided to PTL by Ebasco for inclusion in PTL test reports. Ebasco was, however, recording the elevation of the lift in which the sample was taken.

Q.36 What is the effect of the failure to record the test depths?

A.36 (WRF) As indicated in my prior answer, there is no need to identify or document the testing depths for purposes of assessing the adequacy of the STP Category I backfill. Since Ebasco was recording the elevation of lifts in which samples were taken, sufficient information was available to assess the adequacy of the overall fill.

Q.37 What action was taken in response to this audit finding?

A.37 (TJJ) The specification and inspection procedure were modified to require that Ebasco record specific test depths, and the specification was modified to require Ebasco to provide test depth information to PTL.

Q.38 In light of your testimony, what is your overall conclusion regarding the adequacy of the Category I backfill placed at STP by Ebasco.

A.38 (WRF,AL) The Category I backfill placed at STP by Ebasco is more than adequate to perform its intended structural function and there is reasonable assurance that such backfill conforms to applicable regulatory requirements.

Q.39 In light of your testimony, is there any reason to believe that future Ebasco Category I backfill activities will not be carried out in a manner consistent with applicable requirements and sufficient to assure the adequacy of the backfill?

A.39 (TJJ,WRF,AL) No. Since there is no basis for questioning the technical adequacy of the Category I backfill placed by Ebasco to date, appropriate measures have been taken to assure that future work is carried out in compliance with applicable regulatory and Project requirements, and only a limited amount of such

work remains to be performed, there is reasonable assurance that future Category I backfill activities will comply with applicable requirements and that backfill placed in the future will be adequate to perform its intended structural function.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
HOUSTON LIGHTING & POWER COMPANY, ET AL.	)	Docket Nos. 50-498 OL 50-499 OL
	)	
(South Texas Project, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of Testimony on Behalf of Houston Lighting & Power Company, et al., have been served on the following individuals and entities by deposit in the United States mail, first class, postage prepaid, or by hand delivery as designated with an (*), or by courier service as designated by (**), on this 26th day of June, 1985.

Charles Bechhoefer, Esq.*
Chairman, Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. James C. Lamb, III**
Administrative Judge
313 Woodhaven Road
Chapel Hill, NC 27514

Frederick J. Shon*
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mrs. Peggy Buchorn
Executive Director
Citizens for Equitable Utilities, Inc.
Route 1, Box 1684
Brazoria, TX 77422

Brian Berwick, Esq.**
Assistant Attorney General
for the State of Texas
Environmental Protection Division
P. O. Box 12548, Capitol Station
Austin, TX 78711

Kim Eastman, Co-coordinator
Barbara A. Miller
Pat Coy
Citizens Concerned About Nuclear Power
5106 Casa Oro
San Antonio, TX 78233

Lanny Alan Sinkin*
3022 Porter St., N.W., #304
Washington, D.C. 20008

Ray Goldstein, Esq.
Gray, Allison & Becker
100 Vaughn Building
807 Brazos
Austin, Texas 78701-2553

Oreste Russ Pirfo, Esq.*
Robert G. Perlis, Esq.
Office of the Executive Legal
Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety and Licensing Appeal Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docketing and Service Section
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gerald J. Silver