UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF'S PROPOSED OPINION, FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER IN THE FORM OF A PARTIAL INITIAL DECISION

Jay M. Gutierrez
Counsel for NRC Staff

October 4, 1982

DESIGNATED ORIGINAL

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PARTIAL INITIAL DECISION

OPINION

I. INTRODUCTION

This is a Partial Initial Decision stemming from a Commission Order directing this Board to hold an expedited hearing to determine whether Houston Lighting and Power Company (HL&P) has the managerial competence and corporate character to be granted a license to operate the South Texas Project, Units 1 and 2 (STP).[1/]

II. PROCEDURAL HISTORY

The Commission received an application for a facility operating license and noticed an opportunity for a hearing in August, 1978.[2/] The entities filing for this application are Houston Lighting and Power Company, the City of San Antonio, Texas, Central Power and Light Company

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1/ See Houston Lighting and Power Company, et al. (South Texas Project, Units 1 and 2), CLI-80-32, 12 NRC 281 (1980).

2/ 43 Fed. Reg. 33968, August 2, 1978.

and the City of Austin, Texas (hereinafter collectively referred to as the Applicants). The application is for the operation of two pressurized water reactors at the Applicants' site approximately 15 miles southwest of Bay City, in Matagorda County, Texas. Permits to construct the units, each of which has a rated output of 1250 megawatts of electrical power, were authorized in December, 1975.[3/] By a contract dated July 1, 1973, Brown and Root (B&R) was awarded the engineering, construction and project management functions for the STP. CEU Ex. No. 1 at 10-11. In addition, B&R was to formulate, establish and administer a quality assurance and quality control program covering all aspects of the design and construction effort. Id. at Sections 2.2.1.7 and 5.0.

This Board was established on September 8, 1978.[4/] The parties to this proceeding are HL&P, on behalf of the Applicants, the NRC Staff (Staff), and Citizens Concerned About Nuclear Power (CCANP).[5/] In addition, the State of Texas was admitted to this proceeding as an

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3/ See Houstor Lighting and Power Company, et al. (South Texas Project, Units 1 and 2), LBP-75-71, 2 NRC 894 (1975); Memorandum and Order, August 3, 1979.

4/ On March 11, 1981, this Board was reconstituted and Dr. Emmeth A. Luebke was replaced by Mr. Ernest E. Hill.

5/ Citizens for Equitable Utilities (CEU) was a party to this proceeding throughout a majority of the hearings. However, on June 14, 1982, CEU requested that the Board permit it to withdraw from this proceeding, without prejudice. This request was granted on June 15, 1982 (Tr. 10,384).

interested state. This Board initially admitted eight (8) contentions.[6/]

A. Expedited Hearing On Construction Defeciencies And QA/QC Problems

Of the original eight contentions, the Board indicated in March, 1980 that it planned to hear contentions dealing with construction deficiencies and problems in the Quality Assurance/Quality Control (QA/QC) area on an expedited basis.[7/] This included the question of possible harassment and intimidation of QA/QC personnel on the project. This course of action was considered necessary since, if corrective action would be required in these areas, it was felt it should be undertaken early in the construction schedule.

At approximately the same time as this Board decision, a special Staff investigation to determine the effectiveness of the Quality Assurance/Quality Control program was issued. The investigation, known as I&E Report 79-19 (79-19), substantiated, inter alia, allegations of harassment and lack of support for QC inspectors and further demonstrated shortcomings in HL&P's management of the STP. (Findings of Fact (Fdgs.)

6/ Of the original eight contentions, five were sponsored solely by CEU, and accordingly, with the withdrawal of CEU are no longer contentions in this proceeding. Contentions 1 and 2 were jointly sponsored by CEU and CCANP, and thus, remain in this hearing by reason of CCANP's continued interest in advancing these contentions. See Appendix A for a list of the contentions and their sponsoring parties, and Houston Lighting and Power Company, et al. (South Texas Project, Units 1 and 2), LBP-79-10, 9 NRC 439 (1979).

7/ Memorandum (March 10, 1980). Quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements. 10 C.F.R. Part 50, Appendix B.

at ¶¶ 29, 31). The results of the investigation brought into question the overall adequacy of the QA/QC program, HL&P's control over the project and pointed to the need to verify the adequacy of the existing structures.

Specifically, 79-19 found that procedural and programmatic inadequacies in the HL&P and B&R organizations resulted in a failure to identify quality related problems and to correct and/or prevent recurrence of similar problems. (Fdgs. at ¶ 30). The lack of adequate control by B&R over safety-related activities and the lack of detailed involvement by HL&P in the total scope of activities associated with the STP, as well as the inexperience of both organizations in nuclear construction, was apparently the reason behind these problems. Id. This lack of detailed knowledge and involvement hindered HL&P's ability to maintain adequate control over B&R. Id.

Staff inspection of construction activities and the review of QA records during 79-19 indicated that the QA/QC program had not prevented recurrence of poor concreting practices that at times may have contributed to voids in structural concrete. (Fdgs. at ¶ 34, and Sections II.E.2. and III.A.2.) These poor practices included procedures lacking in clarity and qualitative acceptance criteria; personnel with inadequate training, experience and/or education; production and scheduling pressures; as well as harassment and intimidation of QC inspectors. (Fdgs. at ¶¶ 31, 32 and 34).

In the area of Category I structural backfill, questions were raised as to whether the in-place compacted backfill met the required densities. (Fdgs. Section II.E.1.) Problems were also identified in the areas of welder qualification, welding process controls and NDE performance and interpretation. (Fdgs. Section II.E.3.) 79-19 found both HL&P and B&R

improperly implemented their QA audits and surveillance programs. (Fdgs. at ¶ 35). A failure to perform continuous and effective trend analysis of site documents that record problem areas allowed these conditions to persist. Id. In addition, questions were raised regarding two apparent false statements in the FSAR. (Fdgs. at ¶¶ 61-66).

As a result of these findings the Staff issued an order along with 79-19, directing HL&P to show cause why safety related construction activites should not be stopped and remain stopped until such time as HL&P completed ten tasks set forth in that order (hereinafter the Show Cause Order). In addition, a civil penalty of $100,000.00 was proposed as a result of the items of non-compliance found in 79-19. (Fdgs. at ¶¶ 37-39).

With minor exceptions, HL&P by letters of May 23, 1980, confirmed the findings of 79-19 and paid the civil penalty of $100,000.00 imposed as a result of those violations. (Fdgs. at ¶ 83). See also South Texas Project, CLI-80-32, supra at 283-285. In addition, HL&P adequately responded to the tasks required by the Show Cause Order beginning with its filing on July 28, 1980. Id. In its response to 79-19, HL&P identified six "root causes" which it felt were behind the items of non-compliance found. These causes were: (1) a failure to translate specifications and requirements into clear and simplified procedures; (2) inadequate documentation of nonconforming conditions and a systematic trend analysis; (3) the need for QA/QC training and indoctrination of personnel at all levels; (4) the need for stronger systems control; (5) the need for an improved audit system; and (6) the

need for increased visibility and participation of upper management. (Fdgs. at ¶ 42).

In the interim, on May 28, 1980, CCANP requested a hearing on the Show Cause Order.[8/] CCANP noted that the findings of 79-19 directly supported its contentions before this Licensing Board and it claimed that not having an enforcement hearing on this investigation and related Order would adversely affect the ability of this Licensing Board to evaluate STP and the ability of the intervenors to support their contentions.

B. Expedited Hearing On Corporate Character And Managerial Competence

The Commission denied CCANP's petition but granted alternative relief. The Commission ruled that a full airing of all relevant findings of 79-19 including allegations of harassment of QC inspectors, and possible false statements in the FSAR, could be adjudicated by an expedited hearing in the context of the ongoing operating license proceeding. The Commission stated:

> We believe that the above issues relating to technical competence and to character permeate the pleadings filed by Citizens. They do deserve a full adjudicatory hearing, as they will no doubt get in the operating license proceeding, and they do deserve expeditious treatment because they could prove disqualifying. Accordingly, we agree that the Licensing Board in the operating license proceeding should proceed with its expedited hearing on the quality control-related issues (including the allegations of false statements in the FSAR). As the Board has already determined to proceed in this manner, no formal order is necessary. However, we expect the Board to look at the broader ramifications of these charges in order to determine whether, if proved, they should result in denial of the operating license application. For this reason, we are ordering the Board to issue an early and separate decision on this aspect of

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8/ South Texas Project, CLI-80-32, supra at 285.

> the operating license proceeding. No prejudice should result from this approach and no additional time or resources should be necessary than if the had proceeded to a final, but integrated, decision at a later date by the Licensing Board. [footnote omitted] 12 NRC at 291-92.

In an attempt to implement the Commission's general instructions, a second prehearing conference was held November 19, 1980, to formulate the precise issues and contentions to be addressed during the expedited hearing. This prehearing conference resulted in a Board Order, dated December 2, 1980, wherein the issues of the expedited portion of the operating license proceeding were articulated.

As noted by the Commission, the challenges to HL&P's competence and character permeate the Intervenors' pleadings, and deserve a full adjudicatory hearing.[9/] The issues adopted as a result of the November prehearing conference incorporate these concerns.[10/] Board Issue A asks whether HL&P's record of compliance with NRC requirements,

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9/ 12 NRC at 291.

10/ As set forth in the Second Prehearing Conference Order of December 2, 1980, the Board Issues state, in full:

> Issue A. If viewed without regard to the remedial steps taken by HL&P, would the record of HL&P's compliance with NRC requirements, including:
>
> (1) the statements in the FSAR referred to in Section V.A.(10) of the Order to Show Cause;
>
> (2) the instances of non-compliance set forth in the Notice of Violation and the Order to Show Cause;
>
> (3) the extent to which HL&P abdicated responsibility for construction of the South Texas Project (STP) to Brown & Root; and
>
> (4) the extent to which HL&P failed to keep itself knowledgeable about necessary construction activities at STP,

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without regard to remedial steps taken as a result of NRC enforcement action, is sufficient to determine HL&P lacks the necessary managerial

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be sufficient to determine that HL&P does not have the necessary managerial competence or character to be granted licenses to operate the STP?

Issue B. Has HL&P taken sufficient remedial steps to provide assurance that it now has the managerial competence and character to operate STP safely?

Issue C. In light of (1) HL&P's planned organization for operation of the STP; and (2) the alleged deficiencies in HL&P's management of construction of the STP (including its past actions or lack of action, revised programs for monitoring the activities of its architect-engineer-constructor and those matters set out in Issues A and B), is there reasonable assurance that HL&P will have the managerial competence and commitment to safely operate the STP?

Issue D. In light of HL&P's prior performance in the construction of the STP as reflected, in part, in the Notice of Violation and Order to Show Cause dated April 30, 1980, and HL&P's responses thereto (filings of May 23, 1980 and July 28, 1980), and actions taken pursuant thereto, do the current HL&P and Brown & Root (B&R) construction QA/QC organizations and practices meet the requirements of 10 C.F.R. Part 50, Appendix B; and is there reasonable assurance that they will be implemented so that construction of STP can be completed in conformance with the construction permits and other applicable requirements?

Issue E. Is there reasonable assurance that the structures now in place at the STP (referred to in Sections V.A.(2) and (3) of the Order to Show Cause) are in conformity with the construction permits and the provisions of Commission regulations? If not, has HL&P taken steps to assure that such structures are repaired or replaced as necessary to meet such requirements?

Issue F. Will HL&P's Quality Assurance Program for Operation of the STP meet the requirements of 10 C.F.R. Part 50, Appendix B?

competence or corporate character to be granted a license to operate the South Texas Project. Board Issue B asks essentially the same question but takes into account the remedial measures taken by HL&P following 79-19 relative to the construction effort. Issue C reconsiders the question following examination of HL&P's planned organization for operation. The competence of HL&P is further explored in Issue D by examining the adequacy of the current QA/QC program for the balance of construction. Finally, the adequacy of the existing structures is explored by Issue E.[11/]

At the time of the second prehearing conference a two phase hearing was envisioned. Phase I was to be an expedited hearing encompassing construction deficiencies, the adequacy of the QA/QC program for the balance of construction, as well as addressing issues drafted as a result of the Commission's concerns over competence and character. The balance of the contentions previously admitted in the operating license proceeding would form the basis for a second phase hearing.

C. Phase I Hearing and Future Hearings

The evidentiary hearing for the first phase commenced May 12, 1981. On September 24, 1981, while the first phase hearings were still in

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11/ Although it was initially comtemplated that the Board would hear testimony on Issue F - the adequacy of HL&P's plans for QA/QC for operation - it was decided to defer hearing this issue to a time closer to operation. Fourth Prehearing Conference Order, dated December 16, 1981 at 6.

progress, HL&P informed this Board and the parties that B&R had been dismissed as the architect/engineer of the STP.[12/] HL&P stated Bechtel Power Corporation (Bechtel) would be awarded that function.[13/] Subsequently, this Board and the parties were advised that B&R would be replaced as the constructor by Ebasco Services, Inc (Ebasco).[14/] On September 28, 1981, HL&P further notified this Board of a report on B&R engineering prepared by the Quadrex Corporation (the Quadrex Report) in May, 1981.[15/]

Due to these developments, the Licensing Board held a Fourth Prehearing Conference in December, 1981 to evaluate the impact of these developments on the ongoing Phase I hearing and the contentions and issues being litigated. In its Fourth Prehearing Conference Order of December 16, 1981, this Board determined to further divide this hearing into three phases. It was decided that the current expedited phase, together with certain topics relative to the transition of functions from B&R to Bechtel and Ebasco, should go forward and a Partial Initial Decision be issued. In that order, the Board further ruled on the

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12/ Ltr. from Newman to the Board, informing them that HL&P had decided to reallocate A/E responsibility for completion of STP, dated September 24, 1981.

13/ Id.

14/ Ltr. from Newman to the Board enclosing a copy of a press release issued by HL&P announcing the selection of Ebasco, dated February 16, 1982.

15/ Ltr. from Newman to the Board informing them of HL&P's plans to undertake a complete review of the existing design, engineering and construction, dated September 28, 1981.

admissibility of new contentions filed by CCANP on November 21, 1981. The Board admitted four contentions, designated Contentions 1.8(a)-(d), based on I&E Report 81-28.[16/] Staff Ex. No. 124. It also deferred ruling on the admissibility of contentions advanced by CEU on September 10, 1981, relative to the vendor surveillance program.[17/] A second phase was ordered on all aspects of the Quadrex Report and its impact upon the project following Bechtel's analysis of that report and the Staff's review of that analysis. Finally, a further hearing session was envisioned at a time nearer to the project's completion on any remaining contentions.

The record on Phase I was closed on June 17, 1982.[18/]

III. BOARD ISSUES

A. Introduction

As an aid to the parties, this Board drafted six issues which collectively incorporated the concerns expressed by the Commission. At the same time, the Board acknowledged during the second prehearing conference that such general and vague terms as managerial competence and corporate character are in need of more exacting definitions. Tr. 309 (Bechhoefer). The Board realized that to ask whether HL&P has sufficient managerial

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16/ See Appendix A.

17/ With the withdrawal of CEU and CCANP's decision not to advance these contentions in its filing of August 1, 1982, they are no longer pending before this Board.

18/ The evidentiary hearing for Phase I was held during the weeks of May 14 and 18, June 2, 15 and 22, July 20 and September 14, 1981 and January 19, February 9 and June 14, 1982.

competence and corporate character to operate the STP simply begs a further question; what standards or criteria should be applied in evaluating HL&P's managerial competence and corporate character. This question has been briefed by the parties[19/] and it is appropriate that the law in this area be set forth before developing the facts in this case.

B. Legal Standard In Judging Corporate Character and Managerial Competence

Section 182a of the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2242(a) (AEA), requires an applicant to submit sufficient information for the Commission to determine that the applicant has the requisite character and competence to engage in the licensed activity. It provides in relevant part that:

> Each application for a license hereunder shall be in writing and shall specifically state such information as the Commission, by rule or regulation, may determine to be necessary to decide such of the technical and financial qualifications of the applicant, the character of the applicant, the citizenship of the applicant, or any other qualifications of the applicant as the Commission may deem appropriate for the license . . ." 20/

19/ See NRC Staff Memorandum on Standards for Evaluating Managerial Competence and Corporate Charcter, dated May 6, 1981; Applicants' Memorandum of Law on Issues Concerning Competence and Character, dated May 2, 1981; CEU Prehearing Brief, dated May 6, 1981; and CCANP Brief on Character, dated May 5, 1981.

20/ No Commission rule or regulation sets forth further standards for determining whether an applicant has the character to receive a license. However, 10 C.F.R. § 50.40 offers general guidance with respect to standards a licensing board should apply in evaluating whether or not to issue a construction permit or operating license. This section states:

> In determining that a license will be issued to an applicant, the Commission will be guided by the following considerations:

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The requirement in Section 182a of the AEA that the applicant provide sufficient information concerning its technical competence and character as the Commission may deem necessary to find there exists adequate protection for the health and safety of the public is consistent with general Commission practice which imposes the ultimate burden of proof on the applicant to show that it should receive a license. 10 C.F.R. § 2.732; Virginia Electric and Power Company (North Anna Power Station, Units 1, 2, 3 and 4), ALAB-256, 1 NRC 10, 17 at n.18 (1975).

The interdependence of competence and character is illustrated in Consumers Power Company, (Midland Plant, Units 1 & 2), ALAB-106, 6 AEC

20/ FOOTNOTE CONTINUED FROM PRECEDING PAGE

> (a) The processes to be performed, the operating procedures, the facility and equipment, the use of the facility, and other technical specifications, or the proposals, in regard to any of the foregoing collectively provide reasonable assurance that the applicant will comply with the regulations in this chapter, including the regulations in Part 20, and that the health and safety of the public will not be endangered.
>
> (b) The applicant is technically and financially qualified to engage in the proposed activities in accordance with the regulations in this chapter.
>
> (c) The issuance of a license to the applicant will not, in the opinion of the Commission, be inimical to the common defense and security or to the health and safety of the public.

In addition, after issuance any license is continually subject to revocation, suspension, modification or amendment for cause as provided in the act and regulations. See 42 U.S.C. § 2236 and 10 C.F.R. § 50.54(e).

182 (1973). There the Appeal Board held that a determination that the Applicant had adopted a quality assurance and quality control program which, if implemented in accordance with the representations of the application, would satisfy the requirements of Appendix B, 10 C.F.R. Part 50 was not sufficient. 6 AEC at 183. The Appeal Board emphasized that in addition to determining that an applicant has competence to carry out a quality assurance-quality control program, it must also be determined the applicant has the character to meet its responsibilities and implement that program. 6 AEC at 184. The Appeal Board reasoned that regardless of the adequacy of the quality control program on paper (an indication of the Applicant's managerial competence), the program would be essentially without value unless it is timely, continuously and properly implemented by the Applicant (an indication of the Applicant's corporate character). The Appeal Board went on to give guidance to the Licensing Board stating:

> The inquiry which the Board must make is not necessarily resolved by a determination of whether, in a broad sense, the applicant and its architect-engineer are "technically qualified." A demonstration that technical qualifications do exist does not necessarily provide reasonable assurance that the QA program described in the PSAR will be faithfully fulfilled. To the contrary, as important as qualifications may be, of no less significance is the fact of managerial attitude. Unless there is a willingness--indeed, desire--on the part of the responsible officials to carry out to the letter, no program is likely to be successful. 6 AEC at 184.

This is the inquiry of this Board. After our determination regarding the technical/managerial competence of HL&P, this Board must then determine if HL&P possesses the managerial attitude or corporate

character required to implement the various programs necessary to ensure the safe operation of the STP. As in Midland, HL&P has the burden of showing that it possesses both the technical and managerial competence to develop adequate programs and the character or willingness to implement those programs following licensing. See 10 C.F.R. § 50.40(a).

Thus, managerial competence and corporate character are not discreet attributes which can be isolated and examined. A corporate character stems from, and can be inferred from, the character of its management and that management team's competence in responsibly dealing with corporate affairs. In the present proceeding, if HL&P appreciates the effort, discipline and aggressive management required to design, construct and plan for the operation of the STP in accordance with Commission regulations, and there is reasonable assurance on the record that it has the competence to effectuate that goal, then it should be concluded that it has the requisite managerial competence and corporate character contemplated by the Act. See, Virginia Electric and Power Company (North Anna Nuclear Power Station, Units 1 and 2), LBP-77-68, 6 NRC 1127, 1150-51 (1977).

Although, as discussed above, when evaluating managerial competence and corporate character they cannot be isolated or separated, instructive case law both within and outside the NRC has addressed the two concepts separately. A review of this case law may be helpful in understanding the two concepts.

1. Character

Any legally imposed qualification or requisite character trait for engaging in an activity or receiving a license must have a rational

connection to that activity. Schware v. Board of Bar Examiners of New Mexico, 353 U.S. 232, 239 (1957). See also Konigsburg v. State Bar, 353 U.S. 252, 262-63 (1956). As indicated in Schware, a State may require an attorney to be truthful, candid and honest because those character traits have a rational connection to an applicant's fitness or capacity to practice law.21/ In F.C.C. v. WOKO, Inc., 329 U.S. 223 (1946), the Court held that the Federal Communications Commission, under the Federal Communications Act, 47 U.S.C. § 308-409, in balancing the public interest, may refuse to renew a license based upon character where there has been a failure to follow regulations or a lack of candor by a licensee in dealing with the Commission.

21/ In Konigsberg, the Court explained:

> The term "good moral character" has long been used as a qualification for membership in the bar and has served a useful purpose in this respect. However the term, by itself, is unusually ambiguous. It can be defined in an almost unlimited number of ways for any definition will necessarily reflect the attitudes, experiences, and prejudices of the definer. Such a vague qualification, which is easily adapted to fit personal views and predilections, can be a dangerous instrument for arbitrary and discriminatory denial of the right to practice law. 353 U.S. at 262-63.

Although, as Konigsberg points out, the term character is ambiguous, the Court indicated two approaches or standards which might be used in the course of an applicant attempting to prove its good character. A board or court may require an applicant to set forth evidence proving the absence of bad character or an applicant might be required to affirmatively set forth past acts demonstrating honesty, fairness and respect for the law. See, 353 U.S. at 263.

The Atomic Energy Act in part follows the Federal Communications Act, and as we have indicated the AEA similarly gives this Commission the power to deny a license to one who does not have the requisite character to be entrusted with a license.[22/] In judging character, an agency must depend upon conduct and the representations made to it by its applicants and licensees. F.C.C. v. WOKO, Inc., supra; Leflore Broadcasting Company v. F.C.C.., 636 F.2d 454, 461 (D.C. Cir. 1980), quoting F.C.C. v. WOKO, Inc. 329 U.S. at 227; Sea Island Broadcasting Co. v. F.C.C., 627 F.2d 240, 243 (D.C. Cir. 1980), cert. denied, 449 U.S. 834 (1981); Lorain Journal Co. v. F.C.C., 351 F.2d 824, 830 (D.C. Cir. 1965), cert. denied sub nom, WW12 v. F.C.C., 383 U.S. 967 (1966); see North Anna, supra; Diablo Canyon, supra; Midland, LBP-81-63, supra and Consumers Power Company (Midland Plant, Units 1 and 2), 16 NRC ___, ALAB-691, Slip Op. at 18-20 (September 9, 1982).[23/]

The necessity of judging the relevant character traits of truthfulness, reliability and responsibility based upon past conduct and

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22/ See 12 NRC at 494 n.1 (concurring opinion).

23/ Questions of character have also been looked at in Interstate Commerce Commission proceedings judging "fitness" of an applicant to receive a motor carrier certificate of public convenience and necessity under 49 U.S.C. ¶ 302. See e.g.: Kobrin Refrigerated Xpress, Inc. v. United States, 197 F. Supp. 39, 46-47 (N.D. Iowa, 1961); North American Van Lines v. United States, 412 F. Supp. 782, 791-796 (N.D. Ind. 1976); see also Barnes Freight Lines, Inc. v. I.C.C., 569 F.2d 912, reh. denied, 573 F.2d 85 (5th Cir. 1978).

representations was recognized by the Commission in this case. In setting an early hearing to consider Applicants' character and competence, the Commission stated:

> The history of the South Texas Project - at least 12 separate NRC investigations over a 2-1/2 year period, resulting in conferences with the licensee, several prior items of non-compliance, a deviation, five immediate action letters, and how [sic] substantiated allegations of harassment, intimidation and threats directed to QA/QC personnel and apparent false statements in the FSAR - is relevant to the issue of the basic competence and character of Houston. Central to that issue are two questions: whether the facts demonstrate that the licensee has abdicated too much responsibility for construction to its contractor, Brown and Root, Inc., and whether the facts demonstrate an unacceptable failure on the part of Houston to keep itself knowledgeable about necessary construction activities. Either abdication of responsibility or abdication of knowledge, whether at the construction or operating phase, could form an independent and sufficient basis for revoking a license or denying a license application on grounds of lack of competence (i.e.technical) or character qualification on the part of the licensee or license applicant. 42 U.S.C. 2232a. [illegible] large part, decisions about licenses are predictive in nature, and the Commission cannot ignore abdication of responsibility or abdication of knowledge by a license applicant when it is called upon to decide if a license for a nuclear facility should be granted. 4/

4/ Equally, and perhaps of more concern, the Commission cannot ignore false statements in documents submitted to it. Congress has specifically provided that licenses may be revoked for "material false statements," see section 186a of the Atomic Energy Act, and we have no doubt that initial license applications or renewal applications may also be denied on this ground, certainly if the falsehoods were intentional, FCC v. WOKO, 329 U.S. 223 (1946), and perhaps even if they were made only with disregard for the truth. Leflore Broadcasting Company v. FCC, 636 F.2d 454 (D.C. Cir. 1980); Virginia Electric and Power Company v. NRC, 571 F.2d 1289 (4th Cir. 1978). [12 NRC at 291].

As we indicated, in judging an NRC licensee's character, truthfulness and candor are important standards by which an applicant's character should be evaluated. Nowhere is the importance of, and dependence upon, accurate and complete information from the applicant greater than in the context of nuclear regulation. The Commission has stated:

> In order to fulfill its regulatory obligations, NRC is dependent upon all of its licensees for accurate and timely information. Since licensees are directly in control of plant design, construction, operation, and maintenance, they are the first line of defense to ensure the safety of the public. NRC's role is one primarily of review and audit of licensee activities, recognizing that limited resources preclude 100% inspection.
>
> As the Commission has stated in the past:
>
> > Our inspection system is not designed to and cannot assume such tasks [to provide full inspection of construction activities]. Rather, we require that licensees themselves develop and implement reliable quality assurance programs which can assume the major burden of inspection. Consumers Power Company (Midland Plant, Units 1 & 2), CLI-74-3, 7 AEC 7, 11 (1974).
>
> We require instead a regime in which applicants and licensees have every incentive to scrutinize their internal procedures to be as sure as they possibly can that all submissions to this Commission are accurate. Petition For Emergency And Remedial Action, CLI-78-6, 7 NRC 400, 418 (1978).

See also Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-82-1, 15 NRC 225 (1982); Consumers Power Company (Midland Plant, Units 1 and 2), ALAB-691, Slip Op. (Sept. 9, 1982); Virginia Electric & Power Company (North Anna Power Station), CLI-76-22, 4 NRC 400, 486-87 (1976); affirmed, Virginia Electric & Power Company v. U.S. Nuclear Regulatory Commission, 571 F.2d 1289 (4th Cir. 1978).

Further, because the NRC is dependent upon the applicant to provide thorough and accurate information, the fact that any information would be concealed is more significant concerning an applicant's character than the specific nature of the facts concealed. See, Petition for Emergency and Remedial Action, supra; In the Matter of Hamlin Testing Laboratories, Inc., 2 AEC 423, 428-9 (1964).

In this case, the Commission has specifically directed this Board to inquire into alleged false statements in the FSAR. 12 NRC at 291. Certainly, any evidence that a false statement was made in a licensing document would be probative of an applicant's character. In Virginia Electric and Power Company (North Anna Power Station, Units 1 and 2), CLI-76-22, 4 NRC 480, 489 (1976) the Commission had cause to outline the meaning of a material false statement under § 186 of the Atomic Energy Act. The Commission held a statement may be material within the meaning of section 186 (42 U.S.C. § 2236) if it has a natural tendency to influence the decision of that person to whom the statement was made, and further, that such a statement is false even if it is made without knowledge of its falsity. The consequences for making a false statement could be as severe as license denial or revocation. 42 U.S.C. § 2236; In the Matter of Hamlin Testing Laboratories Inc. 2 AEC 423, 428-9 (1964). See generally Diablo Canyon, CLI-82-1, supra; Consumers Power Company (Midland Plant, Units 1 and 2), LBP-81-63, 14 NRC 1768, 1777 (1981); In the Matter of Advance Industrial X-Ray Laboratories, 1 AEC 281, 284-5 (1960); In the Matter of X-Ray Engineering Company, 1 AEC 553, 555 (1960); In the Matter of Coastwise

Marine Disposal Company, 1 AEC 581, (1960), aff'd, 1 AEC 619 (1961).[24/]

In addition to an applicant's truthfulness and candor, past violations of law or regulations and a past propensity not to follow such rules, have also been weighed by this and other Commissions as an important indicator in determining whether an applicant has the necessary character to be awarded a license. Carolina Power and Light Company (Shearon Harris Nuclear Power Plant, Units 1, 2, 3 and 4), CLI-78-18, 8 NRC 293 (1978), upon remand, LBP-79-19, 10 NRC 37, 56-94 (1979); aff'd and modified, ALAB-577, 11 NRC 18, CLI-80-12, 11 NRC 514, Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), CLI-80-5, 11 NRC 403 (1980); Virginia Electric Power Company (North Anna Nuclear Station, Units 1 & 2), LBP-77-68, 6 NRC 1127 (1977); In the Matter of Hamlin Testing Laboratories Inc., supra; Mester v. U.S.;

24/ In the F.C.C. cases, it does not matter that a false representation is made by an agent or an employee for his own purposes and not in furtherance of the licensee's interest. The representations and the concealment may make the issuance of the license contrary to the public interest. F.C.C. v. WOKO, Inc., supra; WADECO, Inc. v. F.C.C., 628 F.2d 122 (D.C. Cir. 1980); White Mountain Broadcasting Co. v. F.C.C., 598 F.2d 274 (D.C. Cir. 1979). Similarly the materiality of the representations to the grant of the license is not necessarily as important as the fact that they were made, since this indicates a lack of trustworthiness. WOKO, Inc. supra; Independent Broadcasting Co. v. F.C.C., 193 F.2d 900, 902 (D.C. Cir. 1961); cert. denied 344 U.S. 837 (1962). The F.C.C. cases further indicate that misrepresentation, and a lack of trustworthiness can be inferred from an applicant's failure to carry out promises and representations made in the past. Immaculata Conception Church of Los Angeles v. F.C.C., 320 F.2d 795, 796 (D.C. Cir.), cert. denied, 375 U.S. 904 (1963); Leflore Broadcasting Co. v. F.C.C., supra; see also In the Matter of Hamlin Laboratories, supra.

70 F.Supp. 118 (E.D.N.Y.) aff'd. per curiam, 332 U.S. 749 (1947); United Broadcasting Co. v. F.C.C., 565 F.2d 699 (D.C. Cir. 1977); T.V., 9 Inc. v. F.C.C., 495 F.2d 929, 937-940 (D.C. Cir. 1973); Armored Carrier Corp. v. U.S., 260 F.Supp. 612, 615 (E.D.N.Y. 1966) aff'd, 386 U.S. 778, reh'g denied, 389 U.S. 924 (1967).

In Carolina Power and Light Co. (Shearon Harris Nuclear Power Plant, Units 1, 2, 3 and 4), CLI-78-18, supra, the Commission particularly remanded the proceeding for a further inquiry into the applicant's managerial capability as reflected in the applicant's compliance record with Commission regulations in constructing and operating nuclear facilities. 8 NRC 293. In Consumers Power Co., ALAB-106, supra, it was the applicant's compliance with Commission regulations that was a principal source of evidence in determining whether the applicant had the character to receive a license. See also In the Matter of Hamlin Testing Laboratories, Inc., supra. Unless the Commission believes that an applicant's management has evidenced a willingness and propensity to carry out regulations in order to protect the public health and safety, it should not issue a license.

Another indicator of corporate character is the extent to which an Applicant has kept itself informed of the licensed activity. In the instant case, the question has been raised whether HL&P's management abdicated responsibility for construction of the plant to too great an extent to B&R,[25/] and whether HL&P failed to keep itself informed of

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25/ HL&P cannot avoid responsibility for violations because B&R failed to comply with NRC regulations. In the Matter of Pittsburgh-Des Moines Steel Company, ALJ-78-3, 8 NRC 649 (1978); Virginia Electric and Power Company (North Anna Power Station, Units 1 and 2), LBP-75-54, 2 NRC 498, 503 (1975) and ALAB-324, 3 NRC 347, 357 (1976).

construction activity at the site. Either abdication of responsibility or failure to keep adequately informed would reflect negatively upon HL&P's character. Either would evidence a lack of understanding of the effort, discipline and aggressive management that is required to design, build and operate a nuclear power plant in accord with the high standards that must be applied to nuclear plants. See North Anna, supra, 6 NRC at 1150-51.

The Court of Appeals in Cosmopolitan Broadcasting Corp. v. F.C.C., 581 F.2d 917 (D.C. Cir. 1978), addressed the renewal of a radio license where the licensee had abdicated its responsibility for programming by failing to keep itself informed of the station's activities. In order for one to be eligible for a license it must not only accept the privileges granted by the license, but it also must perform the duties required of a license. In that case, the F.C.C.'s licensee merely acted as a clearinghouse for the sale of program time for use or resale by others. This practice violated the basic premise of F.C.C. licensing, that a license holder is a trustee for the public and must therefore assume primary responsibility for programming. The Court of Appeals in remanding the matter to the F.C.C., stated that in light of that policy a licensee's failure to retain responsibility for programming, or keep informed of that programming, could form a sufficient basis for license revocation. See also Continental Broadcasting Co. v. F.C.C., 430 F.2d 580 (D.C. Cir. 1971). Similarly, HL&P is under a duty to construct the STP in a manner which will not adversely impact upon the public. To the extent this Board finds HL&P abdicated too much responsibility to B&R

in the construction of the plant, or failed to keep itself adequately informed of construction activity at the site, such misconduct should be considered in determining the corporate character of HL&P. See, Houston Lighting and Power Company (South Texas Project, Units 1 and 2), CLI-80-32, supra at 291 (1980).

It is emphasized, however, that none of the character traits this Board must examine (i.e., evidence of material false statements, past compliance record, candor with the Commission, assuming responsibility for the licensed activity) are per se bars to a license. See e.g.: Cosmopolitan Broadcasting Co. v. F.C.C., 581 F.2d at 928; Bray Lines, Inc. v. United States, 353 F.Supp. 1240, 1249, (W.D. Okla.), aff'd, 414 U.S. 802 (1973). Each character trait is instead a factor that must be considered in determining whether an applicant has the overall character to be issued a license. See F.C.C. v. WOKO, Inc., 329 U.S. at 229; WEBR v. F.C.C., 420 F.2d 158, 164 (D.C. Cir. 1969); Armored Carrier Corp. v. United States, 260 F.Supp. at 615. supra. For example, if there is evidence of a poor compliance record in the past, any corrective actions taken by the Applicant after it received notice of the violations must be considered. North Anna, supra, 6 NRC at 1150-51; Shearon Harris, LBP-79-19, supra at 97; Midland, ALAB-106, supra, 6 AEC at 183-184. It is the Board's duty to consider the Applicants' character in the context of the record as a whole, and determine in its discretion whether a license should issue. Id.; Cosmopolitan Broadcasting Co., supra; Kidd v. F.C.C., 302 F.2d 873 (D.C. Cir. 1973); Armored Carrier Carrier Corp. v. United States, supra. Accordingly, it is within the above framework that the Board will evaluate the corporate character of HL&P.

2. Competence

The matters relative to judging managerial competence are more clearly defined than the traits examined in evaluating corporate character. See generally Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), CLI-80-5, 11 NRC 408 (1980); Virginia Electric & Power Company (North Anna Nuclear Power Station, Units 1 & 2), LBP-77-68, 6 NRC 1127 (1977); Carolina Power and Light Company (Shearon Harris Nuclear Power Plant, Units 1, 2, 3 and 4), LBP-79-19, supra; Guidelines for Utility Management Structure and Technical Resources, NUREG-0731. In the area of managerial competence, the applicant's management is reviewed for adequacy of organization and technical ability, prior performance as evidenced by I&E Reports, management attitude, and the response to or plans for confronting technical problems. Each of these factors is then weighed in evaluating managerial competence.

In Metropolitan Edison Company, supra, the Commission pointed to the areas of staffing, resources and past actions as germane to the issue of managerial competence. The Commission further stated when looking at these broad areas, that the Licensing Board should examine more specific matters such as the appropriateness of plant and corporate organization; staff technical qualifications; quality of corporate and plant management; past infractions by Metropolitan Edison in contrast to industry-wide statistics; and, inter alia, the interaction of site staff and corporate management. The Commission emphasized that it was not providing standards by which to judge managerial competence but only

outlining questions it deems pertinent to the management issue. The Board was to apply its own judgment in forming its conclusions. 11 NRC at 410. Here again, as in the area of corporate character, technical areas are identified as relevant areas to examine, but in the final analysis the Board is left with a standard of reasonableness with which to evaluate and weigh the various factors which in the aggregate constitute managerial competence.

Not only are past failures of management evaluated but the corrections of such past failures are given much weight in considering whether an applicant has the requisite competence and character to receive a license. In North Anna, LBP-77-68, supra, VEPCO's management conceded that it erred in the past, but believed substantial improvement had been made.[26/] The North Anna Licensing Board concluded that in light of VEPCO's current management's responsiveness in correcting items of noncompliance and its commitment to safe operation of the North Anna facility in compliance with all applicable requirements, it demonstrated its commitment and qualification to run the facility. 6 NRC at 1144. The North Anna Board did not feel VEPCO's past transgressions provided a basis for denying an operating license. In this connection, the North Anna Licensing Board found that although the record made clear that VEPCO lagged in upgrading its management to provide the necessary leadership and control to ensure the proper operation of a nuclear power plant;

26/ VEPCO also had been found to have made material false statements to the NRC. Virginia Electric and Power Company (North Anna Nuclear Power Station, Units 1 and 2), CLI-76-22, 4 NRC 480 (1976).

nonetheless, the record made equally clear that VEPCO's management improved as regulatory requirements increased and in response to NRC Staff recommendations. Consideration of the entire record led the North Anna Licensing Board to find that VEPCO had the commitment necessary to operate North Anna in compliance with all radiological health and safety requirements. Inquiries into such areas as corporate "commitment" in North Anna, LBP-77-68, supra; and "managerial attitude" in Midland, ALAB-106, supra, are examples where licensing boards are discharging their duty to obtain reasonable assurance that the applicant has the requisite competence and character to operate a nuclear power plant.

The approach indicated in Metropolitan Edison Co., supra, is currently followed by the Staff in evaluating managerial competence as evidenced by "Guidelines for Utility Management Structure and Technical Resources," NUREG-0731. This NUREG establishes guidelines for management organization and experience, plant staffing, training, as well as onsite and offsite resources for both routine and emergency conditions. The applicant's compliance with meeting these various guidelines is then weighed together with other relevant material in determining whether the applicant has the requisite managerial competence for a license. In short, if all technical areas are adequately addressed it can be inferred that the applicant's management appreciates the magnitude of the effort required to safely plan, construct and operate a nuclear power plant and is consequently making that effort. The Staff has evaluated the management of HL&P against the guidelines of NUREG-0731 and found it

to be properly organized and prepared for eventual plant operations. (Fdgs. at ¶ 109).

This Board will follow the guidance of the above principles in its determination of whether there is reasonable assurance that HL&P has the managerial competence and character to design, construct and operate the STP. The Board's Issues will next be addressed within the framework of the principles set forth above.

C. The Adequacy of the Corporate Character and Managerial Competence of HL&P

1. Board Issue A

Board Issue A asks whether HL&P's record of compliance with NRC requirements, without regard to the remedial steps taken as a result of I&E Report 79-19 and the related enforcement action, is sufficient to determine that HL&P lacks the necessary managerial competence or corporate character to be granted a license to operate the STP. For the reasons more fully set forth in the findings of this Board, it is concluded that HL&P's record of compliance through 79-19 was not sufficiently poor to conclude it does not have the necessary managerial competence or character to be granted an operating license for the STP. (See generally Fdgs. at ¶¶ 5-65.)

The many problems that HL&P experienced early in this project with its QA program stemmed from inexperience on its part and that of its principal contractor, B&R, with respect to the required effort, discipline and aggressive management to design, construct and operate a nuclear power plant. Specifically, an inordinately long chain of command between HL&P site QA and upper management hindered the effective de-

tection and resolution of problems by HL&P management. (Fdgs. at ¶¶ 48-58). This attenuation of quality control management from quality control inspectors on the site contributed to the weakening of the QA program at STP and may have created an atmosphere wherein QC inspectors could be harassed and intimidated by construction personnel. (Fdgs. at ¶ 53). Moreover, frequent turnover in key site positions within both B&R and HL&P contributed to this problem not being corrected as early as it might have been. (Fdgs. at ¶ 59).

Although HL&P upper management was not as informed about site activities as it should have been early in the program, the Board does not find this evidences a character flaw for purposes of licensing. While the QA program at the STP experienced problems, there was never a total breakdown in the program. (Fdgs. at ¶ 40). Indeed, certain aspects of the program were superior; for example, its reporting under its 10 C.F.R. § 50.55(e) obligation. Id. Throughout the history of this project, HL&P and B&R management at every level has shown a willingness to carry out their regulatory responsibilities and have always dealt with the NRC Staff in an open and helpful manner. Id. When problems were identified to HL&P, they promptly corrected the matter. HL&P solicited from the Staff ways in which its program might be enhanced. There is no evidence on the record that HL&P management ever intended not to comply with NRC regulations and the record is replete with examples of where HL&P management evidenced a sincere desire to comply with all appropriate regulations. Id.

Although the Commission indicated a concern about possible false statements in the FSAR, the evidence has established that the relevant statements were not false. (Fdgs. at ¶¶ 61-65). Similarly, inquiry into

the instances of harassment, intimidation and threats directed to QA/QC personnel, showed that they were isolated instances which were not sanctioned or condoned in any way by the management of HL&P or its principal contractor, B&R. (Fdgs. at ¶¶ 89-91). Indeed, although instances of harassment were documented, it was not shown that in any instance such harassment stopped the QA/QC personnel from performing their duties. (Fdgs. at ¶ 31).

No Item of Noncompliance as severe as a violation was ever issued against this project. (Fdgs. at ¶ 40). No evidence was presented that any statement in the FSAR or any other document filed by HL&P with the Commission was false or misleading. (Fdgs. at ¶¶ 61-65). HL&P did not abdicate its responsibility for the construction of the STP to B&R but rather kept itself knowledgeable about necessary construction activities. However, due to inexperience, it failed to assure that its contractors implemented an otherwise adequate written program. (Fdgs. at ¶ 41). This does not represent an uncorrectable character flaw, but rather, inexperience on the part of HL&P to fully realize the effort and aggressive management required to assure that a nuclear facility is proper designed, constructed and that plans for operation are adequately drafted.

The Board is not unmindful of CCANP's insistence that HL&P's past acts are alone sufficient to deny it a license to operate the STP based

upon inadequate character.[27/] Cases involving Court review of agency licensing decisions involving questions of character demonstrate that it is most unusual for an applicant's conduct to be found so opprobrious as to render the applicant unfit per se. Only misconduct consisting of willful deception of the agency on a grand scale or corrupt practices, neither of which is present here, has been found so repugnant as to taint beyond redemption an applicant's character. See, e.g., Continental Broadcasting v. F.C.C., 439 F.2d 580 (D.C. Cir.), cert. denied, 403 U.S. 909 (1971) (139 spurious documents submitted to Commission by station manager); Public Service Television, Inc. v. F.C.C., 317 F.2d 900 (D.C. Cir. 1962) (applicant tried, in prior proceeding for license for same channel, to corruptly influence the hearing official).

Absent such egregious misbehavior, even where an applicant has engaged in willful misconduct, it has been held in this Commission and

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27/ Many of the matters raised by CCANP for the first time in its findings are beyond the scope of this proceeding and the jurisdiction of this Board. For example, any suggestion that this Board could explore the legal implications of the Price-Anderson Act, 42 U.S.C. § 2210 (CCANP Findings at 7-8) are misplaced. Moreover, the popular magazines, books and other material upon which CCANP relies in its findings are not in the record and cannot as a matter of law form a bases for our decision. See factual assertions based upon A. S. Miller, Modern Corporate State (id. at 1, et seq.) and "Catastrophic Releases of Radioactivity," Scientific America, April, 1981, Volume 244, No. 4 (id. at 9). Administrative Procedure Act, 5 U.S.C. 556(e), 10 C.F.R. § 2.743; 10 C.F.R. Part 2, Appendix a, V(e); Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-463, 7 NRC 341, 351-52 (1978); Pacific Gas and Electric (Diablo Canyon Nuclear Plant, Units 1 and 2), ALAB-580, 11 NRC 227, 230 (1980). In addition, many of the findings of CCANP have no citation to the record at all. In these instances they are improper and provide no basis for a decision herein. 10 C.F.R. § 2.754(c), cf. Virginia Electric and Power Company (North Anna Power Station, Units 1, 2, 3 and 4), ALAB-256, 1 NRC 10, 14 n.8 (1975).

the courts have held that an agency does not abuse its discretion in granting a license upon determining that the applicant's conduct (and character) has improved so as now to be in compliance with regulatory requirements. See, e.g., Midland, ALAB-106, supra; North Anna, LBP-77-68, supra; Shearon Harris, LBP-79-19, supra; Central Florida Enterprise Inc. v. F.C.C. (No. 81-1795) (D.C. Cir. July 13, 1982) (license renewed despite willful violation of Commission rule); Cumberland Broadcasting Corp. v. F.C.C., 647 F.2d 1341 (D.C. Cir. 1980) (license granted despite applicant acquiescence in attorney misconduct); Kidd v. F.C.C., 302 F.2d 873 (D.C. Cir. 1962) (construction permit granted despite applicant's knowing and willful violations, misrepresentations, and concealments in conducting test operations); Bray Lines, Inc. v. United States, 353 F.Supp. 1240 (W.D. Okla.), aff'd, 414 U.S. 802 (1973) (carrier authorized to transport explosives despite its having been held in contempt and punished for violating court order); Slay Transportation Co. v. United States, 353 F.Supp. 555 (E.D. Mo. 1973) (carrier issued certificate despite engaging in illegal tacking operation); Armored Carrier Corp. v. United States, 260 F.2d 612 (E.D.N.Y. 1966), aff'd, 386 U.S. 778, reh'g denied, 389 U.S. 924 (1967) (carrier authorized to deliver in certain counties despite its previous unauthorized deliveries in same counties).

The rationale of these cases is expressed in Armored Carrier, supra: "The argument that past willful violations should, per se, bar a grant of authority in the present and for the future is one that looks backward and appears transfixed. Examination of the past should only be useful in assessing the prospective conduct of the applicant." 260 F.Supp. at 615. CCANP's approach views the denial of a license as a penalty for past

misconduct. The question before this Board, however, is whether the evidence shows HL&P presently has the character to abide by the terms of an operating license and the Commission's regulations in the future. HL&P has already been penalized for past noncompliances.

It is with the above considerations in mind that this Board expressly declines to follow the path chartered for it by CCANP and concludes HL&P's past acts are not sufficiently poor to alone justify denial of an operating license for the STP. Given that, this Board's central concern now becomes whether remedial measures taken subsequent to 79-19 and the Order to Show Cause are sufficient to find HL&P presently has the competence and character to be granted a license.

2. Board Issues B and C

Board Issue B asks essentially the same question as Board Issue A, however, it takes into account the remedial steps implemented by HL&P following 79-19 relative to the construction effort. (See generally Fdgs. at ¶¶ 66-107). Board Issue C reconsiders this same question after examination of HL&P's planned organization for operation. (Fdgs. at ¶¶ 108-126). For the reasons more fully set forth in the findings of this Board, it is concluded that HL&P has taken sufficient remedial steps to provide assurance that it now has the managerial competence and character to operate the STP safely.

As clear as the record is that HL&P management lagged in assuring that an otherwise appropriate program was properly implemented during the early stages of this project, the record is equally clear that following 79-19 upper management became intimately involved in the project and comprehensive changes took place. Once HL&P management was made aware of

the serious problems within its QA/QC program, comprehensive and in-depth corrections were made even prior to the Staff's enforcement actions stemming from the special investigation. (Fdgs. at ¶¶ 69-81). Specifically, following a meeting between HL&P management and the Staff in December, 1979 HL&P voluntarily committed to a Nine Point Program aimed at enhancing its QA/QC program and correcting many of the root causes identified in the Staff's ongoing investigation. (Fdgs. at ¶ 69-73). Similarly, following the exit interview associated with 79-19, HL&P voluntarily committed to a Thirteen Point Program attempting to correct the areas of concern to the Staff before any Staff enforcement action was imposed. (Fdgs. at ¶¶ 74-81). Programs were initiated to improve the working conditions of the QC inspectors, the audit system was revamped, the backfill program and welding activities were investigated and a concrete verification program was undertaken. In addition, numerous personnel changes were effectuated in an attempt to bring more senior and experienced personnel to the project site. When the Staff's enforcement action issued in April, 1980, HL&P's response was comprehensive, cooperative and effective. At all times HL&P's management evidenced a desire to get at the root causes of specific problems cited by the Staff rather than debate and challenge individual Items of Noncompliance. (Fdgs. at ¶¶74-81).

With respect to Issue C, considering the state of completion of the STP, HL&P's plans for operation are well underway. (Fdgs. at ¶¶ 108-126). HL&P upper management is intimately involved with the current construction activities at the STP and is aware of plant status

with a mind toward transition from construction activities to plant operation. Id. Based upon the evidence and observation of HL&P's upper management, there is reasonable assurance HL&P is dedicated to safe plant construction and operation and it appears to be HL&P's intent to insure that this objective is paramount in the minds of its employees. Key positions within the plant operations staff are already filled and that staff is engaged in writing procedures and participating in transition and start up activities. For these reasons and those more fully set forth in the findings of this Board, it is concluded there is now reasonable assurance that HL&P will have the competence and character, as well as the requisite commitment to safety, to operate the STP.

3. Board Issue D

Board Issue D asks whether the current construction QA/QC organizations and practices meet the requirements of 10 C.F.R. Part 50, Appendix B. (See generally Fdgs. at ¶¶ 127-146). Originally, the question referred to the B&R organization; however, in light of the changes in organizations performing the architect-engineer and constructor functions, this issue has been answered relative to the Bechtel and Ebasco organizations. For the reasons more fully set forth in the findings of this Board, it is concluded that that the construction QA/QC organizations and practices meet the requirements of 10 C.F.R. Part 50, Appendix B and further that there is reasonable assurance these programs will be implemented so that the construction of STP can be completed in conformance with the construction permits and other applicable requirements.

HL&P's most current QA program can be summarized as essentially three programs: the previously updated and Staff-approved QA program for the HL&P quality assurance related activities and the QA programs of the two recently assigned principal contractors, Bechtel and Ebasco. (Fdgs. at ¶ 130). The previously updated HL&P portion of the QA program provides for an improved QA organization with increased authority and responsibilities for surveillance by HL&P personnel during the day-to-day design and construction activities. Id. Bechtel commits to apply its Staff-approved quality assurance topical report, as modified to meet its assigned architect-engineer and construction manager functions. Id. Similarly, Ebasco commits to apply its Staff-approved quality assurance topical report, as modified, to meet its function as the constructor. Id. Both Bechtel and Ebasco have extensive nuclear experience in the functions to which they have been assigned at the STP. Moreover, preliminary review of both organizations indicates that they are selecting individuals with considerable qualifications and experience to manage their responsibilities at the STP. (Fdgs. at ¶ 141). Accordingly, for the reasons more fully set forth in the findings of this Board, the Board finds that the current QA/QC organizations and practices for the STP meet the requirements of 10 C.F.R. Part 50, Appendix B, and that there is reasonable assurance that they will be implemented so that construction of STP can be completed in conformance with the construction permits and other applicable requirements.

4. Board Issue E

Board Issue E asks whether there is reasonable assurance that the structures now in place at the STP are in conformity with the

con-struction permits and the provisions of Commission regulations. (See generally Fdgs. at ¶¶ 147-185). This issue goes on to question whether assuming certain structures are not in compliance, has HL&P taken steps to assure that such structures are repaired or replaced as necessary. Based on the reasons more fully set forth in the findings of this Board, it is concluded that there is reasonable assurance that the structures now in place at the STP are in conformity with the construction permits and the provisions of Commission regulations; it is further concluded that to the extent there are deficiencies, HL&P has taken steps to assure that they will be repaired or replaced as necessary to meet such requirements.

Following the Order to Show Cause, HL&P conducted a comprehensive verification program of Category I structural backfill (Fdgs. at ¶¶ 150-163), the concrete placements (Fdgs. at ¶¶ 164-172) and welding (Fdgs. at ¶¶ 176-185). Deficiencies were identified as a result of those verification programs in that voiding was detected in certain concrete structures and problems were identified in AWS and ASME welding. With respect to the voids detected, they were properly grouted and retested for adequacy (Fdgs. at ¶¶ 164-172). Welds were reexamined and extensive corrective action has been performed (Fdgs. at ¶¶ 176-185).

No evidence was developed in the record to indicate that any structure or compacted backfill was inadequate for its intended function. Extensive evidence was developed to indicate HL&P performed a comprehensive verification program relative to existing structures and took

adequate corrective action where deficiencies were detected. Accordingly, the Board finds that there currently is reasonable assurance that the structures now in place at the STP are in conformity with the construction permits and the provisions of Commission regulations.

D. Intervenor Contentions

1. Contention 1

CCANP Contention 1 asserts that due to specified construction deficiencies, the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2). (See generally Fdgs. at ¶ 186). CCANP maintains that due to these alleged deficiencies the Commission cannot find that the STP has been substantially completed in conformity with the construction permit and application, as amended, the provisions of the AEA, as amended, and the Rules and Regulations of the Commission. CCANP further asserts that there is no reasonable assurance that the activities which would be authorized by an operating license for the STP would be conducted without endangering the health and safety of the public.

The Board has examined each of the 15 subcontentions which make up Contention 1. For each of these subcontentions we have examined the validity of the allegation. If it was determined that allegation was valid, we have further examined the steps taken by HL&P to both correct the defect and to prevent recurrence of similar problems. We have also examined the Staff's review of each allegation and any corrective action taken. Where an allegation has been confirmed in whole or in part, we have determined the safety implications of any defect and made findings relative to whether there is reasonable assurance that the activities

which would be authorized by an operating license for the STP could be conducted without endangering the health and safety of the public in light of the deficiency.

Contention 1.1 asserts that there is a one foot surveying error in the Unit 2 Mechanical-Electrical Auxiliary Building. This fact was confirmed by both the Staff and HL&P. However, equipment within this building was rearranged to compensate for the one foot dimensional error and there is no safety significance to the fact that the building is offset one foot to the west of its original design. Although this does represent an instance where a safety related activity was not properly controlled, HL&P took prompt corrective action to assure a similar problem will not occur in the future. Additionally, this problem was reported by HL&P under its program pursuant to 10 C.F.R. § 50.55(e), indicating its self-policing mechanisms were working. (See Fdgs. at ¶¶ 189-196).

Contention 1.2 asserts that there has been a field construction error and as a result, extensive voids exist in the concrete wall enclosing the containment building. Here again, the fact that voiding occurred was not disputed by the Applicants or Staff. In fact, voids in Lifts 15 and 8 of the Unit 1 RCB were the subjects of 50.55(e) reports. Contrary to presenting an example of why the Applicant should be denied a license, the manner in which HL&P handled the investigation of voids should be pointed to as a reason why an operating license should issue. Specifically, after conducting an initial investigation into Lift 15 voids to determine the extent and location of unacceptable areas, HL&P initiated an extensive test program to determine whether this problem was

of a more general nature. Upon determining the scope of the voiding problem, HL&P filled the unacceptable areas within the structure and retested those areas to determine whether there were any ungrouted voids. Moreover, concrete construction procedures were modified in an attempt to cure the perceived cause of the voids. Although faulty concrete construction procedures may have contributed to the creation of voids, once this problem was detected, corrective action was taken in both assuring the structures were repaired and that construction procedures were enhanced to prevent future voiding. (See Fdgs. at ¶¶ 197-205).

Contention 1.3 asserts that a field document relative to Cadweld inspections has been lost and that consequently there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public. CCANP presented no evidence in support of its claim. Consequently this Board, together with HL&P and the Staff, were left guessing as to the details behind this allegation. An incident was the subject of testimony which has no effect on this Board's ability to conclude there is reasonable assurance that the activities which would be authorized by an operating license for the STP could be conducted without endangering the health and safety of the public. The Staff had received an allegation that field sketch No. FSQ-030 had been lost and was no longer available. This field sketch would have recorded where Cadwelds would have been placed in the structures. Although the field sketch had not been drafted, it was demonstrated that all of the Cadwelds which would have been recorded on that field sketch were properly welded and therefore there is no need to know the precise as-built location of each Cadweld. (See Fdgs. at ¶ 206-213).

Contention 1.4 asserts that there are membrane seals in the RCB's which are damaged. CCANP presented no evidence that there currently are damaged membrane seals in any structure. HL&P conceded that there were instances of localized damage to the membrane seal during the construction process, however, each time that occurred the area was identified by the QA/QC program prior to backfilling and documented as a nonconformance report. In the absence of any evidence on the record to indicate there currently are unrepaired areas on the membrane seal, this Board concludes that nothing about Contention 1.4 prevents it from having reasonable assurance that the activities which would be authorized by an operating license for the STP will be conducted without endangering the health and safety of the public. (See Fdgs. at ¶¶ 214-218).

Contention 1.5 asserts that there are steel reinforcement bars or rebar which are missing from the concrete around the equipment doors in containment and that such rebar is also missing from other areas in the containment structure. Again, no evidence was presented by CCANP to support its allegation concerning missing rebar. However, the Staff had investigated similar allegations on two separate occasions. On neither investigation did the Staff confirm any instances of missing rebar. Similarly, the Applicant concluded there is no missing rebar anywhere in the containment building; however, HL&P went on to explain that one could be under the impression rebar is missing from containment because often rebar cannot be erected in accordance with design drawings and is left out after appropriate design and engineering review. In the absence of anything in the record to support this contention, the Board finds it has reasonable assurance that the allegation set forth in Contention 1.5 will

not prevent the activities which would be authorized by an operating license for the STP from being conducted without endangering the health and safety of the public. (See Fdgs. at ¶¶ 219-224).

In Contention 1.6, CCANP again questions the adequacy of the documentation of Cadwelding activities. In this contention, CCANP asserts that Cadwelds have been integrated into parts of the STP, the locations of which cannot be exactly verified. CCANP presented no evidence relative to this contention. However, both the Applicants and the Staff suggested areas where Cadweld documentation has been found wanting in the past. In the wake of several Staff investigations into Cadweld documentation, HL&P established a Cadweld documentation task force to conduct a review of Cadwelding records. All Cadweld records were reviewed. As a result, approximately 190 of the 36,000 Cadweld records reviewed were lacking inspection records. However, 150 of these Cadwelds could be pinpointed to specific pours and by reviewing the pour cards documenting the placements of concrete it was determined that the Cadwelds were found acceptable through preplacement inspection.

This left the Board with having to make a determination about the safety significance of 40 Cadwelds embedded in the structures which may not have been subjected to in-process and visual inspection prior to concrete pours. The Board concludes there is no safety significance to this fact. First, the rejection rate based upon visual inspection of Cadwelds is approximately 1%. Moreover, even those Cadwelds which are visually rejected meet tensile strength requirements. Thus, the probability of any of the 40 embedded Cadwelds which had not been inspected failing a strength requirement is highly unlikely. Further,

the STP structures are designed conservatively and in a manner such that even if there were 40 instances where Cadwelds were below strength requirements or completely omitted from the structure, the structure would still perform its designed function. Accordingly, nothing about the inability of HL&P to verify the adequacy of 40 embedded Cadwelds precludes this Board from making the findings under 10 C.F.R. § 50.57. (See Fdgs. at ¶¶ 225-231).

Contention 1.7 first asserts generally that the quality control program at the STP has not met the appropriate requirements and then goes on to list four specific charges (Fdgs. at ¶ 232). Contention 1.7(a) asserts that efforts by quality control inspectors to verify that design changes were executed in accordance with the purpose of the original design were repeatedly and systematically thwarted. CCANP presented no witnesses relative to this subcontention. The most important point brought out by the Applicants was that it was not the function of the quality control inspectors to verify that design changes were executed in accordance with the purposes of the original design. Rather, the role of the QC inspector was to provide documented verification that the work performed by construction was in accordance with appropriate procedures, specifications and other related documents. The QC inspector played no role in the verification of design changes or the engineering acceptability of that change. The Staff found no evidence that efforts by QC inspectors to verify design changes with design engineers were thwarted.

The Applicants went on to explain a memo issued in April, 1979, which may have been misconstrued to be an attempt to thwart com-

munications between QC inspectors and design engineers. Apparently, line QC inspectors were repeatedly contacting design engineers and thereby taking time away from their inspection function. Accordingly, in an attempt to more effectively manage communications between QC and design, a memo was issued in April of 1979 limiting communications between inspectors and design engineers to a level no lower than lead inspector. In the absence of any evidence to the contrary, the Board finds it has reasonable assurance that nothing relative to the subcontention precludes it from determining that the activities which would be authorized by an operating license for the STP could be conducted without endangering the health and safety of the public. (See Fdgs. at ¶¶ 233-238).

Contention 1.7(b) asserts that there were personnel other than the original designer approving design changes with no first hand knowledge of the purpose of the original design. Here again, the Board was left with no testimony from the Intervenor in support of its claim. Rather, following both the Staff's and Applicants' general denial of the claim, the Applicants explained an incident which may have been construed by the Intervenor to be a practice of permitting an individual not familiar with the original design to make design changes. Although this explanation was useful to the Board as a possible cause of CCANP's contention, it was not necessary for its determination. No evidence was presented to preclude this Board from finding there is reasonable assurance that the activities which would be authorized by an operating license for the STP could be conducted without endangering the health and safety of the public. (See Fdgs. at ¶¶ 239-242).

Contention 1.7(c) asserts that design changes were approved by personnel unqualified in the type of design where the change was made. No evidence was presented by the Intervenor to support the substance of this allegation and the Staff found no incident wherein design changes were approved by personnel unqualified in the type of design that was changed. Again, the Applicants, although not admitting the basis of this contention, attempted to explain events on the site which may have caused the Intervenor to draft such a contention. In light of the fact that no evidence was presented relative to this contention by CCANP, the Board need not address HL&P's possible explanation of CCANP's misconception. Nothing was presented which would prevent this Board from finding there is reasonable assurance that the activities which would be authorized by an operating license for the STP would be conducted without endangering the health and safety of the public. (See Fdgs. at ¶¶ 243-245).

Contentions 1.7(d) and (e) allege that pour cards were falsified and inspections were not performed as a result of a pattern of intimidation of QC inspectors, resulting in inspectors playing cards rather than performing their inspections. Specifically, Contention 1.7(d) asserts that there have been numerous pour cards that were supposed to record the correct execution of concrete pours which were falsified by numerous persons. Contention 1.7(e) asserts that due to this pattern of behavior designed to intimidate QC inspectors, certain inspections were never performed because the inspectors decided to play cards over a period of four months rather than risk their safety by performing inspections on plant grounds. These occurrences were apparently triggered by an incident in July, 1977, where a B&R construction foreman assaulted and

injured a B&R quality control inspector. The Staff's investigation into this matter concluded that an inordinate amount of friction between construction and QC inspectors was present. However, it did not find a pattern of intimidation nor did it find that any inspectors failed to perform their inspections due to the inordinate amount of friction. There were card games during this period, however, they were only played during lunch or periods of low construction activity. Similarly, there were instances of harassment of quality control inspectors during this time when concrete pour cards were allegedly falsified and inspections not performed. The Board finds that no evidence was presented showing that quality control inspectors did not continue to perform their duties and accordingly nothing in the record on Contentions 1.7(d) or (e) precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. (See Fdgs. at ¶¶ 246-252).

Subcontentions 1.8(a)-(d) assert that based upon Staff I&E Report 81-28 (Staff Ex. No. 124) HL&P management failed to assure B&R took prompt corrective action in the area of access engineering and further did not support HL&P QA in its decision to write a stop work order on this matter. CCANP offered no evidence on these subcontentions. The Applicants and Staff adequately explained the findings of I&E Report 81-28, and for the reasons set forth in the findings of this Board, nothing in that explanation demonstrates that B&R was delinquent in not correcting the problems identified in access engineering sooner or HL&P management acted improperly in its dealings with the HL&P QA department. (See Fdgs. at ¶¶ 253-273).

2. Contention 2

Contention 2 asserts that NRC inspection reports indicate that the STP construction records have been falsified by HL&P and B&R employees and that such falsifications preclude this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2). No evidence was presented by CCANP in support of this claim. I&E Reports indicate that the Staff investigated allegations of document falsification on numerous occasions, but that these charges were confirmed on only three occasions. When document falsification was confirmed it had been perpetrated by field level employees and no corporate management involvement was found. Moreover, when these matters were brought to the attention of HL&P, prompt corrective action was taken and thorough in-house investigations were conducted to determine the scope of the problem and its safety significance. Accordingly, nothing about the occurrence of three incidents of document falsification precludes this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2). (See Fdgs. at ¶¶ 274-287).

E. Conclusion

Based upon the foregoing opinion, which is supported by reliable, probative, and substantive evidence, as more fully set forth in the findings of this Board, and upon consideration of the entire evidentiary record in this proceeding, it is concluded:

(1) HL&P's performance in the management of design, construction and planning and preparation for operation of STP demonstrates that HL&P presently has the necessary managerial competence and character

(including commitment to safety) to operate STP safely and in compliance with all applicable NRC requirements.

(2) There is reasonable assurance that safety-related construction work thus far completed at STP is adequate to perform its intended purpose or that appropriate repairs will be made as necessary to make such construction work adequate to perform its intended purpose, in conformity with its construction permits, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission.

(3) HL&P is managing, planning and implementing its program for the balance of design and construction of STP, including its QA program, in a manner which provides reasonable assurance that future construction work at STP will be in compliance with the construction permits, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission.

(4) No construction deficiencies have been identified which would preclude this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2); completed construction work has been completed in conformity with the construction permits, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission, and further, there is reasonable assurance that the STP will operate in conformity with the above Act and regulations.

FINDINGS OF FACT

I. INTRODUCTION

1. In an operating license proceeding, the Board is authorized only to decide the issues in controversy among the parties (10 C.F.R. § 2.760a and Appendix A to 10 C.F.R. Part 2, Section VIII) and those matters specially raised by the Board itself. In this proceeding, the contentions have placed in issue the general adequacy of the Applicants' QA/QC program for design and construction and certain construction deficiency. The Board has drafted issues based upon the concerns of the Commission that the adequacy of HL&P's competence and character be given a full airing in this proceeding.

2. As noted by the Commission in CLI-80-32, challenges to HL&P's competence and character permeate the Intervenors' pleadings and deserve a full hearing.[28/] In an attempt to implement the Commission's concerns, the Board adopted six issues relative to the competence and character of HL&P. Three of these issues pose essentially the same question - the adequacy of HL&P's corporate character and competence to operate the STP; however, the time period examined by each question differs. Board Issue A asks whether HL&P's record of compliance with NRC requirements, without regard to the remedial steps taken as a result of I&E Report 79-19 and the related enforcement action, is sufficient to determine that HL&P lacks the necessary managerial competence or

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28/ 12 NRC at 291.

corporate character to be granted a license to operate the STP. Board Issue B asks essentially the same question but takes into account the remedial steps taken by HL&P following 79-19 relative to the construction effort. Board Issue C reconsiders the same question posed by Issues A and B after examination of HL&P's planned organization for operation.29/

3. It is important that the Board explain its approach in deciding these issues. First, the central question this Board needs to answer is whether HL&P presently has the character and competence to be granted a license to operate the STP. Past acts are key indicators of HL&P's present qualifications, however, it would be an extraordinary and unprecedented finding to conclude that past actions alone are sufficient to warrant denial of a license on the grounds that an applicant currently lacks adequate character and competence. Absent such an extreme situation, this Board is compelled to look at remedial measures. Commission case law cautions this Board to look at the entire compliance record of an applicant before passing on its present qualifications. See Opinion at Section II.B.1 and 2, supra; North Anna, supra, 6 NRC at 1150-51; Three Mile Island, supra, 11 NRC 408 and Shearon Harris, supra, 10 NRC 37. If, upon examining the early performance of HL&P under its construction permit the Board finds that HL&P's character or competence were somehow inadequate, then the Board must determine if such deficiencies are so extreme that they should disqualify HL&P outright from being granted an

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29/ Board Issues D and E are discussed, infra. The hearing of the sixth issue, Board Issue F, has been postponed until later in this proceeding. Fourth Prehearing Conference Order, December 16, 1982 at 6.

operating license or, in the alternative, whether such inadequacies could be cured. If HL&P is not found to be disqualified from holding an operating license due to its actions prior to 79-19, then the remedial actions stemming from 79-19 will be examined to assure there presently is reasonable assurance HL&P has the competence and character to be granted a license to operate the STP.

4. Based upon the entire record of this proceeding, including but not limited to all documents received into evidence and all testimony given during the hearings, this Board makes the following findings of fact on contested issues."

II. BOARD ISSUES

A. The Adequacy of HL&P's Character and Competence Prior to the Remedial Measures Following 79-19 - Board Issue A

5. Board Issue A states:

> If viewed without regard to the remedial steps taken by HL&P, would the record of HL&P's compliance with NRC requirements, including:
>
> (1) the statements in the FSAR referred to in Section V.A.(10) of the Order to Show Cause;
>
> (2) the instances of non-compliance set forth in the Notice of Violation and the Order to Show Cause;
>
> (3) the extent to which HL&P abdicated responsibility for construction of the South Texas Project (STP) to Brown & Root; and
>
> (4) the extent to which HL&P failed to keep itself knowledgeable about necessary construction activities at STP,

be sufficient to determine that HL&P does not have the necessary managerial competence or character to be granted licenses to operate the STP?

6. In addition to addressing the four enumerated concerns in Issue A, the witnesses who testified on this issue presented evidence in regard to the overall compliance record of HL&P and its contractors through I&E Report 79-19, as well as the adequacy of the project management organization and the capabilities of key personnel within that organization. HL&P's compliance record was shown by I&E Reports, 50.55(e) Reports and evaluations of HL&P's overall course of conduct by both HL&P managers and the NRC inspectors who were responsible for reviewing the STP during this time period. The adequacy of the project management organization and persons occupying key roles within that organization were shown by an explanation of the development of that organization from its early stages. Moreover, key employees offered evidence relative to their education, job experience, familiarity with NRC requirements and attitudes toward both their job and NRC regulatory involvement.

7. The Applicants presented numerous witnesses to testify on HL&P's compliance record and corporate management's commitment to adequately design, construct and plan for the operation of the STP. Mr. Don D. Jordan, then President and Chief Executive Officer of HL&P, offered testimony on his personal, and HL&P's corporate, commitment to the safe construction and operation of the STP. Jordan direct ff. Tr. 1223. A panel consisting of Mr. George W. Oprea, Jr., Executive Vice President for HL&P; Mr. Joseph W. Briskin, STP Project Manager, Houston Operations for HL&P; Mr. Richard A. Frazar, then Manager STP QA for HL&P and;

Mr. John M. Amaral, Corporate QA Manager for Bechtel, offered testimony on HL&P's early experience in the construction of the STP and actions taken as a result of the Order to Show Cause (hereinafter referred to as Oprea, et al., direct ff. Tr. 1505). For its part, B&R offered the testimony of Dr. Knox M. Broom, Jr., Senior Vice President of B&R's Power Group and Raymond J. Vurpillat, Manager of the B&R Power Group QA Department, to explain the development of the B&R program at STP and that company's commitment to a quality program (hereinafter referred to as Broom, et al., direct ff. Tr. 3646).

8. The Staff presented two panels in response to Issue A. A Staff panel consisting of William C. Seidle, Chief, Engineering-Inspection Branch, Region IV; William A. Crossman, Chief, Section Three, Reactor Projects Branch, Region IV; William G. Hubacek, former Reactor Inspector, Region IV; Robert G. Taylor, former Reactor Inspector and currently Resident Reactor Inspector, Comanche Peak Station, Region IV; and H. Shannon Phillips, former Resident Reactor Inspector at STP, presented testimony relative to the history of construction activity at STP leading up to the Show Cause Order of April 30, 1980 (hereinafter referred to as Seidle, et al., direct ff. Tr. 9205). In addition, a Staff panel consisting of Robert E. Shewmaker, Senior Structural Engineer; D. W. Hayes, Chief, Reactor Projects Section 1.B, Region III; and H. Shannon Phillips, presented testimony relative to I&E Report 79-19 and the Order to Show Cause (hereinafter referred to as Shewmaker, et al., direct ff. Tr. 9576).

1. HL&P's Compliance Record Through 79-19

9. The Staff found that HL&P's record of compliance through 79-19, without regard to the remedial steps in response to that report, was not sufficiently poor to conclude it does not have the necessary managerial competence or character to be granted an operating license for the STP. Shewmaker, et al., direct ff. Tr. 9576 at 49. Furthermore, the Staff found that assuming the remedial steps ordered by the Commission and additional corrective action suggested by HL&P were implemented, the STP would be in compliance with all requirements and HL&P should be issued an operating license. Id. at 49-50. For the reasons that follow, the Board adopts these conclusions.

10. HL&P's compliance record has been primarily determined by a review of the Staff's inspection and enforcement program at STP. An understanding of that program is a prerequisite to understanding HL&P's record, and accordingly, that program will first be explained. Under the Staff's total reactor licensing program, it is the licensee's obligation to design, construct, test and operate its facility in accordance with the applicable regulatory requirements. Seidle, et al., direct ff. Tr. 9205 at 6. An integral and essential element of that regulatory program is licensee compliance with Appendix B to 10 C.F.R Part 50 - Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants. Id. This appendix describes a management control system, or quality assurance program, which each licensee must develop and implement. Id. The design of this program envisions a pyramid control system whereby the lower level of this pyramid assures a detailed inspection and test program by the licensee or its contractors to assure that all safety significant actions are properly accomplished. Id. At

this level of the quality control system, a detailed verification of the program requires up to 100% inspection by the licensee's on-site quality control personnel. Id. It is this level of verification of implementation of procedures that provides accept/reject decisions on specific equipment, construction activities, systems, technician or operator actions and procedures. Id. It is at this level of the system that the HL&P and B&R quality control inspectors were functioning.

11. Moving up the management control system, the licensee must next include a system of audits to oversee and test the adequacy of the performance of the detailed quality control tests and inspections. Id. at 7. These audit results are reported to licensee management which must make program corrections and provide feedback to the lower level of the system in the form of changes in training, modification of procedures, upgrading or improving testing methods, design changes or other programmatic improvements. Id. This feedback system is designed to assure and enhance the reliability of the program as a whole, which assures and verifies that all actions that are of safety significance have been considered and will be properly completed. Id. It is at this level of the system that Houston based B&R and HL&P auditors should have been performing. However, it was determined during 79-19 that there was a partial breakdown in both the B&R and HL&P audit programs for the years 1977, 1978 and 1979. Staff Ex. No. 46 at Appendix A, Items of Noncompliance 18 and 19.

12. At the upper level of this organizational scheme, the licensee's management must provide adequate organizational independence and competent manpower for its quality assurance and quality control

programs, and provide policy guidance to all aspects of the licensee's and contractors' organizations in order to assure quality performance in all safety aspects of the construction and operation of its nuclear facility. Id. It is at this level of the system that HL&P should have been providing its contractors programmatic direction. However, prior to 79-19 HL&P had neither the staff nor experience to provide such direction. Tr. 2228 (Amaral).

13. The Staff seeks reasonable assurance that the licensee's programs meet these regulatory requirements through its inspection, investigation and enforcement program. Id. In order to obtain this reasonable assurance, the Staff performs selective inspections, in contrast to the licensee performing up to 100% verification, of all phases of the construction activity. These inspections or investigations are not aimed at verification of individual components, actions, or procedures followed by the licensee, but rather are aimed at evaluating whether or not the licensee's management control systems relative to quality assurance are properly functioning and thereby verifying compliance. Id. at 7-8. The findings of the Staff reviewers are recorded in inspection and enforcement reports (I&E Reports).

14. An I&E report may embody the results of an investigation or an inspection. Inspections are normally devoted to routine review of selected areas of the construction effort against the criteria of appropriate NRC regulations or code requirements. Tr. 10,032 (Hall). The inspection program is a preventive program whereby on a routine basis, using a pre-planned documented inspection program, the licensee's facility is inspected in the more critical areas of nuclear construction.

Tr. 9325 (Seidle). In contrast, an investigation results from an allegation received by the Staff concerning an irregularity at a facility. Id. The Staff will investigate an allegation if it has safety significance, is sufficiently specific, and the alleger is credible. Tr. 10,358 (Herr). In light of the fact that most allegations involve safety related matters, the threshold for initiating an investigation is necessarily low. Tr. 10,363 (Phillips). Thus, in judging HL&P's corporate character and competence the Board finds little significance in the fact that an allegation was made and an investigation was initiated. The more significant facts are whether an allegation of impropriety was confirmed, whether it indicates managerial or programmatic failures, and how HL&P reacted to any positive finding.

15. If during an inspection or investigation a licensee fails to comply with any of a number of regulatory requirements, an item of noncompliance is written. Seidle, et al., direct ff. Tr. 9205 at 10. Such items of noncompliance prior to 79-19 were divided into three levels of severity: violations, infractions and deviations. Id. A violation was the most severe item of noncompliance and was issued when the fabrication, construction, testing or operation of a safety Category I system was such that the function or integrity of that system was lost. No violation was issued to HL&P during the time covered by Issue A. Seidle, et al., direct ff. Tr. 9205 at Appendix B. In contrast, an infraction was a less serious finding that a safety-related Category I system was impaired rather than lost. Id. at 10. Thirty infractions were issued to HL&P prior to 79-19. Id. at Appendix B. A deficiency was an item of non-compliance in which a threat to the health, safety or

interest of the public was, although remote, possible. Id. at 10. The Staff found eleven deficiencies before 79-19. Id. at Appendix B. The licensee's response to items of noncompliance are evaluated for adequacy and follow-up inspections are conducted to assure corrective action has been implemented properly. Seidle, et al., direct ff. Tr. 9205 at 13 and Tr. 9346 (Seidle).

16. Not every item of noncompliance is significant when judging a utility's overall competence and character to design, construct and eventually operate a nuclear power plant. See Opinion at Section III.B. Obviously, on a large construction site, with many individuals involved in a complex construction effort, variances from procedures will occur. Indeed, the detection of such irregularities and their subsequent correction is the very function of a properly operating QA/AC program. Therefore, before items of noncompliance are judged significant indications of a lack of applicant character or competence, it must be determined if they were violations, infractions or deficiencies. Moreover, the compliance record must be more closely examined to determine whether the record as a whole is so severe or noncompliances are so numerous to indicate corporate incompetence or lack of proper managerial attitude. If it is determined that items of noncompliance stem from either incompetence or a failure to devote the proper attention to the construction effort, then these items of noncompliance are probative of whether the utility has the requisite character and competence to be granted an operating license. Accordingly, in surveying HL&P's compliance record this Board will be essentially making a determination of whether the items of noncompliance found were either so

severe or constitute such a pattern of deviations as to indicate that HL&P management did not have the competence or character to assure that the STP was being designed and constructed in conformity with industrial codes and regulatory requirements.

17. During the approximately six years of design and construction activity on this project prior to I&E Report 79-19 the Staff performed approximately seventy-eight site and corporate inspections or investigations. Seidle, et al., direct ff. Tr. 9205 at 9-10 and generally Appendix A to that testimony. These inspections and investigations resulted in the issuance of approximately forty-one notices of items of noncompliance. Id. and generally Appendix B to that testimony. Although it has been argued the types of problems found at the STP during this period were of a similar nature to those experienced on other nuclear construction projects, Oprea, et al., direct ff. Tr. 1505 at 18, any comparison with the compliance record of another nuclear project is misplaced because the enforcement program implemented by the Staff is a specific program tailored to an applicant's site specific procedures and commitments. Tr. 9469 (Crossman). One plant is not compared with another facility before an item of noncompliance is written. Id. Thus, the specific compliance record of HL&P at STP is the primary indicator of whether it now has the requisite character and competence for this Board to conclude it should eventually be granted a license to operate the STP.

18. Up until 79-19, eleven investigations were initiated. The charges giving rise to these investigations are summarized as follows: Staff Ex. No. 1 (reported falsification of test records for concrete); Staff Ex. No. 4 (alleged threats to two QC inspectors); Staff Ex.

No. 5 (alleged questionable radiographs), Staff Ex. No. 6 (alleged improper procedures relative to assigning tools); Staff Ex. No. 7 (alleged falsification of Cadweld Records); Staff Ex. No. 8 (alleged irregularities in the civil QA/QC program); Staff Ex. No. 12 (alleged misconduct of B&R QC inspectors); Staff Ex. No. 13 (alleged irregularities in Cadwelding and mislocation of Unit 2 mechanical-electrical auxiliary building); Staff Ex. No. 17 (alleged irregularities in Cadwelding); Staff Ex. No. 26 (alleged irregularities in concrete and Cadwelding processes); and Staff Ex. No. 32 (alleged irregularities in the QA/QC program).

19. The majority of the allegations that gave rise to these investigations were not substantiated. The eleven investigations resulted in the finding of only four infractions and one deviation. For the reasons which follow the Board finds that these items of non-compliance, both individually and collectively, were not so severe or numerous to warrant the conclusion that HL&P does not have the character or competence to be granted a license to operate the STP. None of the items of noncompliance involved purposeful management misconduct or otherwise reflected negatively on HL&P's corporate character. Specifically, in Staff Ex. No. 13 (I&E Report 78-15) the Staff found two infractions during an investigation conducted in September, 1978. Staff Ex. No. 13 at Appendix A. HL&P was cited for the failure of Cadwelders to follow Cadwelding procedures and failure to provide the requisite in-process Cadweld inspection during the night shift. HL&P was next cited as a result of an investigation into its QA program in January, 1979. Staff Ex. No. 17 (I&E Report 79-01). HL&P was given an

infraction for its failure to provide a procedure for a quality control activity. Id. at Appendix A. Finally, following an investigation conducted during September, 1979, an infraction was issued for the failure to follow procedures for the release of a stop work notice. Staff Ex. No. 32 (I&E Report 79-14) at Appendix A. During this same investigation a deviation was issued for improperly recorded QC records relative to a concrete placement. Id. at Appendix B.

20. All of these noncompliances were corrected by HL&P in a timely manner and in each case the corrective action suggested was found acceptable by the Staff. In response to being cited for its failure to follow Cadweld procedures, B&R and HL&P initiated in November, 1978, a visual reinspection program. In addition, selected Cadwelds were cut out and passed strength tests. Moreover, an additional training session for both Cadwelders and inspectors was given to assure proper understanding of the procedural requirements for Cadwelding. Staff Ex. No. 15. In response to being cited for its failure to provide inspectors during the night shift, HL&P committed to assigning Cadweld inspectors to both the day and night shift and procedures were revised to require that Cadwelder surveillance be performed on a "per shift" basis rather than on a "once per 24-hour" basis. Staff Ex. No. 15. The corrective action in response to both of these infractions was reviewed and found to be acceptable by the Staff in Staff Ex. No. 16 at 3-4.

21. As noted above, HL&P was also cited for its failure to provide procedures for a quality control activity. Staff Ex. No. 17. Specifically, Cadwelding examination check lists were being transcribed without benefit of documented instructions, procedures or drawings. Id.

at Appendix A. HL&P adequately resolved this infraction by issuing procedures designed to control the transcription of Cadwelding examination check list records. Staff Ex. Nos. 18 and 19. HL&P's failure to follow procedures for the release of a stop work order was similarly adequately resolved. Staff Ex. Nos. 33 and 35 at 3. Apparently, all the requisite engineering analysis had been performed to warrant the release of the stop work order; however, the accompanying documentation was not complete. Staff Ex. No. 33 at 1. This was an example of the B&R site QA manager not following QA procedures. In addition, the deviation issued for improperly filled out QA records was addressed to the Staff's satisfaction. Staff Ex. Nos. 33, 34 and 35.

22. The Staff performed over sixty-five inspections between November, 1973 and November, 1979. See Seidle, et al., direct ff. Tr. 9205 at Appendix A. Many of the problems found during this period were minor, however similar problems continued to resurface and the inability of HL&P to effect a programmatic and permanent solution eventually became of such concern to the Staff that the investigation which resulted in 79-19 was initiated. Seidle, et al., direct ff. Tr. 9205 at 64.

23. For example, there were recurrent allegations relative to a lack of management support for QC inspectors and charges of an inadequate QA/QC program. Id. at 64. In addition to the specific investigations into problems in the QA program set forth in ¶ 18 through 21, supra, the Staff met with the corporate management of HL&P on August 15, 1978 to discuss the Staff's concern over low morale among the civil QA/QC personnel, weaknesses in the implementation of the site civil QA/QC

program and the adequacy of the QA/QC staffing levels. Staff Ex. No. 9 at 2. (See also Fdgs. at ¶ 24). The Staff expressed concern over the fact that procedures and acceptance criteria that QC inspections must follow were ambiguous, upper management was perceived as inaccessible to the inspectors and there was apparently undue pressure on the QC inspectors from construction. Staff Ex. No. 10. During this meeting, as throughout this period, the Staff found HL&P management responsive and totally committed to quality assurance. Tr. 9506 (Seidle). However, due to recurrences of similar problems it was evident that during the time covered by Issue A HL&P's management controls were not properly functioning down to the field worker level . Tr. 9506 (Seidle).

24. During this time period HL&P was cited numerous times for problems in its QA program. Seidle, et al., direct ff. Tr. 9205 at Appendix B; 75-02 (failure to clearly delineate authority and duties of QA personnel), 77-06 (unqualified QC inspectors), 77-09 (unqualified QC inspectors) 77-12 (deficiencies in the audit program), 79-08 (failure to have a procedure to monitor a safety related activity), 79-13 (the failure to have procedures for maintaining QA manuals, failure to follow procedures for conducting site audits, failure to delineate organizational changes in the QA manual and failure to maintain completed audit checklists in the licensee's audit files).

25. There were repeated procedure and documentation problems in the area of Cadwelding as well. Early in the construction effort HL&P was cited for its failure to follow procedures for Cadweld fabrication and the failure to follow procedures for inspection and acceptance of Cadwelds. Seidle, et al., direct ff. Tr. 9205 at Appendix B. Sub-

sequently, items of noncompliance were again issued for the failure to follow Cadweld procedures and the failure to provide specific in-process inspection. Staff Ex. No. 13. Items of non-compliance were further written on failures to follow appropriate transcription of Cadweld inspection records and the reporting of Cadweld qualification test results by an improper individual, Staff Ex. Nos. 16 and 17. The problem HL&P experienced in Cadweld documentation is discussed, infra at Sections III.A.3. and 6.

26. The area of concrete placement provides yet another example of where HL&P was cited repeatedly for minor noncompliances that, viewed alone, were of little safety significance. However, they confirmed the emerging trend that indicated HL&P was unable during this period to effectively correct programmatic deficiencies within its QA/QC program. Specifically, on three separate occasions infractions were written against HL&P for its failure to follow proper concrete consolidation practices See, CCANP Ex. Nos. 2 and 8, and Staff Ex. No. 36. In addition, the Applicant was cited for failure to follow concrete placement procedures in not controlling concrete temperature in CCANP Ex. No. 8; permitting standing water and improper lateral movement of concrete in Staff Ex. No. 20; and the failure to include appropriate quantitative or qualititative acceptance criteria for concrete surface moisture prior to placement in Staff Ex. No. 41.

27. Throughout this history, HL&P's compliance record was being studied by the Division of Reactor Construction Inspection in NRC headquarters. Shewmaker, et al., direct ff. Tr. 9576 at 4. Headquarters agreed with the Regional Office that, although HL&P was cooperative in

correcting specific problems, the resurfacing of the same or similar problems evidenced HL&P's inability to control the construction effort. Id. In an effort to assess the effectiveness of the QA program it was determined that the Staff's mid-term QA inspection, scheduled to be conducted in 1980, should be performed a year early. Id. Th t report that issued in October, 1979, found five items of noncompliance: failure to follow procedures for maintaining a QA Manual; failure to follow procedures in conducting a site audit; failure to delineate an organizational change in a QA Manual; failure to maintain complete audit files; and failure to mark a QA procedure deleted. See Staff Ex. No. 27 at Appendix A. Concurrent with the issuance of this report the resident inspector again received allegations relative to lack of QC management support, harassment and intimidation of quality control employees. Shewmaker, et al., direct ff. Tr. 9576 at 4-5.

28. As a result of the mid-term QA inspection and recurring allegations, the Director of the Office of Inspection and Enforcement ordered on November 3, 1979, an in-depth investigation be made into these continuing allegations and into the current effectiveness of the QA program. Id. at 5.

29. The Staff presented a panel consisting of Robert E. Shewmaker, H. Shannon Phillips and D. W. Hayes to testify relative to the findings of I&E Report 79-19 and the Show Cause Order of April 30, 1980 which resulted from the in-depth report. Mr. Hayes has been involved in various aspects of the nuclear industry for the past thrity-four years and is currently Chief of the Reactor Inspector and Engineering Support Section in NRC's Region III office. Id. at Professional Qualifications.

Mr. Hayes was designated the investigation team leader and coordinated the investigation activity that occurred between November 10, 1979 through February 7, 1980. Mr. Shewmaker has been a structural engineer for the past nineteen years and is currently a senior civil-structural engineer with the Staff. Id. at Professional Qualification. Mr. Shewmaker was the liaison for headquarters and both reviewed the results of 79-19 and participated in the decision relative to enforcement. Id. at 5. Mr. Phillips has been involved with various aspects of quality control for the past nineteen years and was the Resident Reactor Inspector at the STP since 1979. Id. at Professional Qualifications. Mr. Phillips, as the STP Resident Reactor Inspector, provided the desired continuity from the special investigation through follow-up inspections. Id. at 5. Other members of the team were chosen by reason of their expertise in specific aspects of nuclear construction. Id.

30. This special investigation found that procedural and programmatic inadequacies in the HL&P and B&R organizations had resulted in a failure to systematically identify quality control problems and a failure to routinely correct and prevent the recurrence of identified problems. Shewmaker, et al., direct ff. Tr. 9576 at 7 and Staff Ex. No. 46 at 9. Such inadequacies in the QA program resulted in a lack of adequate control over safety-related activities. Id. It was concluded that the lack of detailed involvement by HL&P in the total scope of construction activities at the STP was an apparent major reason behind programmatic inadequacies. Shewmaker, et al., direct ff. Tr. 9576 at 7. HL&P was cited for a total of twenty-two items of noncompliance in 79-19.

Staff Ex. No. 46 at Appendix A. HL&P acknowledged these noncompliances occurred. Staff Ex. No. 47 and Tr. 1365 (Jordan).

31. Allegations of harassment and an inordinate amount of friction between B&R quality control inspectors and construction personnel, which had been common knowledge by way of rumor, were substantiated by this investigation. Shewmaker, et al., direct ff. Tr. 9576 at 7. Staff Ex. No. 46 at 9. HL&P was aware of the problems in this area for more than a year prior to 79-19. Staff Ex. Nos. 9 and 10. Nonetheless, HL&P was unable to effectuate a solution to this tension. No evidence was gathered, however, to indicate the QC inspectors did not perform their inspections as a result of this harassment. Staff Ex. No. 46 at 10.

32. Item of Noncompliance 1 in 79-19 addresses this problem. This noncompliance is perhaps the most serious of the twenty-two items of noncompliance and warrants further discussion. This infraction maintains that during the period of October, 1979 through January, 1980 HL&P was in continuous noncompliance with 10 C.F.R. Part 50, Appendix B in that the licensee and B&R did not adequately control all safety related activities to assure such activities were conducted in accordance with Appendix B. Staff Ex. No. 46 at Appendix A, p. 1. This continous noncompliance is evidenced by several examples; specifically, pressure from construction for QC inspectors to either rush through or overlook their inspection function, QA/QC site supervisors' continuous siding with construction during disputes between contruction and QC inspectors, a general lack of support for QC inspectors from their site supervisors and physical threats from construction personnel against QC inspectors. See Staff Ex. No. 46 at Appendix A, p. 1-5. As a result, it was determined that the QA/QC function in the civil area was not sufficiently independent from

construction, QA/QC civil personnel did not have sufficient authority and QA/QC personnel did not have sufficient freedom to identify problems and to adequately resolve indicated problems. Shewmaker, et al., direct ff. Tr. 9576 at 11.

33. The record indicates that HL&P management was aware of similar problems in both 1977 and 1978, and that it was formally called to their attention in August, 1978. Tr. 1378 (Jordan) Staff Ex. Nos. 9 and 10, Tr. 3561-62 (Turner). However, HL&P apparently failed to implement an effective resolution to this problem as late as the spring of 1980. It further appears that these problems between construction and QA/QC personnel were permitted to continue due to inexperienced management and an unusually long chain of command from the site to upper management, thereby masking critical information. Tr. 1739 (Amaral).

34. The special investigation further confirmed that earlier corrective action implemented by HL&P relative to concrete placement procedures had not prevented recurrence of poor concrete practices, which at times resulted in voids in structural concrete. Staff Ex. No. 46 at Appendix A. Item of Noncompliance 7 and Shewmaker, et al., direct ff. Tr. 9576 at 8. Problems that persisted until the time of 79-19 included: procedures lacking in clarity and qualitative concrete placement acceptance criteria; personnel with inadequate training, experience and/or education; and production pressures in the form of harassment and intimidation of employees. Shewmaker, et al., direct ff. Tr. 9576 at 8, Staff Ex. No. 46 at 50-60. With respect to other specific areas of construction, the investigation revealed that backfill placement procedures were not uniform and consequently backfill may not have been sufficiently compacted to meet required densities. Shewmaker, et al.,

direct ff. Tr. 9576 at 8 and Staff Ex. No. 46 at Appendix A, Items of Noncompliance 2, 3, 4, 5, 16 and 17 and Section II.E.1, infra. In addition, serious problems were identified in the area of safety related welding controls, welder qualifications and NDE performance and interpretation. Shewmaker, et al., direct ff. Tr. 9576 at 8 and Staff Ex. No. 46 at Appendix A, Items of Noncompliance 10, 11, 12 and 13, and Section II.E.3, infra.

35. Audits - the necessary checks to provide feedback to management concerning the effectiveness of the QA program - were improperly implemented and at times not performed. Shewmaker, et al., direct ff. Tr. 9576 at 8 and Staff Ex. No. 46 at Appendix A, Items of Noncompliance 18 and 19. Moreover, no effective program had been implemented to perform continous and effectiveness trend analysis of HL&P and B&R generated noncompliance reports, thus allowing chronic problems to persist. Shewmaker, et al., direct ff. Tr. 9578 at 8.

36. An overall lack of an agressive and effective QA/QC program was found. That is to say the principal failure found was not the adequacy of the QA/QC written, in-place program; but rather, the failure of both HL&P and B&R to effectively implement the in-place requirements and procedures. Shewmaker, et al., direct ff. Tr. 9576 at 8. HL&P conceded this fact. Tr. 3421 (Turner); Tr. 1365 (Jordan); Tr. 1715 (Amaral).

37. As a result of these findings, the Staff issued an Order to Show Cause, effective in ninety days, requiring HL&P to set forth its reasons why safety related construction activities at the STP should not be stopped and remain stopped until certain specified actions were completed by HL&P. Specifically, HL&P was directed to complete ten

specific actions in order to permit the Staff to evaluate whether future activities at the STP could be conducted in accord with Appendix B to 10 C.F.R. Part 50. Shewmaker, et al., direct ff. Tr. 9576 at 9.

38. To summarize the actions mandated by the Staff, HL&P was directed to do the following:

> 1. Contract an experienced, independent management consulting firm, knowledgeable in QA/QC and nuclear construction, in order to evaluate HL&P's management of the quality assurance program, giving due consideration to certain organizational arrangements.
>
> 2. Review existing data or obtain new data in regard to safety related aspects of Category I structural backfill.
>
> 3. Review safety related welding in the civil structural and piping area, as well as safety related concrete structures, and report on the extent of necessary repairs, incorporating a schedule for completion of those repairs.
>
> 4. Rescind a B&R brochure entitled "Implementation of the Brown and Root Quality Assurance Program at the South Texas Project Job Site" and issue a new brochure incorporating the fundamental philosopnies contained in 10 C.F.R. Part 50, Appendix B.
>
> 5. Define more clearly which employees have stop work authority and describe how that line of responsibility was to be implemented.
>
> 6. Develop and implement a more effective system to provide for the identification and correction of "Root Causes" of nonconformances.
>
> 7. Develop and implement a more effective program to provide for the control of field changes in order to assess the impact of the overall design of the structure.
>
> 8. Develop and implement a more effective system of records control.

9. Develop and implement an improved audit system.

10. Verify or correct, if necessary, the FSAR Statements contained in Sections 2.5.4.

See generally Staff Ex. No. 46 at Order to Show Cause.

39. In addition to the overall directives in the Order to Show Cause and the twenty-two items of noncompliance; the Staff further levied a $100,000.00 fine against HL&P based upon the items of noncompliance. Staff Ex. No. 46 at Appendix B - Notice of Imposition of Civil Penalties and Staff Ex. No. 90.

40. It should be stressed, however, that the special investigative team did not find a total breakdown in the STP QA/QC program. Tr. 9855 (Phillips). In many instances the STP QA/QC program was working very well and exceeded the minimum requirements imposed by the NRC. Id. and Tr. 9861 (Shewmaker). For example, HL&P's record in identifying and reporting construction deficiencies, in accordance with 10 C.F.R. § 50.55(e) was open, honest and better than most other utilities. Id. at Crossman, et al., direct ff. Tr. 10010, Appendix C. HL&P's attitude was good relative to both assisting the Staff in inspections and investigations, and in promptly correcting problems found. Tr. 9855-60 (Phillips); Tr. 9861-63 (Shewmaker) and Tr. 9863-64 (Hayes). The special team found no irreparable construction deficiencies in structures already completed. Shewmaker, et al., direct ff. Tr. 9576 at 7. Indeed, from the inception of this project the Staff has never issued HL&P an item of noncompliance at the severity level of a violation--indicating the Staff does not believe the functional integrity of any system has ever been lost. Seidle, et al., Tr. 9205 at Appendix B. Indeed, none of the 22

infractions were considered by the Staff to be so severe as to indicate that HL&P management was irresponsible or grossly negligent in permitting them to occur. Tr. 9853-54 (Phillips). The fact these problems occurred was not the result of irresponsible corporate management but rather the result of HL&P's and B&R's inexperience in nuclear design and construction. Shewmaker, et al., direct ff. Tr. 9576 at 49.

41. The special investigative team found that where HL&P failed was in assuring that their various contractors carried out their duties in compliance with all applicable requirements. Tr. 9864 (Hayes). This does not represent an uncorrectable character flaw, but rather, inexperience on the part of HL&P to fully realize what it takes to design, construct and plan for the operation of the STP. Tr. 9864 (Hayes).

42. In the wake of this escalated enforcement action, HL&P attempted to trace its various problems in its QA program back to one of six root causes:

> 1. Translating specifications and requirements into clear and simplified procedures down to the job level.
>
> 2. Improvement in systems for documenting nonconforming conditions and failure to perform systematic trend analysis.
>
> 3. Upgraded training of personnel at all levels in quality related tasks.
>
> 4. Stronger systems control, reflected in procedures which assure quality related activities are initiated, controlled and properly documented.

5. Improvement in the system of audits.

6. Increased visibility of, and active participation by, upper management in QA/QC activities.

Staff Ex. No. 47 at 2-3.

43. The Board does not disagree with any of these root causes, but finds that the primary cause of the problems identified in 79-19, as suggested by the Staff, was inexperience on the part of all levels of HL&P and B&R management with implementing a many faceted program to design, construct and plan for the operation of a nuclear power plant and an attenuated chain of command from the site to upper management. See Section II.A.2, infra.

44. The Board finds that for the reasons set forth above the instances of noncompliance set forth in the Notice of Violation attached to 79-19 and the Order to Show Cause are insufficient to determine HL&P does not have the necessary managerial competence or character to be granted a license to operate the STP. Moreover, it is our conclusion that none of the early recurring problems giving rise to the special investigation rose to the level of severity that would indicate HL&P lacked these attributes.

2. Management Organization and Key Personnel Prior to 79-19

45. The adequacy of the project management organization and an examination of persons occupying key roles within that organization were the subjects of extensive testimony. The Board examined HL&P corporate and site management involved in all phases of this project--design, construction and QA/QC. Jordan, direct ff. Tr. 1223; Oprea, et al., direct ff. Tr. 1505 and Goldberg, et al., direct ff. Tr. 906. The B&R

project management group for both construction and QA/QC was also presented. Broom, et al., direct ff. Tr. 3646.

46. In reviewing the record the Board concludes that a major contributing factor to the problems encountered at the STP both before and during 79-19 was the general lack of experience on the part of key personnel in the design, construction and planning for the operation of a nuclear power plant. Moreover, frequent turnover in key positions, particularly B&R General Manager and Site Manager, contributed to the problems identified in 79-19. The basis for these conclusions will next be set forth.

47. Mr. Don D. Jordan, the President and Chief Executive Officer of HL&P since 1974, testified to his company's corporate commitment to the safe construction and operation of the STP. Jordan, direct ff. Tr. 1223 at 2-3. Mr. Jordan had no prior involvement with nuclear construction or operation before HL&P initiated plans for the STP. Id. Although he knew from the beginning that the construction and operation of a nuclear power plant would be more complex than a similar venture involving a fossil fuel plant, he was not sensitive to just how complex a nuclear project could be until 79-19. Jordan direct ff. Tr. 1223 at 11 and Tr. 1396 (Jordan). Mr. George W. Oprea, Jr., HL&P's Executive Vice President in charge of the overall STP effort from the beginning similarly testified that his "intensity" toward the project has increased since the issuance of the construction permit. Tr. 3397 (Oprea). Given the fact that complexities of nuclear construction may have caught HL&P's senior management by surprise, Mr. Jordan still did not feel it was a fair statement to say that HL&P abdicated its responsibility to its con-

tractors or failed to keep itself knowledgeable concerning activity at the STP. Id. at 8. For his part, Mr. Jordan communicated with Mr. Oprea on almost a daily basis, he was briefed by HL&P executives during the weekly executive meeting and further participated in the monthly partners management meeting. Id. at 8-9 and Tr. 1264 (Jordan). Moreover, nothing in his conversations with Mr. Oprea prior to 79-19 indicated that QA/QC was experiencing the significant problems identified in 79-19. Id. at 8-9.

48. This failure to perceive the problems set out in 79-19 stemmed from upper management's failure to receive the type of information it needed in order to make informed decisions. Tr. 1395 (Jordan). The probable cause for this failure to receive relevant information was the long chain of command between relatively inexperienced individuals within the HL&P QA organization. Tr. 1850 and 1897-98 (Amaral). There were too many layers of supervision between site supervisors and upper management. Id. This resulted in a screening effect on information. Id. In addition, audit reports were not issued beyond the level of the organization being audited, so consequently there was no feedback system to upper management to alter the system based upon the results of an audit report. Tr. 1897-98 (Amaral). It was Mr. Jordan's feeling that HL&P's failure to perform audits and trend analyses contributed to its failure to be adequately informed about the matters brought out in 79-19. Tr. 1394 (Jordan). He further cites the fact that although HL&P adequately addressed each item of noncompliance as it arose, it failed to look deeper into its compliance record to see an emerging trend. Tr. 1446-47 (Jordan).

49. Mr. George W. Oprea, Jr., Executive Vice President of HL&P and member of HL&P's Board of Directors was presented to offer testimony regarding the development, management, and implementation of HL&P QA program at STP. Oprea, et al., direct ff. Tr. 1505 at 4. Mr. Oprea is HL&P's second ranking officer and has been responsible for the STP since the day of its inception. Tr. 1239 (Jordan). Although Mr. Oprea has an extensive engineering background, he had no prior experience with nuclear design or construction prior to HL&P's decision to build the STP. Oprea, et al., direct ff. Tr. 1505 at 3-4.

51. HL&P QA was described as performing an oversight function and providing programmatic direction to B&R on the implementation of the STP QA program requirements. Oprea, et al., direct ff. Tr. 1505 at 8. However, prior to 79-19 it was conceded by HL&P that it did not have a clearly defined idea of what was involved in providing its contractor programmatic direction. Tr. 2965 (Frazar) and Applicant Exhibit No. 8.

52. HL&P presented Mr. John M. Amaral as an expert in the area of QA/QC and he offered testimony on the meaning of programmatic direction and HL&P's ability to provide such guidance. Oprea, et al., direct ff. Tr. 1505 at 118. Mr. Amaral is the manager of quality assurance for Bechtel Power Corporation and presented testimony regarding QA organizational structures. Id. Oprea, et al., direct ff. Tr. 1505 at 118. Mr. Amaral defined programmatic direction as establishing the quality assurance policies and basic programs that a contractor would then implement through detailed procedures. Tr. 2228 (Amaral). It was the opinion of Mr. Amaral that prior to 79-19 HL&P had neither adequate

staff nor sufficiently experienced staff to provide such direction to B&R. Tr. 2228 (Amaral).

53. Mr. Amaral further found that an inordinately long chain of command existed within the HL&P QA department and that this, along with that department's inexperience, hindered the effective detection and resolution of problems. Tr. 1715 (Amaral). Mr. Amaral went on to state that this attenuation of quality control management from quality control inspectors on the site contributed to the weakening of the power of the quality control inspectors relative to construction personnel. Tr. 1739 (Amaral). This weakening Mr. Amaral suggested could have contributed to creating an atmosphere wherein QC inspectors could be harassed and intimidated. Id.

54. The chain of command within the HL&P QA organization prior to 79-19 best illustrates the point that key personnel were inexperienced and that the organization as a whole was top heavy with managerial layers. Mr. E. A. Turner, then Vice President, Power Plant Construction and Technical Services, reported to Mr. Oprea and was responsible for both the QA department and the project management team. Oprea, et al., direct ff. Tr. 1505 at 7. Although Mr. Turner is a man of many years experience in power plant construction, prior to HL&P's involvement with the STP he had no nuclear construction or operation experience. It was Mr. Turner's belief that the two factors that led the STP QA/QC program to be out of compliance with NRC requirements were lack of experience and its failure to implement an otherwise acceptable program. Tr. 3421 (Turner).

55. Reporting to Mr. Turner was the corporate QA manager. During this time period this individual was Mr. Richard A. Frazar. Mr. Frazar's lack of prior experience in both QA/QC and nuclear construction generally was the subject of extensive testimony. Mr. Frazar readily admitted that his own inexperience contributed substantially to some of the problems experienced at the STP because he failed to recognize that HL&P was not performing its QA function. Tr. 3246 (Frazar). Mr. Amaral acknowledged that Mr. Frazar did not meet the minimum requirements for a QA manager. Tr. 1767 (Amaral). Mr. Jordan, although maintaining he has confidence in Mr. Frazar, conceded if he had to hire a QA manager today he would opt for someone with more experience. Tr. 1444-45, 1467-68 (Jordan).

56. Within the QA department there was next a projects QA manager and, reporting to him, an STP project QA supervisor. Oprea, et al., direct ff. 1505 at 7. The project QA supervisor was stationed in Houston, and he directed the activities of the site QA supervisor, who was stationed at the site. The HL&P QA staff at the project site was supervised by the site QA supervisor. Id. The site QA supervisor during this period was Mr. Logan Wilson. Warnick, et al., direct ff. Tr. 8032 at 29. Mr. Frazar cited Mr. Wilson, along with himself, as persons who did not have the proper experience to be occupying their respective positions. Tr. 3244 (Frazar).

57. Managers within the B&R QA department were similarly inexperienced. Specifically, Mr. Amaral felt that Mr. Warnick, the B&R site QA manager, was overwhelmed by his job and that the job was otherwise beyond him. Tr. 2066 (Amaral). Of the approximately 20 to 25 supervisory positions within both the HL&P and B&R QA/QC departments,

Mr. Amaral felt that approximately 15 were in need of some change. Tr. 2069-70 (Amaral). It was Mr. Amaral's recommendation that both HL&P and B&R retain a qualified site QA manager. Tr. 1599. Of the root causes discussed by HL&P, its QA/QC expert, Mr. Amaral, felt the most important cause was the issue dealing with management involvement and the communication problem between corporate headquarters and the site that masked the problem because of the attenuated organizational structure. Tr. 2061 (Amaral). This problem apparently continued because persons in supervisory positions were inexperienced or otherwise incapable of perceiving the organizational problem.

58. The attitude of HL&P's management remained positive throughout Mr. Amaral's review and in fact evidenced a strong desire to overcome cited problems in the QA program. Tr. 1966 (Amaral). HL&P used consultants on several occasions in an attempt to keep informed of the progress on the STP. In early 1978 HL&P hired the Management Analysis Corporation (MAC) to determine the progress of the STP project. Tr. 1235 (Jordan). Subsequently, Gibbs and Hill was retained to prepare a report to evaluate the Brown & Root organization and how it functions on a daily basis. Tr. 1250 (Jordan). These efforts were not the result of HL&P's lack of confidence in B&R, but rather, resulted from a desire for HL&P to assure itself that work was progressing in accordance with HL&P's understanding. Id. In mid-1979 Oprea was considering having yet another independent audit to be performed on STP by Bechtel, in light of the increase in construction activity at the STP and the various I&E reports that were issued in that year. Tr. 2222 (Oprea).

59. Turning to the B&R site management, an unusually large turnover in key site positions apparently contributed to problems cited in 79-19. Specifically, with reference to the STP general manager for B&R, between January 1977 to the time the B&R management panel offered testimony six persons occupied that position. Tr. 4362 (Broom). This means on the average that once every eight months since 1977 the person occupying this slot changed. Tr. 4366 (Broom). With respect to the Brown & Root site manager, seven persons occupied that position from January 1977 until the time the B&R panel offered testimony on this subject. Tr. 4363 (Broom). Thus, this resulted in a personnel change on the average of once every seven months. Tr. 4366 (Broom). Several of these early managers may have contributed to the problems eventually reported in 79-19. Tr. 9522-9526 (Taylor). Obviously, the desired continuity within management cannot be achieved during such a state of upheaval. B&R management indicated that ideally they would like employees within these key roles to stay in those positions for several years. Tr. 4365 (Broom). B&R offered an explanation why such turnover occurred indicating that revised cost and scheduling plans necessitated the removal of certain managers whereas other managers received more lucrative offers elsewhere. See generally Tr. 4365-4376.

60. We have considered all of the above in reaching a conclusion on the matters raised by Issue A(3) and (4)--whether the extent to which HL&P abdicated responsibility for construction of the STP or failed to keep itself knowledgeable about necessary construction activities prior to remedial action taken as a result of 79-19 is sufficient to determine that HL&P does not have the necessary managerial competence or character

to be granted a license to operate the STP. We find that HL&P did not violate any rules of the Commission in hiring B&R to be the architect-engineer and constructor for the STP. We further find that during the period addressed by Issue A, HL&P upper management was not sufficiently informed about construction activities at the STP to provide the requisite programmatic direction and to discharge its responsibilities as a licensee. However, this failure to stay adequately informed was not because HL&P management was not attempting to keep informed, sensitive to the need to be knowledgeable about the project or attempting in good faith to discharge in an open manner the duties imposed upon HL&P by the Commission. Rather, necessary information was not making its way through the HL&P QA chain of command to the corporate management level. This was not the result of an inadequate written QA program but due to a partial failure to properly implement that program. However, this too is a failure on the part of management to assure that the program is functioning properly. Nonetheless, considering Commission precedent in viewing an applicant's entire record prior to passing on questions of character and competence the Board finds that HL&P's compliance record and management of the STP was not sufficiently poor to conclude it should be denied an operating license. HL&P's failure to stay sufficiently informed was not due to an uncorrectable character flaw, but rather inexperience in assuring that all the activities required to design, construct and plan for the operation of a nuclear facility were carried out. Tr. 9864 (Hayes). This is a correctable deficiency and the very question of whether adequate corrective action has been taken is the subject of the next issue. Id.

61. Finally, the Board must determine the significance of the FSAR statement in Section V.A.(1) of the Order to Show Cause relative to character. In that Order the Staff stated:

> The licensee shall verify or correct if necessary, the FSAR statements contained in Section 2.5.4, Stability of Subsurface Materials, especially Section 2.5.4.5, Excavations and Backfill.

Staff Ex. No. 46 at Show Cause Order, p. 17.

62. Specifically, the FSAR statements in question are:

> The compaction field tests were made according to ASTM D 1556, ASTM D 2167 or ASTM D 2992. At least one field density test was performed per 20,000 feet of each lift in unrestricted areas. In restricted areas, at least one field density test was performed for each 200 yards.
>
> One relative density test (ASTM D 2049) and one gradation test (ASTM D 422) were performed on the average for every four field tests in the plant area to ensure compatibility between field and laboratory tests.
>
> Whenever fill or backfill was placed during a work shift, at least one field test and one laboratory relative density test were conducted during the shift, provided that the compaction operation was completed in some area. FSAR § 2.5.4.5.6.2.4;
>
> The testing agency provided QC inspection of the backfill, the placement and testing of the material in the field for degree of compaction. The QC inspectors observed the type of material, lift thicknesses, operation of compaction equipment, and all other pertinent material or construction conditions affecting the quality of work and compliance with the specifications. The QC inspectors noted conformance with the limiting criteria of the specification and construction procedure for structural backfill and reported the acceptability of the operation. The frequency of testing and selection of tests locations for placed material were according to the requirements identified in these six categories: . . . FSAR § 2.5.4.5.6.2.5 Shewmaker, et al., direct ff. Tr. 9576 at 20-21.

63. The equipment required to perform relative density tests was inoperable for a period of several months in late 1979 and early 1980 yet backfill continued to be placed. Staff Ex. No. 46, Item of Noncompliance 2. Thus, one relative density test could not have been performed on an average of one for every four field tests or at least once per shift in accord with FSAR § 2.5.4.5.6.2.4. See Staff Ex. No. 46, Item of Noncompliance 2. Similar questions were raised relative to whether QC inspectors noted conformance with limiting criteria of the construction procedures in compliance with FSAR § 2.5.4.5.6.2.5. Staff Ex. No. 46, Item of Noncompliance 3.

64. At the time the accuracy of these statements was initially called into question by the special investigation team in late 1979, this was not an allegation that HL&P had made a material false statement in its FSAR, but rather, a question regarding the accuracy of statements made in the FSAR in light of subsequent construction practices. Tr. 9862-63 (Shewmaker). The Commission directed this Board to consider whether these apparent inaccurate statements in the FSAR represented material false statements filed with the Commission. South Texas Project, CLI-80-32, supra at 291. No evidence was presented with respect to the two FSAR statements to indicate that they were false statements at the time they were made. Tr. 6208 (Pettersson).

65. The Applicants presented Jon G. White, HL&P Licensing and Technical Coordinator, and C. Bernt Petterson, B&R Assistant Discipline Project Engineer, to testify as to how the FSAR statements in question were prepared. White-Petterson, direct ff. Tr. 6162. These statements were prepared in .977 and care was taken to assure those statements

complied with basic design documents and were correct. Id. at 7-8; Tr. 6208 (Pettersson). However, in late 1979, the special investigative team witnessed construction practices that deviated from the description of how backfill would be compacted. Staff Ex. No. 46 at 60-66. Thus, the problem was that construction in the field did not conform to the basic design documents which formed the basis for the FSAR statements. Tr. 6216 (White). Items of Noncompliance were issued based on this deviation and as is the usual course HL&P was required to amend its FSAR. Staff Ex. No. 46, Items of Noncompliance 2, 3, 4 and 5, and Show Cause Item 10; Crossman, et al., direct ff. Tr. 10010 at 12-13. In FSAR amendment 12, submitted September 12, 1980 HL&P amended its FSAR statements to conform to what actually occurred. Id. In light of the fact that the statements in question were prepared in 1977 against design documents which never changed and the construction practices which deviated from these documents, occurred in late 1979, concurrently with the investigation that led to 79-19, this Board finds there was no intent on the part of HL&P to file false statements with the Commission. Currently, the Board is satisfied that the revisions made to the FSAR on these two items now reflect what was completed in the field during construction of engineered backfill and that HL&P did not file a material false statement with the Commission.

B. The Adequacy of HL&P's Corporate Character and Competence As Reflected in Its Remedial Actions Following 79-19 - Issue B

66. Issue B states:

Has HL&P taken sufficient remedial steps to provide

assurance that it now has the managerial competence and character to operate STP safely?

67. This Board heard extensive testimony on the remedial actions taken by HL&P following 79-19 and the Order to Show Cause. HL&P responded promptly and comprehensively to 79-19 and the Order to Show Cause. See generally Staff Ex. Nos. 47 and 48. Moreover, HL&P initiated many changes that were not mandated by 79-19 or the Order to Show Cause but which have enhanced the overall quality of its program. Many of the voluntary improvements were implemented by HL&P even before 79-19 and the Staff Order were issued. See App. Ex. Nos. 1, 2 and 3. For the reasons that follow, this Board finds that HL&P has taken sufficient remedial steps to provide assurance that it now has the managerial competence and character to operate STP safely.

68. It should first be noted that most of the improvements discussed in this section took place while B&R was the constructor and architect/engineer. Subsequent to these changes Bechtel replaced B&R as the architect/engineer and construction manager and Ebasco replaced B&R as the constructor. See Testimony Of Jerome H. Goldberg, Burton L. Lex And John Crnich, regarding the management of the South Texas Project, direct ff. Tr. 10403 at 5-7. The impact of those organizational changes is addressed in connection with Issue D, infra. Nonetheless, many of these changes have been carried over into the new programs and are otherwise relevant to this Board's inquiry into whether presently HL&P has taken sufficient remedial steps to determine it now has the competence and character to be granted a license to operate the STP.

1. HL&P's Response to 79-19 and the Order to Show Cause

69. An examination of HL&P's response to 79-19 and the Order to Show Cause necessarily begins before those documents were issued on April 30, 1980. On December 21, 1979, Mr. Turner and Mr. Oprea of HL&P met with Mr. Karl Seyfrit, at that time the Director of NRC, Region IV, to discuss the preliminary findings of 79-19. Staff Ex. No. 46, Appendix D at 8 and Oprea, et al., direct ff. Tr. 1505 at 20. At that time, HL&P was made aware of the serious problems within its QA/QC program. Id. Many of the deficiencies were the same or similar to those previously identified and previously led HL&P to impose a stop work order on the placement of safety related concrete in June, 1979. Staff Ex. No. 46, Appendix D at 8. Based upon that meeting, HL&P again imposed a stop work order on the placement of concrete for safety related structures until corrective action could be developed and implemented. Id.

70. Within a week of that first meeting, HL&P again met with Region IV officials to discuss the elements of a program to correct the conditions the Staff found in 79-19. Id. and Oprea, et al., direct ff. Tr. 1505 at 20. This initial HL&P response became known as the "Nine Point Program." App. Ex. No. 1.

71. In the Nine Point Program HL&P voluntarily committed to the following actions: (1) hold a seminar to review with both construction and QC personnel the fundamental philosophies and standards of its QA program; (2) clarify the use of field requests for engineering action and nonconformance reports, as well as retraining construction and QC personnel in their use; (3) establish a written policy to resolve personnel problems and to set forth specific steps to be taken when

disagreements among personnel occur; (4) undertake an overall assessment of B&R QA/QC personnel so as to provide the basis for upgrading the caliber of that organization; (5) emphasize procedure implementation relative to concrete preplanning and placement activities; (6) revise procedures to provide a controlled method for judging when reinspection of a concrete placement is necessary prior to the sign off of a pour card; (7) reassign certain HL&P QA staff members from Houston to the site and commit to hiring additional staff in 1980; (8) provide refresher training routinely to both construction and QC personnel; and (9) assess the B&R organization to determine the cause of the perception among QC inspectors of harassment and undue pressure and effect the necessary changes as a result of that assessment. See generally App. Ex. No. 1, being the letter transmitting HL&P's Nine Point Program to the Staff.

72. HL&P provided the Staff with an update and status report relative to its Nine Point Program on January 25 and February 28, 1980. App. Ex. Nos. 2 and 4, respectively. As of the second status report, all actions that had been committed to by HL&P had been implemented with the exception of parts of two items. App. Ex. 4 at 1. In item 4 HL&P had committed to assessing the overall qualifications of the 152 B&R QA/QC employees. The only thing that remained to complete this task was to resolve certain discrepancies relating to either an inspector's education or work experience. Id. at 2. With respect to Item 9, which was an attempt to pinpoint the cause of perceived harassment of QC inspectors, HL&P hired a professional consultant, Timelapse, Inc., to conduct an independent survey of both QA/QC and construction personnel to determine the cause of the perception of harassment and undue pressure on site

QA/QC personnel. Id. Timelapse, Inc., concluded that the perception of harassment could have existed because of instances of confrontation between construction and QC personnel in the past. App. Ex. No. 4 at 3. The investigation resulted in HL&P reemphasizing the role of QA/QC relative to the construction team, refresher training for construction personnel relative to the role of QA/QC, revamping and upgrading the B&R salary administration program for QA/QC and a commitment to a more open communication among QA/QC management and all other site personnel. Id. at 3.

73. During this same period HL&P retained Bechtel to perform an independent audit on the effectiveness of the STP QA program. Staff Ex. No. 47 at 1-3 and Tr. 1553 and 1556 (Amaral). Prior to that time Bechtel had no involvement with the STP QA program. Tr. 1556-57 (Amaral). This too was a voluntary action on the part of HL&P in an effort to ascertain the reasons behind the problems being experienced in its QA program. Tr. 9857 (Phillips).

74. On January 24, 1980, the investigative team involved in 79-19 held its exit interview with HL&P. Staff Ex. No. 46, Appendix D at 8 and Oprea, et al., direct ff. Tr. 1505 at 21. During that interview, the Staff outlined the findings of 79-19. Even though the earlier meeting with the Staff had forewarned HL&P of the seriousness of the findings in 79-19, HL&P management admitted that it did not expect that noncompliances would be identified in so many aspects of the project. Id. at 22, Tr. 9855-56 (Phillips). In fact, HL&P's President candidly admitted that at first he was suspicious of whether all the findings in 79-19 had in fact transpired, but that after HL&P's investigation and

that of Bechtel's he was then convinced the Staff had done a proper job. Tr. 1364-65, 1383 (Jordan).

75. At the exit interview the Staff outlined the various enforcement options available and explained that following detailed review of 79-'9 appropriate enforcement action would be taken. Staff Ex. No. 46, Appendix D at 8. HL&P, to its credit, did not wait until the Staff acted but attempted to correct the problems in its program that the Staff cited during the exit interview.

76. Following the exit interview, HL&P voluntarily committed to a "Thirteen Point Program" in a letter dated February 7, 1980. App. Ex. No. 3. Many of the points committed to in that letter anticipated the requirements of the Order to Show Cause. This illustrates that HL&P both understood the Staff's concerns and took prompt corrective action. For example, HL&P committed to implementing an effective program to review and analyze nonconformance reports and to attempt to establish root causes to problems, id. at 2; This eventually became Show Cause Item 6. Staff Ex. No. 46, Show Cause Order at 16. HL&P next initiated a test program relative to the adequacy of Class 1 structural backfill, App. Ex. No. 3 at 6. This is a critical aspect of Show Cause Item 2. Staff Ex. No. 46, Show Cause Order at 14-15. HL&P also commited to taking corrective action with respect to both performing and inspecting welds, App. Ex. No. 3 at 7-8. This is part of Show Cause Item 3(a), Staff Ex. No. 46, Show Cause Order at 15. HL&P further commited to evaluating the adequacy of its document control and audit programs, App. Ex. No. 3 at 9-10. These commitments anticipate Show Cause Items 8 and 9. Staff Ex. No. 46, Show Cause Order at 16-17. All of these

commitments HL&P made voluntarily and before they were under an order to do so. Tr. 9854-58 (Phillips).

77. Specifically, HL&P instituted a program to upgrade its system for analyzing trends in nonconformances. Nonconformance Reports (NCRs) and Field Requests for Engineering Actions (FREAs) were coded to permit trend analysis. Oprea, et al., direct ff. Tr. 1505 at 80. A quarterly trend report was initiated to both identify trends and determine root causes. Id. at 80-81.

78. HL&P audit schedules were revised to make sure that there was an annual corporate audit of B&R construction and HL&P audit procedures were revised to state that procedure implementation would be verified by direct observation of work being performed in the field as well as by review of documentary evidence. Id. at 81. This represented a substantial improvement over prior audits that consisted merely of the review of objective evidence of compliance to requirements--that is to say documents--and did not always include an actual inspection of in-process work activities to verify compliance. Tr. 3198 (Frazar). HL&P further committed to having its QA program audited by an outside consultant at least once a year. Oprea, et al., direct ff. 1505 at 81. Bechtel performed such an audit in the spring of 1981 and found HL&P's audit group was fully in place and fully staffed in key positions. Tr. 1828-29 (Amaral).

79. In the area of welding, B&R completely revised the welder training program and added a general superintendent to coordinate the work of the welders on the project, to monitor their capabilities and progress, to initiate retraining where needed, and to work closely with

the welding engineers and the welder training department. Oprea, et al., direct ff. Tr. 1505 at 82. In addition, a new B&R chief welding engineer assumed responsibility for working closely with construction, welder training, B&R corporate welding engineering, and QA/QC groups to institute programs to further improve welder performance. Id. Radiography was halted and all site NDE personnel were retrained and recertified. Id. A review of all radiographs on the project was undertaken and surveillance teams were organized to conduct special reviews of the NDE program. Id. and Section II.E.3, infra.

80. Backfill procedures were amended to specify the depths for conducting in-place density tests and a test program was initiated on site to determine whether proper density had been obtained thus far on the project. Id. HL&P retained the services of an outside consultant, Woodward Clyde Consultants, for the purpose of performing these tests. See Section II.E.2, infra.

81. Throughout the special teams' investigation the attitude of HL&P was responsive and cooperative. Tr. 9855 (Phillips). The point was stressed by the Staff that even where information requested was detrimental to HL&P it was produced and never refused. Tr. 9855 (Phillips). The actions outlined above were all initiated by HL&P in advance of any Staff enforcement action. The Board finds that this comprehensive, and timely response to the Staff's investigation together with its cooperative and open approach during the investigation reflects favorably on HL&P's character and competence in judging whether it should be granted a license to operate the STP.

82. The Board will next review HL&P's response to the enforcement action associated with 79-19 to determine whether that response provides this Board reasonable assurance that HL&P now has the managerial competence and character to operate the STP safely. For the reasons set forth below, the Board finds that HL&P's response to this escalated enforcement action gives this Board reasonable assurance that it now has the managerial competence and character to operate STP safely.

83. The Staff issued the results of its special investigation (79-19) and its escalated enforcement action on April 30, 1980. Staff Ex. No. 46. That issuance was comprised of 22 items of noncompliance, Appendix A--Notice of Violation; a Notice of Proposed Imposition of Civil Penalties in the amount of $100,000.00, Appendix B; cross references between the items of noncompliance and report details, Appendix C; and the investigative report itself, Appendix D. An Order to Show Cause was attached. HL&P's response was contained principally in two documents. On May 23, 1980, HL&P responded to the 22 items of noncompliance. Staff Ex. No. 47. On July 28, 1980, HL&P responded to the Order to Show Cause. Staff Ex. No. 48. Moreover, HL&P acknowledged and paid the civil penalty by a letter transmitted on May 23, 1980. Staff Ex. No. 90. The Board has reviewed these documents and generally finds them to be comprehensive answers to the Staff's enforcement actions. Essentially, HL&P admitted the validity of the findings in 79-19, the 22 items of noncompliance and committed to satisfying the requirements of the Show Cause Order. Staff Ex. Nos. 47 at 1-2; 48 at 1-16; 90 and 91.

84. Those responses to the various enforcement items that most evidence HL&P's competence and character will next be reviewed. The

Staff presented a panel consisting of William A. Crossman, Chief, Section Three, Reactor Projects Branch, Region IV; Ramon E. Hall, Chief, Systems and Technical Section, Region IV; William G. Hubacek, former Reactor Inspector, Region IV; H. Shannon Phillips, former STP Resident Reactor Inspector, Region IV; Dan Paul Tomlinson, Reactor Inspector, Region IV; and J. I. Tapia, Reactor Inspector, Region IV, to testify relative to the inspection and enforcement activity following 79-19 and the Order to Show Cause (hereinafter Crossman, et al., direct ff. Tr. 10010).

85. Show Cause Item No. 1 required HL&P to perform several tasks: specifically, to have a review conducted of HL&P's management of its quality control program by an experienced, independent management consultant, knowledgeable in QA/QC and nuclear construction; to evaluate the recommendations of the consultant in order to select the best among several alternatives considered; to provide information on how management will exercise its overall responsibility for the QA/QC program and to explain how both upper and middle management will participate to assure that knowledge of the program's effectiveness is current. Staff Ex. No. 46, Show Cause Order at 12-14. In response, HL&P retained Bechtel to conduct an audit of its QA/QC program and to consider the pros and cons of the various QA/QC organizational alternatives set forth in the Order to Show Cause. Crossman, et al., direct ff. Tr. 10010 at 35 and Staff Ex. No. 48 at 1-1 through 1-22 and Ex. No. 1 attached thereto.

86. HL&P chose to maintain a modified version of the in-place organizational structure in which B&R had responsibility to implement the QA program under the overall supervision of HL&P. Crossman, et al., direct ff. Tr. 10010 at 35-36 and Staff Ex. No. 48 at 1-1 through 1-22

and Ex. 1 attached thereto. The program was revised, however, to enhance the direct role of upper management with the ongoing activities at the site. Id. This goal was accomplished by having the corporate QA manager for HL&P assigned to the STP site to become the Site QA Manager and he in turn reporting directly to the HL&P Executive Vice President. Crossman, et al., direct ff. Tr. 10010 at 36. This change is significant when it is realized that prior to this there were four layers of management between the site and the Executive Vice President, and further, that a contributing cause to past problems was an attenuated chain of command within the QA group. See Section II.A.2, supra.

87. Numerous other changes were effectuated in the QA/QC program. Among the more critical changes made were: (1) the authority and responsibilities of the HL&P QA organization have been increased in the major construction disciplines of civil, structural and electrical, Gilray, direct ff. Tr. 10689 at 3; in this regard, the QA organization has been restructured to include a quality engineering function with separate project QA supervisors in each of the above disciplines to provide QA technical direction to HL&P's contractors QC inspectors, id.; (2) the QA organization at the site has been increased to provide additional QA coverage over construction activities, id.; (3) training and indoctrination programs for QA/QC personnel have been improved by incorporating proficiency tests to assure personnel are not only knowledgeable of QA/QC principles but are capable of executing their assigned tasks, id.; (4) stop work authority has been more clearly defined giving QA/QC personnel of both HL&P and the contractor authority to stop unsatisfactory work, id. at 4; (5) HL&P QA organization performs

trend analysis on construction activity to identify recurring deficiencies and prevent them from happening in the future, id.; (6) nonconformance reports and field requests for engineering action are analyzed in order to assess their impact upon the overall design within the trending program, id.; (7) the identification and correction of nonconforming conditions have been improved to require the prompt reporting of deficiencies and their formal disposition with QA involvement, id.; (8) the control of changes and "as-built" drawings have been improved to preclude situations where changes have been made without engineering and QA documented direction, id.; (9) the audit staff and procedures within HL&P have been upgraded to improve audit skills and capabilities as outlined in ¶¶ 77 and 78, supra, id.; (10) the QA/QC staff participates in the review and concurrence of changes in procedures and instructions to assure that the necessary quality assurance elements have been initiated, id.

88. Moreover, HL&P instituted a QC function as part of its surveillance over its contractor. Tr. 2966 (Frazar). This development was viewed by Mr. Amaral as both a very positive and unique QA/QC tool. Tr. 1819 (Amaral). These changes were incorporated into HL&P's docketed QA program by a submittal on October 31, 1980, Gilray, direct ff. Tr. 10689 at 3, and supplemented by an HL&P submittal of April 22, 1981. App. Ex. No. 8. As a result of the changes in the organizations performing the architect-engineer, construction manager and constructor functions, on March 9, 1982, HL&P submitted to the Staff revision 3 to their docketed QA program for the remaining design and construction activities at the

STP. See Geiger, et al., direct ff. Tr. 10580 at 9; App. Ex. Nos. 55 and 55A and Gilray, direct ff. Tr. 10689 at 4-5. These changes and this program are the subject of Issue D, infra. However, it should be mentioned here that all of the commitments made in response to the Show Cause Order have been followed through in the new program and the new program has been found to be acceptable for the control of the remaining design and construction activities at the STP. Gilray, direct ff. Tr. 10689 at 5-6.

89. Closely related to Show Cause Item No. 1 is item of non-compliance No. 1 in 79-19. This item of noncompliance maintained that during the period from October 1979 through January 1980 HL&P was in continuous noncompliance with 10 C.F.R. Part 50, Appendix B in that it failed to adequately control activities affecting safety related functions at the STP. Staff Ex. No. 46, Appendix A at 1. Of particular concern in this item of noncompliance was the substantiation of intimidation and harassment of QC personnel, a lack of support for QC personnel on the part of QC supervisors, and construction pressures on QC inspectors. Staff Ex. No. 46, Appendix A at 2-5. HL&P stated in its May 23, 1980 response to this item that the specific instances set forth as examples in the Staff's notice of noncompliance could neither be confirmed nor denied since the Staff did not disclose the names of persons involved, nor specify the places and dates where the alleged incidents occurred. Staff Ex. No. 47, Attachment at 1. However, HL&P went on to state that its review suggested that such incidents of intimidation and harassment did occur and acknowledged that its QA/QC program, as implemented, was inadequate. Id. and Crossman, et al., direct ff. Tr. 10010 at 7.

Moreover, many of the names and incidents could have been verified by HL&P without obtaining further specifics from the Staff. In addition to the extensive programmatic changes outlined above, HL&P had already retained Timelapse, Inc., to poll its site QA/QC staff in an effort to determine the source or sources of perceived production pressures and harassment. App. Ex. No. 4 at 2-3.

90. In a follow up inspection by the Staff to evaluate the effectiveness of HL&P's efforts in this area, 29 QC inspectors and 2 quality assurance record clerks were asked a series of questions relative to production pressures, management support, harassment, threats, intimidation, freedom to identify nonconformances, stop work authority, resolution of safety related problems and falsification of QA/QC records. Staff Ex. No. 45 and Crossman, et al., direct ff. 10010 at 8. The results of this follow up inspection indicated from the overall answers to these questions that the inspector's attitudes were very positive in that previously identified conditions which resulted in Item of Noncompliance No. 1 had been corrected and no recurring trends were evident. Id.

91. The adequacy of HL&P's actions in response to several Show Cause Items has been addressed in regard to other issues this Board must decide. For purposes of deciding Issue B, the Board notes that it has considered those actions and finds them acceptable. Specifically, Show Cause Item 2 required HL&P to verify certain procedures and densities relative to the compaction of Category I structural backfill and this task has been reviewed and found acceptable in response to Issue E, See Section II.E.1., infra. Show Cause Item 3A required safety related

welding to be reviewed and this task was satisfactorily accomplished by HL&P and discussed by this Board in Section II.E.3, relative to Issue E. Similarly, HL&P's review of safety related concrete structures was included in this Board's treatment of Issue E in Section II.E.2, and further in response to Intervenor Contention 1 in Section II.A.2. HL&P's actions in this area were found to be adequate. Lastly, Show Cause Item 10 requiring HL&P to verify or correct certain statements in the FSAR has been addressed by this Board in its treatment of Issue A in Section II.A.

92. The remaining Show Cause items were also adequately addressed by HL&P and the responses found adequate by the Staff. That activity will be reviewed to determine its adequacy and its impact upon the Board's decision on Issue B. Show Cause Item 4 required HL&P to rescind a brochure entitled "Implementation of the Brown & Root Quality Assurance Program at the South Texas Project Job Site" and associated videotape. Staff Ex. No. 46, Show Cause Order at 15. HL&P promptly rescinded the brochure and replaced it with a new QA program brochure reflecting the fundamental philosophy of 10 C.F.R. Part 50, Appendix B. Staff Ex. No. 47, at 4-1 and Ex. 19 attached thereto. On July 30, 1980, the Staff resident reactor inspector attended a seminar given by HL&P during which the new publication was distributed and discussed. Crossman, et al., direct ff. Tr. 10010 at 44. The Staff found that the new brochure, attached to Staff Ex. No. 47 as Exhibit 19, properly emphasized the need for quality assurance. The brochure did properly emphasize the need for quality assurance since quality assurance personnel now reported to a management level sufficient to give them organizational freedom from

construction, including freedom from cost and schedule, and authority to identify quality problems and verify solutions. Staff Ex. No. 64 and Crossman, et al, direct ff. Tr. 10010 at 44. The Board finds HL&P's response appropriate.

93. In Show Cause Item 5 HL&P was directed to define more clearly QC inspectors' stop work authority, including implementation of that authority. Staff Ex. No. 46, Show Cause Order at 16. HL&P more clearly defined stop work authority by stating the specific persons who have such authority. Staff Ex. No. 47 at 5-1. Specifically, among HL&P personnel the STP QA manager, project QA supervisors and QA/QC discipline personnel have this authority. Id. With respect to Brown & Root, the site QA manager, the project QA manager, the QA/QC engineers as well as both supervisors and QC inspectors have such authority. Id. In following up on this commitment, as the Staff has found, HL&P has set forth procedures clearly describing how QC inspectors shall exercise their stop work authority and that the lower tier of management and QC inspectors were adequately trained in how to exercise such authority. Staff Ex. No. 71. The Board finds HL&P's response appropriate.

94. In Show Cause Item No. 6 HL&P was directed to develop and implement a more effective system to provide for the identification and correction of root causes. Staff Ex. No. 46, Show Cause Order at 16. HL&P approached its response to this directive by breaking the problem into three separate elements: documenting nonconformances, analyzing the documented nonconformances to identify underlying causes, and correcting the causes identified. Staff Ex. No. 47 at 6-1 and Crossman, et al., direct ff. Tr. 10010 at 45. In an attempt to have a more controlled

construction effort, quality engineering will participate in construction planning and will determine inspection hold points for work activities. Any nonconformance report requiring design evaluation will be forwarded by the quality engineer to a Materials Review Board. Staff Ex. No. 47 at 6-1 and 6-2. This Review Board will be an onsite committee consisting of senior B&R QA, design engineering and construction personnel. The Materials Review Board is responsible for providing dispositions to all nonconforming reports requiring design evaluation. Staff Ex. No. 47 at 6-6. Moreover, HL&P committed to a trend analysis system to perform reviews of nonconforming experiences to prevent further similar non-conformances by identifying and eliminating causes underlying those past incidents. Staff Ex. No. 47 at 6-8 through 6-10. This system was reviewed by the Staff and found to be adequate. Crossman, et al., direct ff. 10010 at 46 and Staff Ex. No. 71. Based upon the evidence presented the Board similarly concludes HL&P adequately responded to this Show Cause Item.

95. Show Cause Item 7 required HL&P to develop and implement a more effective system to provide for the control of field changes in order to assess the impact of the individual design change on the overall design. Staff Ex. 46, Show Cause Order at 16. It was first explained that a field change is a change in the plant design that is initiated by a request from the job site. Oprea, direct ff. Tr. 1505 at 62. In response to Show Cause Item No. 7, the field design change system was enhanced in a number of respects: to provide feedback to the QC inspector originating or impacted by the change; to enable more rapid and efficient resolution of the impact upon design through enhanced

engineering staffs at the site; and to require complete documentation of the justification of each design change request. Id. at 64. Revisions to the design change form were made to preclude the use of a field design change request when an NCR should have been written. Id. This was a source of confusion in the past. Id. at 64-65. Moreover, relevant personnel are made aware of any design change by means of a computerized tracking system. Crossman, et al., direct ff. Tr. 10010 at 47. As a further means of ensuring that the impact of a design change on the overall plant design has been assessed, a Change Review Board was established within B&R engineering with the primary function of providing a mechanism to assure that proper interdiscipline design reviews have been conducted. Id. These improvements of HL&P's design change system were the subject of Staff monitoring and after a series of inspections the Staff concluded that the system had been properly implemented. See Staff Ex. Nos. 74, 80, 87 and 121. Upon the evidence presented the Board concurs.

96. By Show Cause Item 8, HL&P was directed to develop and implement a more effective system of records control. Staff Ex. No. 46, Show Cause Order at 16. In order to properly respond to this item, HL&P retained a consultant, Nuclear Power Consultants, Inc., and together they identified the following objectives for the STP site record control system: (1) record requirements for each construction activity will be individually delineated; (2) that the system will be capable of providing prompt information concerning the status and location of relevant documents; (3) as records are created they will be controlled and protected to assure that the recorded status and location remain correct

and; (4) techniques will be incorporated in the system to assure that the other objectives are met. Staff Ex. No. 47 at 8-2 and Crossman, et al., direct ff. Tr. 10010 at 48-49. To implement these objectives HL&P has drafted procedures relative to "Inspection, Planning and As-Built Verification, Records Control, Instructions For Records Control, and QA Document Administration For The QA Vault." Crossman, et al., direct ff. Tr. 10010 at 49. These procedures have been reviewed by the Staff and found acceptable. Staff Ex. Nos. 74, 80, 87 and 131. Based upon the evidence presented the Board similarly finds HL&P's response to this Show Cause Item was acceptable.

97. In Show Cause Item 9 HL&P was further ordered to develop and implement an improved audit system. Staff Ex. No. 47, Show Cause Order at 17. Closely related to this Show Cause Item are five Items of Noncompliance set forth in 79-19. Staff Ex. No. 46, Appendix A, Items of Noncompliance 14, 18a, 18b, 18c, and 19. HL&P's response to these Items of Noncompliance and this Show Cause Item set forth the details of HL&P's revised audit system. The system was principally improved through supplementing audits, upgrading the audit staff, and revising audit procedures to require both the review of objective evidence through records and direct observation of work being performed to assure procedural adherence and compliance with quality requirements. Staff Ex. No. 47 at 9-2 through 9-4. Moreover, HL&P developed a matrix system to assure all procedures will receive proper consideration when audits are being planned. Crossman, et al., direct ff. Tr. 10010 at 31. Both the number and depth of audits have increased. Crossman, et al., direct ff. Tr. 10010 at 32 and Staff Ex. No. 45. For example, the numbers of audits

scheduled and performed by the B&R audit group have increased markedly, as follows: 1975, one scheduled, one performed; 1976, three scheduled, three performed; 1977, four scheduled, four performed, 1978, ten scheduled, nine performed; 1979, eleven scheduled, eleven performed; 1980, twenty-one scheduled, twenty-one performed; 1981, forty scheduled and nine performed by May of that year. Tr. 3194-98 (Frazar). As is apparent, HL&P adequately implemented its commitments relative to an upgraded audit system. The Staff closed this item in Staff Ex. No. 131 and this Board similarly finds HL&P adequately responded to this Show Cause Item.

98. The Staff inspectors charged with the duty of following up on HL&P's commitments stemming from both 79-19 and the Order to Show Cause concluded generally that there were no major safety related problems with respect to completed structures or systems. Crossman, et al., direct ff. Tr. 10010. This team went on to conclude that based upon HL&P's response there is now reasonable assurance that the current QA/QC program will be implemented so that construction can be completed in conformance with the construction permits and applicable NRC requirements. Substantially this same team concluded that HL&P has taken affirmative steps in correcting the deficiencies set forth in the Show Cause Order but that there are still problems in compelling improvement in B&R's performance. Staff Ex. No. 133 at 6. However, in light of the organizational changes set forth in Issue D, infra, this problem appears to have been solved. For the reasons outlined above and those set forth in § 2, infra, the Board adopts the Staff's findings.

2. Key Personnel Changes Following 79-19

99. Personnel changes since the spring of 1980 perhaps have had as great an impact upon the STP project as the numerous programmatic changes in response to 79-19 and the Order to Show Cause. HL&P has made vast improvements in both the qualifications and numbers of staff it has committed to the STP. In addition, although B&R has been replaced as constructor and architect/engineer, the numerous replacements it made in response to the Staff's enforcement actions will be noted as the Board finds they evidence remedial action in response to the Show Cause Order and HL&P's willingness to improve this project.

100. Organizationally, following the Order to Show Cause, HL&P separated all activities relating to its nuclear program from other power plant construction and operation within the company. Tr. 1319 (Jordan). Mr. Turner was relieved of his responsibilities for the STP in June, 1980, and Mr. Oprea, HL&P's second ranking officer, was put directly in charge of the project. Tr. 3385 (Turner) and Oprea, et al., direct ff. Tr. 1505 at 42. Mr. Oprea gave up essentially all of his nonnuclear duties to devote full time to the STP. Oprea, et al., direct ff. Tr. 1505 at 42. In addition, HL&P hired Jerome Goldberg as Vice President, Nuclear Engineering and Construction. Id. at 42-43. Mr. Goldberg has 26 years of experience in nuclear engineering, design and construction, 17 of them as a manager. Id. at 43 and Goldberg, et al., direct ff. Tr. 906 at 3-4. Moreover, Mr. Frazar, then HL&P QA manager, immediately transferred from Houston to the site and to become site QA Manager and reported directly to Mr. Oprea. Oprea, et al., direct ff. Tr. 1505 at 42. This latter change was substantial in light

of the fact that prior to this there were four layers of management between Mr. Oprea and the site Staff. Id.

102. The Bechtel audit of the STP QA/QC organization recommended more qualified personnel within that group. Of the approximately 20 to 25 supervisory positions within the QA/QC organization, Bechtel recommended that approximately 15 were in need of reassignment. Tr. 2069-70 (Amaral). HL&P followed the Bechtel recommendations by immediately acquiring approximately 12 other people to fill various positions within the HL&P and B&R QA/QC department from the Management Analysis Corporation. Tr. 1442 (Jordan). Bechtel further recommended that both HL&P and B&R retain qualified QA managers for the site. Tr. 1599 (Amaral). This recommendation was similarly followed. HL&P acquired the services of Mr. James E. Geiger and B&R hired Mr. Al Smith. Tr. 2563 (Frazar). Mr. James E. Geiger joined HL&P in June, 1981, as project QA manager for STP, reporting directly to Mr. Oprea. Testimony of James E. Geiger, Donald T. Krish and Clyde L. Hawn Regarding The Quality Assurance Program For STP, direct ff. Tr. 10580 at 3. Mr. Geiger has had extensive QA experience, including holding the positions of QA supervisor and project QA manager for Bechtel at the San Onofre nuclear project. Id. at 2. In July, 1982, Mr. Geiger became the Corporate QA Manager for STP and was replaced as Project QA Manager by Mr. Al Walker. Tr. 10583 (Geiger). Mr. Walker has eighteen years QA/QC experience, including nine nuclear. Tr. 10583 (Geiger). In Bechtel's follow up audit in the spring of 1981 it was established that all individuals within HL&P's QA/QC department either had the requisite credentials or they were assisted in their job by a qualified Management Analysis

Corporation employee. Tr. 1905 (Amaral). For example, although Mr. Frazar did not have the suggested qualifications for QA manager, he was aided by an experienced Management Analysis Corporation employee who did. Id.

103. HL&P assured itself that B&R was hiring appropriate personnel for their QA department by prescreening the experience and qualifications of persons whom they considered to be filling key positions. Tr. 3130 (Frazar). Specifically, HL&P reviewed B&R hires down to the site supervisor level. Tr. 3132 (Frazar). In this regard, upon HL&P's request the site QA manager was replaced. Tr. 3138 (Frazar).

104. For its part, B&R retained an experienced manager for its QA department. Raymond J. Vurpillat was hired to manage and direct all QA programs implemented within the B&R power group, including the B&R STP QA program. Broom, et al., direct ff. Tr. 3646 at 2-3. Mr. Vurpillat has extensive experience as a QA manager involving the planning, management, and supervision of QA programs related to design and/or construction of 16 commercial nuclear power plants, and QA planning related to 7 other nuclear plants that never reached the construction permit stage. Id. at 6.

105. Moreover, HL&P has launched an aggressive recruiting program for technical personnel. Tr. 2549 (Goldberg). HL&P has had an ongoing advertisement in Nuclear News, a trade publication, and, with respect to more specifically defined skills, has retained the services of three recruiting firms. Id. Similar efforts have been undertaken to retain qualified people for HL&P's QA/QC department. Tr. 2552 (Frazar). Mr. Goldberg made the point that his management (Mr. Oprea and

Mr. Jordan) have been very supportive of his efforts to upgrade the quality of HL&P's technical staff and that he has received their encouragement to acquire the services of professionals that he deems necessary to implement a proper program. Tr. 1056 (Goldberg). Essentially, the manner by which he will upgrade the program will be by bringing in more experienced personnel. Tr. 1056-56 (Goldberg).

106. Other key persons hired by HL&P since the Show Cause Order include Joseph W. Briskin, Manager, Houston Operations. Oprea, et al., direct ff. Tr. 1505 at 52. It will be Mr. Brisken's responsibility to direct the work of HL&P's project management team, including engineering, procurement, project control services, and project administration. Id. Mr. Briskin has been actively engaged in project control and project management for 20 years, including 10 years on nuclear projects. Id. Numerous other positions have been either created or upgraded since the Order to Show Cause, including: HL&P manager of licensing, Tr. 1055 (Goldberg), HL&P site manager, Tr. 2385 (Goldberg); and several changes in HL&P's engineering department, Tr. 2366-67 (Goldberg), including hiring a welding engineer, an ASME-3 pipe stress analysis-pipe support design engineer, a fluid transient engineering specialist, and attempting to acquire the services of an equipment environmental qualification specialist. Tr. 2367 (Goldberg). Finally, HL&P has committed to continually review its staffing levels and needs and to supplement its work force as requirements dictate. Tr. 2367-68 (Goldberg).

107. For the reasons set forth above, this board finds that the remedial steps taken by HL&P in response to 79-19, the Order to Show Cause and the steps it voluntarily took to enhance its program, provide

reasonable assurance that HL&P now has the managerial competence and character to operate STP safely. This conclusion is reached not only from a review of the evidence presented but by observing the demeanor and conduct of the numerous HL&P officials who testified during this proceeding.

C. The Adequacy of HL&P's Corporate Character and Competence As Reflected in Its Preparation for Plant Operation--Board Issue C

108. Board Issue C states:

> In light of (1) HL&P's planned organization for operation of the STP; and (2) the alleged deficiencies in HL&P's management of construction of the STP (including its past acts or lack of action, revised programs for monitoring the activities of its architect-engineer-constructor and those matters set out in Issues A and B), is there reasonable assurance that HL&P will have the competence and commitment to safely operate the STP?

109. HL&P's plans for the operation of the STP were presented by a panel consisting of Mr. Jerome H. Goldberg, Vice President, Nuclear Engineering and Construction for HL&P, and Mr. Gerold G. Dewease, Vice President, Nuclear Plant Operations for HL&P. Goldberg-Dewease direct ff. Tr. 10548. This panel also sponsored into evidence App. Ex. No. 56, being various sections of Chapter 13 to the STP FSAR, as amended through amendment twenty-five, addressing HL&P's plans for operation of the STP. Tr. 10553 (Goldberg). The Staff addressed this issue through a panel consisting of Mr. Lawrence P. Crocker, Mr. Glen L. Madsen and Mr. Frederick R. Allenspach. Crocker, et al., direct ff. Tr. 10721. Mr. Crocker is a section leader in the Licensee Qualifications Branch of the Division of Human Factors Safety, Office of Nuclear Reactor

Regulation, Nuclear Regulatory Commission. Id. at Professional Qualifications. He participated in the management and plant staffing review for operation of the STP. Id. Mr. Madsen is Chief, Reactor Project Branch 1, Region IV, U.S. Nuclear Regulatory Commission. He is responsible for inspection activities at the STP, including those activities relating to the transition program. Id. Mr. Allenspach is within Mr. Crocker's section and assisted him during the management review. Id. This panel submitted as evidence the Staff's Partial Safety Evaluation Report (PSER) relating to the adequacy of HL&P's plans for the operations of STP. Id., Sections 13 and 17. The evaluation of management was made against the guidelines of NUREG-0731 and HL&P's management was found to be properly organized and prepared for eventual plant operations. Id. at 13-1. The Staff's testimony was admitted into the record, without cross examination, upon stipulation of all parties. Tr. 10721. Intervenors presented no evidence on this issue.

110. Although operation of the STP is approximately four years away, HL&P has made considerable plans for the organization that will manage STP's operation. In addition, key positions are already being filled. Mr. Dewease will oversee the nuclear plant operations staff. Goldberg-Dewease, direct ff. Tr. 10548 at 4. Mr. Dewease will report directly to the Executive Vice President, as will the Manager of QA for operations and the Director, Nuclear Fuels. Id.

111. Based upon his past job assignments and testimony before this Board, it would appear Mr. Dewease has the appropriate experience to occupy the position of Vice President, Nuclear Plant Operations. Mr. Dewease has approximately twenty-two years of experience, including

fourteen years of nuclear experience with the Tennessee Valley Authority in such positions as instrument engineer, assistant engineering supervisior, quality assurance supervisor and plant superintendent. Goldberg-Dewease, direct ff. Tr. 10548 at 2-3; Crocker, et al., direct ff. Tr. 10721 at 3. In his most recent position prior to joining HL&P he was Assistant Director of Nuclear Operations for TVA, wherein he had responsibilities involving four nuclear plants. Id.

112. The organization for plant operations is divided into four functional areas: operating, technical, maintenance and training. Goldberg-Dewease, direct ff. Tr. 10548 at 5-6 and Corcker, et al., direct ff. Tr. 10721, PSER at 13.1.3 and Figure 13.4. In addition, two other organizations--the Radiation Protection Group and an Administrative Group--support the plant staff. Id.

113. The operating section includes licensed operators and auxiliary operators to operate the reactors. Goldberg-Dewease, direct ff. Tr. 10548 at 6. It is estimated that this section will eventually consist of 78 persons under the direction of the Operating General Supervisor. Crocker; et al., direct ff. Tr. 10721, PSER at 13-13. The Operating General Supervisor will hold a senior reactor operator (SRO) license for each unit. Goldberg-Dewease, direct ff. Tr. 10548 at 6. Six shift supervisor positions are planned for the operating section. Id. at 7. Shift supervisors will hold an SRO license for each unit and their command duties will be established prior to fuel load, emphasizing primary responsibility for safe operation of the plant. Id. Unit supervisors will also be licensed SROs, will report to shift supervisors and will be responsible for reactor operations command in the control

room. Id. The entire shift organization is set forth in Figure 13.5 of the Staff's PSER. HL&P plans to use a six shift rotation that will provide for a minimum of five days of training in each 42-day shift cycle. Crocker, et al., direct ff. Tr. 10721, PSER at 13-13.

114. Currently, HL&P has one Shift Supervisor, three Unit Supervisors and seventeen support personnel in the operating section. Goldberg-Dewease, direct ff. Tr. 10548 at 7. The Shift Supervisor and one of the Unit Supervisors hired so far were previously licensed SROs on operating commercial nuclear power plants. Id. The reactor operations personnel already retained by HL&P are presently involved in writing system descriptions and/or operating procedures. Id. at 8. Moreover, as systems are turned over to HL&P, these employees will be participating in pre-operational testing. Id. and PSER § 13.1.3.1.

115. The technical section is under the direction of the Technical General Supervisor and is made up of four subgroups; reactor engineering, chemical operations, chemical analysis and results engineering. Goldberg-Dewease, direct ff. Tr. 10548 at 8 and Crocker, et al., direct ff. Tr. 10721 at 13-17. The Reactor Engineering Group will consist of a lead reactor engineer and one reactor engineer for each unit. Goldberg-Dewease, direct ff. Tr. 10548 at 8. These positions have already been filled by persons with extensive nuclear experience. Id. The reactor engineers are currently developing the core physics and thermal hydraulic testing programs to monitor core performance. Id. at 9. In addition, they are developing the initial start up test program, the onsite special nuclear materials accountability program and the new fuel inspection and storage procedures. Id.

116. It is anticipated that the Chemical Operations Groups will consist of 42 persons, including a supervisor, 6 foremen, 15 chemical operators and 20 operator trainees and auxiliary operators. Id. at 10. Currently, HL&P has hired one chemical operations foreman, three chemical operators and four chemical operator trainees. Id. The chemical operations group will be responsible for the operation of chemical process systems, demineralizer systems, radioactive waste proc ing systems and non-radioactive waste processing systems. Id. Currently, persons within this group are writing procedures and developing training materials. Id.

117. The Chemical Analysis Group will consist of 23 people, including a supervisor, 2 lead technicians, a nuclear plant chemist and 19 chemical technicians and monitors. Id. The Chemical Analysis Group presently consists of a supervisor, lead technician and 6 chemical technicians. Id. The Chemical Analysis Group is responsible for plant chemistry and radiochemistry. Id. at 11. Currently, people within the Chemical Analysis Group are writing procedures, developing training materials, conducting the pre-operational environmental sampling program and providing chemical analysis support for hydrostatic tests. Id. at 11.

118. The Results Engineering Group will consist of a lead results engineer and approximately 11 results engineers. Id. at 11. Presently, HL&P has retained the lead results engineer and six results engineers. Id. The results engineers prepare test procedures, perform tests and prepare test reports for initial start up, maintenance and performance testing of plant systems. Id. at 12. Results engineers also develop

solutions to problems and analyze equipment malfunctions in various plant systems. Id. Currently, this group is developing the programs to implement the various testing activities they will be performing during start up and eventual plant operation. Id.

119. The Maintenance Group is divided into four subgroups; electrical, mechanical, instruments and controls, and maintenance support. Id. at 12-13. HL&P has made substantial progress in staffing these various subgroups and currently personnel are performing preventive and corrective maintenance on the reservoir make up pumping facility and meteorological tower equipment. Id. at 13-14. The maintenance personnel will provide support for various start up and operation functions. Id. at 14.

120. The Training Section is responsible for plant staff training activities and consists of three subgroups; operator training, simulator training and general training. Id. at 15. The simulator training group will utilize a plant specific simulator that is currently on order and scheduled to be installed by mid-1983. Id. A substantial number of the instructor positions within the training organization have been filled and those personnel are going to various technical schools and preparing course work. Id. at 15-16.

121. The Radiation Protection Group will consist of 33 individuals, including a supervisor, 2 health physicists and 30 radiation protection technicians, monitors and trainees. Id. at 16. Currently, HL&P has retained a supervisor and one health physicist. Id. The supervisor has 30 years experience in applied radiation protection in both the Navy and commercial nuclear power plant experience. Id. Lastly, an

Administrative Group consisting of 15 to 20 employees is envisioned to provide clerical and administrative support to the plant operations staff.

122. With respect to technical support from outside the operations group, but still from within HL&P, HL&P is currently developing the capability to perform non-LOCA transient analysis. Id. at 17. Nuclear Services Corporation completed a study on behalf of HL&P in January, 1980, to determine the requisite technical staff HL&P would require to provide in-house technical support during plant operation. Id. In this regard, HL&P's goal is to have a staff technically capable of performing the design or design verification for all technical areas, especially those that are uniquely nuclear. Id. at 18. Mr. Goldberg's Engineering and Construction organization will also provide technical support, as needed. Id. at 4. In aid of that goal, HL&P has assigned twenty-six people to Bechtel in order to gain practical experience in the design activity associated with the STP so that HL&P may better maintain the plant after it is completed and is operating. For specialized areas, HL&P anticipates it will continue to employee outside consultant assistants. Id. at 18 and Tr. 10558 (Goldberg).

123. Considering the stage of construction of the STP, HL&P's staffing for the plant organization is well underway and those people hired are performing various pre-operational activities. Id. at 20-22. In addition, before fuel is loaded at the STP, HL&P will conduct tests of the plant equipment and systems. Id. at 21. A separate HL&P organization has been established for this purpose designated as the Start Up Group. This Group is already writing start up test procedures. Id.

at 21. As each plant system nears completion, the HL&P Start Up Group, along with HL&P plant QA and Bechtel, will review the status of the system to determine what must be accomplished before the system will be ready for testing and operation. Id. at 22.

124. HL&P's plans for its shift organization is similarly well developed. A Shift Supervisor with an SRO license will be on site any time a unit is loaded with fuel. Id. at 29. This supervisor will have total authority to shut down the plant. Tr. 10555 (Dewease). All personnel on shift are responsible to this individual. Goldberg-Dewease, direct ff. Tr. 10548 at 29. Reporting to him will be an organization for each reactor un t headed by a Unit Supervisor who has an SRO license and a Chemical Operations Foreman with associated staff. Id. Each unit will further have two operators with RO licenses, a Radiation Protection Technician/Monitor and a Chemical Technician/Monitor. Id. HL&P currently plans to provide for the expertise envisioned by a Shift Technical Advisor by providing increased training for its Shift Supervisor. Id. at 30. If, however, in the future the NRC requires that a specific Shift Technical Advisor position be established, HL&P has committed to creating such a slot. Id. at 31 and Tr. 10565 (Dewease).

125. Procedures are currently being drafted to limit access to the control room and to govern the turnover in personnel between shifts. Id. at 31. A Plant Operations Review Committee (PORC) has been established in accordance with technical specifications to advise the plant superintendent on matters important to safety. Id. at 33. Among the activities conducted by the PORC are review of procedures, tests, changes to technical specifications, technical specification violations,

24 hour notification items, plant operations and the security and emergency plans. Id. at 33-34. Moreover, there is a corporate level committee known as the Nuclear Safety Review Board (NSRB), with the function of reviewing matters such as proposed changes to procedures, equipment, systems, technical specifications and the operating license. Id. at 34-35 and Crocker, et al., direct ff. Tr. 10721, PSER at 13-21. The NSRB will further routinely audit various aspects of plant operations. Id.

126. The Staff reviewed all aspects of HL&P's plans for operation and found that HL&P corporate management is intimately involved with the current construction activities at the STP plant and that they are aware of the plant status. Crocker, et al., direct ff Tr. 10721, PSER at 13-18. The Staff further found that plans for the transition from construction activities to plant operation are well underway. Id. It was the opinion of the Staff that HL&P management is dedicated to safe plant construction and operation and that it is HL&P's intent to assure that this objective is paramount in the minds of HL&P personnel involved with the STP. Id. Based upon Staff contact with HL&P upper management, the Staff concluded they were involved in the plans for transition to plant operation, that HL&P management had a personal involvement in construction oversight and planning, and that management had an overall positive attitude to do what is necessary to assure that the STP can be completed and operated safely. Id. at 13-18-19. CCANP presented no evidence on this issue and did not cross examine the panels presented. For the reasons outlined above and based upon the Board's observation of many of HL&P's senior officials, the Board adopts these findings and concludes that there is

now reasonable assurance that HL&P will have the competence and commitment to safely operate the STP.

D. The Adequacy of HL&P's QA/QC Organization and Program for the Balance of Design and Construction--Board Issue D

127. Board Issue D states:

> "In light of HL&P's prior performance in the construction of the STP as reflected, in part, in the Notice of Violation and Order to Show Cause dated April 30, 1980, and HL&P's responses thereto (filings of May 30, 1980 and July 28, 1980), and actions taken pursuant thereto, do the current HL&P and Brown and Root (B&R) construction QA/QC organizations and practices meet the requirements of 10 C.F.R Part 50, Appendix B; and is there reasonable assurance that they will be implemented so that construction of STP can be completed in conformance with the construction permits and other applicable requirements?"

128. The current QA/QC organization and program were presented by HL&P through a panel consisting of Mr. James E. Geiger, Donald T. Krisha and Clyde L. Hawn. Geiger, et al., direct ff. Tr. 10580. At the time this testimony was offered, Mr. Geiger was the HL&P Project Quality Assurance Manager for the STP. Id. at 1. Mr. Geiger has extensive QA/QC experience, including being Project QA Manager for San Onofre Units 1, 2 and 3. Id. at 2-3. As of July, 1982, Mr. Geiger became the Corporate QA Manager for STP and was replaced as Project Quality Assurance Manager by Al Walker. Tr. 10583 (Geiger). Mr. Walker has eighteen years QA/QC experience, including nine in nuclear. Tr. 10583 (Geiger). Mr. Krisha is the QA Manager for the Houston area office of Bechtel and is currently assigned as the STP Project QA Manager. Id. at 1. Mr. Krisha similarly has extensive QA/QC experience, including managing the Bechtel QA activities at the Palo Verde, Vogtle and Rancho Seco Nuclear Generating

Stations. Id. at 4. Mr. Hawn is the Quality Program Site Manager for Ebasco Services, Inc. (Ebasco) at the STP. Id. at 1. Mr. Hawn has considerable QA experience, including holding such positions as Senior QC Supervisor, QA Supervisor, Quality Program Site Manager and QA Manager at such nuclear facilities as WPPSS Nuclear Project Nos. 3 and 5, Laguna Verde, Waterford Unit 3 and Tomahawk Fusion Test Reactor prior to his assignment to the STP. Id. at 6. This panel also sponsored into evidence App. Ex. Nos. 55 and 55A that, taken together, are a total description of the quality assurance program currently being implemented at the STP. Tr. 10582 (Geiger).

129. The Staff presented Mr. John W. Gilray to testify on the adequacy of HL&P's current QA/QC organization and program for the balance of design and construction. Gilray, direct ff. Tr. 10689. Mr. Gilray is the principal quality assurance engineer within the Quality Assurance Branch (QAB) of the Office of Nuclear Reactor Regulation, Division of Engineering. Gilray, direct ff. Tr. 10689 at 1. Since the Show Cause Order of April 30, 1980, Mr. Gilray has been the QAB reviewer responsible for the evaluation of changes in HL&P's docketed QA/QC program for design and construction to determine its acceptability. Id. Specifically, Mr. Gilray reviewed HL&P's most recent submittal to the Staff on March 9, 1982, being Revision 3 to its docketed QA program for the remaining design and construction activities at the STP. Id. at 4-5. Intervenors produced no evidence on this issue.

130. HL&P's Revision 3 to its QA program can be summarized as essentially three programs; the previously updated and Staff-approved QA program for the HL&P quality assurance related activities and the QA

programs of the two recently assigned principal contractors, Bechtel and Ebasco. Id. at 5. The previously updated HL&P portion of the QA program provides for an improved QA organization with increased authority and responsibilities for surveillance by HL&P personnel during the day to day design and construction activities as more fully explained in Section II.B., supra; see also Gilray, direct ff. Tr. 10689 at 5. Bechtel commits to apply its Staff-approved quality assurance topical report BQ-TOP-1 rev. 3(a), as modified in part B of Revision 3 of HL&P's latest QA program for Bechtel's engineering, procurement, and construction management activities at the STP. Similarly, Ebasco commits to apply its Staff-approved quality assurance topical report ETR-1001, revision 10(a) as modified in part C of Revision 3 of HL&P's latest QA program for the quality assurance and quality control of Ebasco's construction services at the STP. Id. These topical reports are Bechtel's and Ebasco's descriptions of a generic QA/QC program that meet Appendix B criteria. These programs were then conformed to the plant-specific needs of STP. Geiger, et al., direct ff. Tr. 10580 at 9-11.

131. For the reasons that follow, the Board finds that Revision 3 describes the necessary reqirements, procedures and controls that, when properly implemented, comply with the requirements of Appendix B to 10 C.F.R. Part 50. Moreover, the Board finds that there is reasonable assurance that this program will be implemented so that construction of STP can be completed in conformance with the construction permits and other applicable requirements.

132. The relationship between Revision 3 and the various changes and commitments made by HL&P in response to the Order to Show Cause

should first be clarified. Since the implementation of the various changes stemming from the Order to Show Cause, HL&P has replaced B&R as architect-engineer and construction manager with Bechtel and has further replaced B&R as constructor with Ebasco. Geiger, et al., direct ff. Tr. 10580 at 12. But for minor modifications due to these contractor changes, the program commitments made by HL&P as a result of the Order to Show Cause have been carried into the current QA/QC organization and program. Id. at 13-15.

133. Bechtel's organization for performing its QA function at the STP is under the direction of Bechtel's Los Angeles Power Division. Id. at 15. Within that division, the QA manager is at the same organizational level as the managers of engineering, construction and procurement. Id. at 15-16. The Los Angeles Power Division Manager of QA has reporting to him a QA Manager for the Houston area office. Id. at 16. This manager provides technical and administrative direction to the STP Project QA Manager, who, with the assistance of higher levels of QA management, is responsible for assuring the satisfactory implementation of the Bechtel project quality program at the STP. Id. at 16. The Bechtel STP organization consists of three sections reporting to the Project QA Manager; design QA, construction QA and site QC associated with Bechtel's job site activities. Id. 16-17. The first two of these sections are supervised by a project quality assurance engineer (PQAE) and the last section by a project quality control engineer (PQCE). Id.

134. The design PQAE is responsibe for assuring the orderly and adequate implementation of the quality program within the design office through review, surveillance and audits of engineering and procurement

activities. Id. at 16-17. The construction PQAE is responsible for assuring that Ebasco and other contractors' construction activities comply with approved quality program and engineering requirements by surveillance of in-process and completed work, review of documentation and audits for quality program compliance. Id. at 17.

135. This QA function over construction is pursuant to Bechtel's construction manager role and represents an extra layer of QA review not present when B&R had both construction and construction manager roles. Tr. 10619 (Geiger). Moreover, HL&P will monitor Bechtel's surveillance over Ebasco. Tr. 10622 (Geiger). This is all in addition to Ebasco's primary obligation, as constructor, to have a QA/QC program that complies with 10 C.F.R. Part 50, Appendix B. Finally, Bechtel's site PQCE is responsible for performing QC inspections associated with Bechtel's job site activities; specifically, receipt, storage and maintenance of permanent plant items. Geiger, et al., direct ff. Tr. 10580 at 17. The site PQCE is also responsible for verifying the effectiveness of the contractor's QC program by surveillance and redundant inspections of selected work activities which had previously been accepted by the contractor's QC personnel. Id. The Project QA Manager, the two PQAEs and the site PQCE all have stop work authority over quality-related activities at STP. Id. at 17.

136. Bechtel QA is responsible for review and approval of Ebasco's quality related procedures and instructions. Id. at 18. HL&P in turn will monitor Bechtel's approval of Ebasco's implementing procedures. Tr. 10622 (Geiger). Bechtel will also audit and monitor the activities and documentation of organizations and individuals involved in the

implementation of the constructor's quality program. Id. at 18. Bechtel management will be informed of QA activities through audit reports, monthly trend reports, management staff meetings and an annual review meeting that covers the status of the quality programs of the various Bechtel Divisions and Projects. Id. at 18-19.

137. Bechtel's QA program is functionally divided into engineering, procurement and construction. Id at 19. Project engineering is responsible for all Bechtel engineering design work performed by and for the project and for checking and reviewing functions performed on the project. Id. at 19. Key design work is also reviewed off the project by personnel on the staffs of the chief engineers. Id. Bechtel QA is responsible for conducting audits, surveillances and document reviews of engineering work activities. Id. Procurement specifications for materials and equipment are prepared by engineering and reviewed by QA for adequacy of specified QA program and documentation requirements. Id. at 20. Procurement contracts are awarded only after a supplier's capabilities to meet the project's quality requirements have been verified and the supplier's quality program or plan has been reviewed by Bechtel engineering and concurred in by Bechtel QA. Id at 20. After a contract has been awarded, procurement supplier quality (PSQ) performs a surveillance and inspection function over supplier activities and reviews completed supplier quality verification documents at the supplier's facility. Id. The inspection of items received, including review of records not previously examined by PSQ is performed by Bechtel's QC group at the construction site. Id. QA monitors this process and performs audits and surveillances to assure effective implementation and has the

authority to stop supplier work and shipments until required corrective action has been taken and verified. Id. at 21.

138. The Bechtel construction management organization is responsible for the overall construction program for the STP, including such functions as planning, scheduling, monitoring and evaluating the Ebasco and contractor construction and QA/QC activities. Id. at 21. Construction management's activities are performed in accordance with approved procedures and are monitored by Bechtel QA through audits and surveillances. Id. Each contractor, including Ebasco, is held responsible for performing construction work within the scope of its contract in accordance with approved procedures and a quality program. Id. Thus, the contractors are responsible for first-level inspection of their respective work. Id. These contractors moreover are responsible for audits and surveillances of their respective work and QC activities. Id. Bechtel QA is responsible for conducting audits, surveillances and selected redundant inspections of the Ebasco contractor work and QA/QC activities. Id.

139. Ebasco's STP QA/QC organization consists of three basic groups; QA, QC, and Quality Records. Id. at 22. Each of these groups are headed by a site supervisor who reports to the Quality Program Site Manager. Id. at 22. The QA group is responsible for performing planned and scheduled audits of Ebasco activities, including the performance of trend analyses of non-conformance reports, deficiency reports to identify any trends adverse to quality. Id. at 22. The Ebasco QA group is the contact point between Ebasco and HL&P, Bechtel and the NRC. Id. at 23. The QC group is responsible for performing inspections and witnessing or

performing examinations and tests of all Ebasco nuclear safety-related construction activities. Id. at 23. The Quality Records group is responsible for assembling documentation packages, verifying the completeness and accuracy of the records, providing adequate safeguards and retrievability of records while under Ebasco control, and for transmitting completed records to HL&P. Id.

140. For its part, HL&P will conduct a series of reviews of engineering, procurement, construction management and construction activities to assure proper implementation of its contractors' QA programs. Id. at 24. Initially, HL&P has reviewed and approved all aspects of the docketed QA/QC program. Id. at 24-25. HL&P will also conduct a series of audits, surveillances and selective redundant inspections to assure that the procedures of Bechtel, Ebasco and other constructors not only accurately reflect regulatory requirements but are in fact being implemented. Id. at 25. In a selective redundant inspection HL&P takes a plant component which has been previously inspected and approved by its contractor and performs a reinspection. Tr. 10620 (Geiger). In contrast, a surveillance of contractor's activity would be a situation in which HL&P performs a QC function of ongoing work. Tr. 10620-21 (Geiger). HL&P will remain closely involved in the project through daily activities of its QA personnel, weekly meetings with Bechtel and Ebasco QA personnel and receipt of monthly trend reports. Id. at 25. Moreover, an annual independent assessment of the STP QA program will be conducted throughout the life of the project by an organization not involved in the project. Id. at 26.

141. Staff review of Bechtel's staffing of key positions within its QA/QC organization currently indicates that persons with appropriate experience are being assigned. Crocker, et al., direct ff. Tr. 10721 at 7. For example, the project QA Manager has eight years of nuclear QA experience, Id. at 30; the design office PQAE has sixteen years of QA/QC experience; the construction PQAE has seventeen years of nuclear QA/QC experience; and the site PQCE has fifteen years of QA/QC experience. Id. at 30-31. Similarly, key persons within the Ebasco QA/QC program have appropriate experience levels; for example the site QA supervisor has eleven years experience in design, construction and QA of power plants and the site QC supervisor has twelve years. Id. at 32-33.

142. Accordingly, based upon the programs outlined above, it appears that HL&P, Bechtel and Ebasco QA/QC organizations have the requisite independence from cost and scheduling in order to perform their functions. Tr. 10632 (Geiger, Krisha). All organizations report to upper level management off-site. Geiger, et al., direct ff. Tr. 10580 at 13, 15, 22 and Figures 1, 2 and 3 attached thereto. The Staff performed a detailed review and evaluation of the HL&P QA program, including Bechtel's and Ebasco's QA programs, and concluded that these programs described the necessary requirements, procedures, controls that, when properly implemented, will comply with the requirements of Appendix B to 10 C.F.R. Part 50. Gilray, direct ff. Tr. 10689 at 5-6. The Staff further concluded that based upon past experience and association with Ebasco and Bechtel, both corporations are well-qualified in the activities they have been assigned at the STP. Crocker, et at., direct ff. Tr. 10721 at 7. The Staff further found that based upon preliminary reviews both organizations are selecting in-

dividuals with considerable qualifications and experience to manage their responsibilities at the STP. Crocker, et al., direct ff. Tr. 10721 at 7. Accordingly, for the reasons set forth above, the Board finds that the current QA/QC organizations and practices for the STP meet the requirements of 10 C.F.R. Part 50, Appendix B and that there is reasonable assurance that they will be implemented so that construction of STP can be completed in conformance with the construction permits and other applicable requirements.

143. Finally, although not specifically required in order to answer this or any other of the original issues posed, the Board indicated HL&P should present evidence not only on QA/QC activities but also on Bechtel's organizational framework for continued construction, including consideration of plans for design, a review of past problems, project construction and HL&P management involvement. Fourth Prehearing Conference Order at 4. The Applicant presented a panel consisting of Jerome H. Goldberg, Vice President for Nuclear Engineering and Construction for HL&P; Burton L. Lex, Project Manager for Bechtel at STP; and John Crnich, Construction Manager for Ebasco at STP. (Hereinafter referred to as Goldberg, et al., direct ff. Tr. 10403).

144. The Board finds both Bechtel and Ebasco qualified to perform their assigned functions at the STP. Bechtel is one of the world's largest engineering firms engaging in nuclear power plant design, construction and start up activities. Crocker, et al., direct ff. Tr. 10721 at 5. During the past 8 years, Bechtel has been involved in the design of 50 nuclear power units with a total capacity of 51,000 megawatts. Id. at 6. During the same period, Bechtel has been involved

with the construction of 41 nuclear units with a total capacity of 43,000 megawatts. Id. The Staff concluded Bechtel has had a vast amount of nuclear experience and is intimately familiar with the NRC regulations governing plant design and construction, including the requirements for a quality assurance program. Upon review of the transition program, the Staff indicates that all personnel assigned by Bechtel to its transition team have had appropriate previous nuclear experience and that personnel assignments to the team have been made to provide for continuity from the transition phase through to project completion. Id. Similarly, Ebasco also has had considerable nuclear experience extending over the past 20 years. Id. Ebasco has served as constructor or construction manager on 17 nuclear units and, on occasion, has taken over construction management duties for a nuclear plant where the initial construction was performed by others. Id. at 7. Ebasco also appears to be staffing its organization with persons having considerable nuclear experience. Id.

145. HL&P has taken an active role in both the transition program and plans for the completion of the design and construction of the STP. HL&P reviewed and approved the transition program to assure that it encompassed appropriately all of the major areas of the project, including engineering, construction, QA/QC, procurement and project control. Goldberg, et al., direct ff. Tr. 10403 at 36. HL&P has coordinated transition meetings between Bechtel and B&R. Id. at 37. Overall project direction is provided by HL&P to Bechtel's project manager. Id. at 38. HL&P has taken special care to assure the six root causes identified in response to 79-19 and the Order to Show Cause are

being considered by both Bechtel and Ebasco in their transition program and plans for the eventual completion of the STP. Id. at 39-44.

146. Thus, there is reasonable assurance HL&P, Bechtel and Ebasco have organized themselves in such a manner so that the balance of design and construction can be completed in conformity with the construction permit, the Atomic Energy Act, as amended, and the Rules of the Commission.

E. The Adequacy of Existing Structures - Board Issue E

147. Board Issue E states:

> Is there reasonable assurance that the structures now in place at the STP (refered to in Sections V.A.(2) and (3) of the Order to Show Cause) are in conformity with the construction permits and the provisions of Commission regulations? If not, has HL&P taken steps to assure that such structures are repaired or replaced as necessary to meet such requirements?

148. The structures referred to in Sections V.A.(2) and (3) of the Show Cause Order are the Units 1 and 2 reactor containment buildings (RCB), Unit 1 fuel handling building and Unit 2 mechanical-electrical auxiliary building (MEAB). Staff Exhibit 46, Show Cause Order at 6. As set forth in the Show Cause Order, problems in those structures included improper construction practices during the placement of concrete, concrete voids, improper Cadwelding practices, improper placement of Category I backfill, a dimensional error in one of the buildings, and inadequate welding controls. Id. at 1-11. As a result of these problems, the Show Cause Order directed that a review be made of existing structures to determine whether work in the three areas of welding, concrete and soils had been properly performed and, if repairs were

required, to describe the extent of the repairs and a schedule for completion of that work. Id. at 14-15. This process has now been substantially completed.

149. On July 28, 1980, HL&P filed its response to the Show Cause Order. Staff Exhibit 48. The status of the work in the three areas was reported, verification of the work performed to date was set forth and a repair program, where appropriate, was outlined. Id. at 14. The results of that effort will next be addressed for each of the three areas.

1. Adequacy of Category I Structural Backfill

150. The concerns expressed by the Staff relative to the adequacy of the Category I Structural Backfill will first be addressed. The Show Cause Order directed HL&P to perform five (5) tasks relative to the structural backfill at the STP. Staff Ex. No. 46, Show Cause Order at 14. HL&P was directed to review information or obtain data to (1) verify the test fill program that established the soil conditions, lift thickness, compactive effort, and equipment characteristics necessary to develop the requisite in-place densities; (2) perform a comparison of backfill material tested and described in Section 2.5.4.8.3. of the FSAR addressing liquefaction with the backfill used in the field; (3) determine what the sequence of construction was for existing backfill, including the loose-lift thickness and number of passes of the equipment to obtain the required density; (4) determine the adequacy of the density of the existing backfill material, including that under structures founded on backfill; and (5) explain the rationale behind the

construction procedure of using 18-inch loose-lifts compacted by eight passes of the equipment to achieve the required densities. Id.

151. In addition to the Show Cause concerns, the Staff reported six items of non-compliance with respect to the STP structural backfill program in 79-19. Specifically, those items of non-compliance found that: (1) PTL's procedures did not provide instructions for depth of in-place density testing, Staff Exhibit 46, Appendix A, Item of Non-Compliance 4; (2) B&R construction procedures failed to set forth an identified and documented basis for the acceptability of the required minimum of eight roller passes, Id. at Item of Non-Compliance 2; (3) PTL did not record the actual number of roller passes or the actual lift thicknesses in the earthwork inspection reports (EIR's), Id. at Item of Non-Compliance 5; (4) the PTL relative density test apparatus was broken for a period between November 1979 and January 1980, and backfill placement proceeded although the required laboratory test could not be performed, Id. at Item of Non-Compliance 3; (5) Woodward-Clyde Consultants (WCC) used a non-comforming hammer for standard penetration tests of the backfill from January 28, 1980 to February 4, 1980, Id. at Item of Non-Compliance 16; (6) WCC used a non-conforming split spoon for its standard penetration testing, Id. at Item of Non-Compliance 17. See also Pettersson, et. al., ff. 5796 at 23-24.

152. In January 1980, to respond to initial concerns raised by the Staff inspection team still conducting 79-19, HL&P and B&R initiated a soil test boring program to assess and verify the adequacy of the in-place Category I Structural Backfill at the STP. Pettersson, et. al., ff. 5796 at 26. This program was conducted by geotechnical engineers

from WCC. Id. The program, completed in April 1980, verified the overall adequacy of the Category I structural backfill, but recommended further confirmatory investigations in four specific areas to assure engineering adequacy of the backfill. Id. and Staff Exhibit 48 at 2-2.

153. At the time the Staff Show Cause Order was issued in April, 1980, data obtained during the WCC test boring program was already under analysis. Upon issuance of the Show Cause Order, HL&P established a special Task Force to answer the Show Cause Order comprised of geotechnical and QA engineers from both HL&P and B&R. The Task Force was to perform a study to verify the acceptability of previously placed backfill, the testing methods used in determining the adequacy of that backfill and the adequacy of the in-place Category I Structural Backfill. Id. at 27. WCC, which was in the process of completing their verification analysis, was assigned by the Task Force to investigate, analyze and conduct further verification studies. Id. and Staff Exhibit 48 at 2-2 and 2-3. In addition, HL&P deemed it desirable that an independent assessment of the Category I Structural Backfill analysis be performed. Accordingly, in May, 1980, the firm of Shannon and Wilson, Inc., was retained as consultant to B&R to establish an independent review committee of geotechnical experts to review the Category I Structural Backfill construction for the STP and to review the work of the Task Force. Id. and Staff Exhibit 48 at 2-4 and 2-5.

154. The Applicants presented a panel of witnesses from both the Task Force and the Expert Review Committee in respone to the concerns expressed in the Show Cause Order, and Board Issue E relative to the backfill. The first panel consisted of Messrs. C. Bernt Pettersson,

Assistant Discipline Project Engineer for B&R at the STP; Timothy K. Logan, Project QA Supervisor for HL&P's W.A. Parish Generating Unit and HL&P's QA respresentative on the STP Soils Task Force; Charles S. Hedges, Project Manager for WCC's Work at the STP; and W. Stephen McKay, Corporate Manager for Quality Assurance at Pittsburgh Testing Laboratories (PTL). This panel addressed the development of the structural backfill program at the STP and the Task Force's effort in response to the Show Cause Order.

155. The second panel consisted of Mr. Stanley D. Wilson, a private consulting engineer and founding partner of Shannon and Wilson, Inc., and Thomas E. Kirkland, senior principal engineer and engineering group leader in Shannon and Wilson's Seattle Office. This second panel described the Expert Committee's evaluation of the Task Force's work and its findings on the adequacy of the Category I Structural Backfill at STP. Wilson, et. al., ff. 2697 at 5. This panel further sponsored into evidence the Expert Committee's final report concerning Show Cause Item #2 Structural Backfill Investigation. App. Ex. No. 6.

156. The Task Force panel first explained how backfill was placed at the STP. Backfill was placed, compacted and accepted in individual layers or lifts. Pettersson, et. al., ff. 5796 at 7. The backfill placed at one time in a specific area is called a placement and several placements of backfill are generally required to complete one lift over an entire building foundation area. Id. All placements were compacted before an overlying placement was made. Id.

157. Although no specific code or standard governs placement and the compactive effort of Category I Structural Backfill for the safety

related structures at the STP, compacted properties of the backfill must be consistant with the structural design criteria for foundations and embedded walls of all Category I structures. Regulatory Guide 1.70 and Id. To satisfy this general requirement, specifications were developed in 1974 jointly by B&R and WCC to decide upon the material properties of the backfill. Id. at 8. Material from the Eagle Lake area (Colorado River Alluvium), approximately 55 miles from the STP site, was determined to be the best source area for the fill material. Id. Upon re-evaluation of this choice in light of the Show Cause Order, it was again determined that the fill material had all the desired characteristics of an ideal structural backfill. Tr. 2807 (Wilson).

158. Based on the 1974 laboratory testing of this material, WCC initially recommended that an 80% relative density requirement for backfill at STP would provide an ample factor of safety against liquefaction. Pettersson, et. al., direct ff. Tr. 5796 at 8. B&R adopted a specification requirement for the STP providing for a minimum relative density of 80% and an average relative density of 84%. Id. at 9. Construction procedures were developed in an effort to implement these end-process goals in 1976. It was determined that a 10-ton steel drum vibratory roller should be used to compact lifts with a maximum loose-lift thickness of 18-inches. It was further decided that after eight or twelve passes, it would be appropriate to begin in-place density testing to evaluate the adequacy of compaction. Although not set forth in the construction procedures, it was understood by construction that the density tests were end-process tests and that the compaction effort would be continued beyond the minimum number of passes until proper density was

achieved. Id. at 11 and 12. How this became generally understood by QC inspectors and construction, and why the construction procedures developed in 1976 did not state this understanding, was never adequately explained.

159. With respect to monitoring this process, PTL inspectors were to provide continuous inspection of the placement of all material. Id. at 13. In this context, continuous inspection was interpreted to mean observing the placement process sufficiently to assure that the minimum construction procedures were met and that the final acceptance density was achieved. Tr. 2815 (Wilson). For example, in the inspectors earthwork inspection reports (EIRs), a check list indicated not the actual loose-lift thickness but only that the lift was 18 inches or less. Id. at 14. Similarly, inspectors did not check the actual number of roller passes performed to achieve the requisite density but rather only that the minimum number of passes required occurred. Id. at 14.

160. To determine the density of each lift after compaction, PTL inspectors generally performed at least one field density test for every 20,000 square feet of unrestricted backfill. Id. at 10. For every fourth field density test, at least one laboratory maximum-minimum test and one gradation test was performed. Id. It was then recorded on the EIR and Density Test Reports whether the required relative density had been achieved. Id. at 15. In addition, backfill material qualification, placement, inspection and testing were monitored by HL&P QA personnel. Id. at 17.

161. All the questions raised in the Show Cause Order relative to backfill have been adequately answered. Specifically, HL&P found no

material difference between the soil properties tested in 1974 and the soil properties found during 79-19. Pettersson ff. 5796 at 29, Crossman, et. al., ff. Tr. 10010 at 38; Staff Exhibit 120. Construction procedures for Category I structural backfill were developed based upon specification requirements and existing industry practices. Pettersson et. al., ff. 5796 at 29, Crossman, et. al., ff. 10010 at 36; see also Staff Exhibit 40. The original test fill program showed that approximately 80% relative density could be obtained by four passes over loose-lifts of between 18 to 24 inches. However, the Expert Committee Report found that 16 to 20 passes or more are presently needed to consistently meet the desired densities. App. Ex. No. 6 at 30. It further stated that this number of passes is consistent with the number actually performed in the field before the requisite density was met. Id. Nonetheless, B&R site geotechnical engineers originally recommended that provisions for a minimum of 12 roller passes be initially incorporated into construction procedures. B&R subsequently concluded that the minimum of 12 passes would actually only be necessary on the surface lift. Crossman, et. al., ff. 10010 at 36. This was so because underlying lifts would receive further densification upon compaction of overlying lifts. Pettersson, et. al., ff. 5796 at 12. Although it was not set forth in the procedures, HL&P and B&R indicated that it was generally understood the 12 passes represented an appropriate place to begin end-process testing. Petterson, et al., direct ff. Tr. 5796 at 11-12.

162. The Staff reviewed the procedures used to perform the test fill program, and the technical reference document entitled "Test Program For Compaction of Category I Structural Backfill." and the results of the Expert Committees' report. Crossman, et. al., ff. 10010 at 36, Staff Ex. Nos. 40. 58, and 94.

163. Based upon the Expert Committee's report the Staff is satisfied that the Category I structural backfill is adequate at STP. Crossman, et. al., ff. 10010 at 39 and Staff Ex. No. 94. The Staff concluded that the density of lower lifts is significantly increased by compaction of subsequent lifts and that this multiplying effect demonstrated that a minimum of eight passes of compaction equipment was adequate to begin in-process testing. Id. at 37. As a practical matter, it was pointed out by the Staff that if the requisite density was not achieved using the minimum number of passes, additional passes with compaction equipment were made until the required density was achieved prior to continuing the construction effort. Id. The Staff reviewed the findings of both the Task Force and Expert Committee and based upon those findings determined that Item 2 of the Show Cause Order was satisfied. See Crossman, et. al., ff. 10010 Corrections and Update at 3, and Staff Ex. No. 94. For the reasons set forth above, the Board adopts the Staff's findings, and concludes that there is reasonable assurance that the backfill now in place is in conformity with the construction permit and applicable regulations and that work performed in the future will meet such requirements.

2. The Concrete Verification Program

164. The Show Cause Order directed HL&P to review safety related concrete structures, including embedments such as supports and the fuel transfer tube. Staff Exhibit 46, Show Cause Order at 15. If, after this review, repairs were required, HL&P was to describe the extent of the repairs necessary and to provide a schedule for completion of that work. Id. In addition, among the 22 items of non-compliance in 79-19 were citations for failure to implement corrective action relative to concrete placement activities and unqualified Civil QC inspectors. Staff Ex. No. 46, Appendix A at Items of Non-Compliance 7 and 8.

165. It should first be noted that at the time the Order to Show Cause was issued, HL&P was already in the midst of an extensive concrete verification program stemming from voids discovered in Lifts 15 and 8 in the RCB. See Section III.A.2, infra. Upon issuance of the Show Cause Order, HL&P and B&R initiated a Task Force to perform an assessment of safety related concrete structures at STP. It was determined that embedments such as supports and the fuel transfer tube involve issues of traceability and the application of Section Three of the ASME Code, and that accordingly those items would be addressed by the Welding Task Force in response to Item (3)(a) of the Show Cause Order. Staff Exhibit 48 at 3 b-1. See Section II.E.3, infra and Staff Ex. No. 88. The Task Force included over 20 full time engineers from HL&P and B&R, and this team received further assistance from outside consultants due to the same concerns that led to the Expert Committees in the Backfill verification program. Staff Exhibit 48 at 3 b-2.

166. A panel from the Task Force was presented to testify on the efforts of the Concrete Verification Program. The panel consisted of

Messrs. Gerald R. Murphy, Assistant Discipline Project Engineer (Civil-Structural Discipline) for the STP; Ralph R. Hernandez, Supervising Engineer for the Civil Nuclear Support Section within the Civil Mechanical Engineering Division of HL&P's Power Plant Engineering Department; and Joseph F. Artuso, President of Contruction Engineering Consultant, Inc., an engineering firm providing consulting services, quality control services and materials analysis for construction projects. See Artuso, et. al., ff. 6327 at 1-5. Mr. Murphy was the task force leader in response to the concrete verification request in the Show Cause Order and Mr. Artuso was a member of the consultant panel. Id. at 10. The Task Force was charged with determining whether the safety related concrete work at STP, as of the time of the Show Cause Order, had been properly performed, and to describe the extent of repairs, if any, that needed to be made in order to correct any deficiencies. Id. at 11.

167. The Task Force pursued this objective by identifying and examining samples of the safety related concrete in several structures at STP selected by a conservative, statistically valid method. Id. at 11-12. Once the placements selected for review were chosen a four-phase verification program was followed, consisting of: (1) a review of all documentation relating to each placement; (2) a comparison of the "as-built" configuration for each placement (as determined by a field survey) against the "as-designed" configuration reflected in the documentation; (3) a visual inspection of each placement to assess the general quality, and to determine potential structural defects as well as to identify areas requiring follow-up testing; and (4) random selection of three sample areas within each selected placement to perform a variety

of specialized tests to investigate the structural properties of the placement. Id. at 12.

168. Placements were then classified into five major generic types: thick slabs, thin slabs, thick walls, thin walls, and high (tall) placements. The placements were selected on the basis of accessibility for inspection and testing and on the amount of information that testing would disclose with respect to the placement. Placements were selected from those determined to be more critical because the complexity of the placement was related to previously identified concerns. Id. at 14.

169. After it was determined that documentation was substantially complete, Id. at 17, the "as-built" configuration was checked against the "as-designed" condition. In the vast majority of cases the specified tolerance was met. Id. at 19. The deviations from tolerance that were identified were minor and in no instance resulted in the rejection of an item because it was out of tolerance to the point that "fit-up" could not be accomplished. Mr. Artuso justified the minor deviations from tolerances that occurred by stating that the design tolerances at STP are too restrictive. Id. at 20.

170. Next, a visual inspection was conducted by the consultant panel. Id. at 21. The visual inspections addressed any prior items of non-compliance as well as the known characteristics and accompanying potential problems on each placement. The visual inspections indicated quality workmanship and satisfactory construction. Id. at 22. In addition, selected destructive testing was performed. Id. at 23-24. The break samples indicated well consolidated concrete. Id. In addition, selected cores were compression tested and all met the design require-

ments, Id. All concrete subjected to a petrographic examination was found to be homogeneous and hard with little or no segregation. Id. at 24-25. Selected Windsor Probe testing indicated that all concrete tested was in excess of design requirements. Id. at 25. Ultrasonic testing indicated that concrete, in addition to having a high strength, had excellent uniformity. Id. at 26.

171. Based on the above verification program the consulting panel concluded that there was reasonable assurance that the quality of safety related concrete at STP is adequate and that the concrete structures will perform as designed. Id. at 27. Accordingly, the panel concluded that based on its review, test and inspections there is reasonable assurance that the safety related concrete structures at STP, as constructed or repaired, are substantially in conformance with the construction specifications, and that in the few instances where deviations exists they are insignificant from the point of view of plant safety. Id. at 29-30. This assurance is reached after examining structures representative of 97% of all safety related concrete at STP. Id. at 30.

172. The Staff concurred with the finding that there are no internal honeycomb or void areas which remain unrepaired in the structures. Staff Ex. No. 113 at 5. This concurrence is based upon the Applicants' four phase investigation program, Windsor Probe readings, ultrasonic testing, and petrographic and compressive strength evaluations of drilled core samples. The Staff reviewed all phases of this program prior to its concurrence. See Staff Ex. Nos. 113, 82 and 85. For the reasons set forth above, the Board adopts the findings of the consulting panel and the Staff, and concludes there is reasonable assurance that the

concrete work now in place at the STP is in conformity with the construction permit and applicable NRC regulations or that such work will be repaired or replaced as necessary to meet such requirements. In addition, due to the numerous improvements in the procedures for placing concrete, the Board finds that there is reasonable assurance that concrete work performed in the future will be in accordance with applicable requirements.

3. The Welding Verification Program

173. The Show Cause Order directed HL&P to review safety related welding, including civil, structural and piping. Staff Exhibit 46, Show Cause Order at 15. If, after this review, repairs were required, HL&P was to describe the extent of the repairs necessary and to provide a schedule for completion of that work. Id. In addition, seven items of noncompliance were cited in 79-19 relative to the STP welding program. Specifically: (1) the B&R weld filler material specification did not contain the latest document change notice, Staff Exhibit No. 46, Appendix A at Item of Noncompliance 9; (2) the STP construction procedures failed to incorporate requirements for welding protection against adverse environmental conditions, id. at Item of Noncompliance 10; (3) the quality of numerous radiographs was such that proper interpretation was not possible, id. at Item of Noncompliance 11a; (4) linear indication contained in several radiographs were not recorded on interpretation sheets, id. at Item of Noncompliance 11b; (5) the evaluation of certain liquid penetrant indications was not in compliance with the ASME Code, id. at Item of Noncompliance 11c; (6) outdated

procedures for liquid penetrant examinations were being used, id. at Item of Noncompliance 12; (7) radiographic evaluation of some welder qualification tests did not comply with the ASME Code in that the penetrameter (radiographic image quality indicator) was placed on the side of the test pipe close to the radiographic film (film side) rather than the preferred radiation source (source side), id. at Item of Noncompliance B.

174. Upon issuance of the Show Cause Order, HL&P and B&R formed a special Task Force review team to formulate a program to reassess and verify safety related welding at STP and to determine whether the safety related welding that was completed as of the date of the order was properly performed. Staff Exhibit No. 48 at 3a-1. The Task Force was also given the responsibility of identifying any repair work that might be required and to establish a schedule for completion of such work. Id. In addition, as was the case in both soils and concrete, early in the review process the Task Force established an Independent Review Committee to both review and approve the Task Force programs and reports. The Independent Review Committee further was to assure that the Task Force was properly implementing the programs, provide technical and code advice, and advise the task force in making recommendations for corrective action and additional review. Id. at 3a-2 and 3.

175. The Task Force defined the scope of its review to encompass examination of randomly selected safety related ASME piping welds and AWS structural welds made by B&R from the start of construction until the time safety related welding was stopped on April 11, 1980. Saltarelli, et al. ff. 7536 at 27. All STP welding procedures, specifications and a

significant portion of documentation were also examined. Id. The Task Force members developed a plan to evaluate four specific areas of the STP welding program: (1) the safety related AWS welding program; (2) the ASME welding program including welder qualifications; (3) the non-destructive examination program; and (4) Code commitments as identified in the engineering specifications and implementing procedures. Id.

176. With respect to the first of these 4 commitments, the Task Force visually examined a random sample of 79 safety related AWS welds selected from all areas of the plant in accordance with accepted sampling procedures. Id. at 29. This examination revealed 61 welds with nonconformances. Id. The task force therefore recommended that all accessible safety related structural AWS welds be reexamined and that all such welds not in compliance with the AWS Code be repaired and that the adequacy of all inaccessible AWS welds be determined based on the types of nonconformances found in the reexamination of the accessible welds. Id. at 30. In addition, it was recommended that all AWS welders and inspectors be retrained to the requirements of the AWS Code and applicable STP procedures. Id.

177. As a result of the Task Force conclusions with respect to weld deficiencies (both AWS and ASME) B&R and HL&P decided in September, 1980, that all accessible safety related AWS and ASME welds be re-examined and repaired, where required. Id. at 44. This reexamination and repair program encompassed radiography of 100% of the accessible ASME welds in the ECW system, requiring that those ECW welds buried under backfill be unearthed. Id. This program was conducted pursuant to a detailed reexamination and repair plan submitted to the Staff on September 10,

1980. Id. In October, 1980, the Staff authorized the reexamination and repair of AWS welds as well as limited restart of new AWS welding, based on new management systems and procedures, personnel retraining, the completion of commitments regarding safety related welding in response to the Show Cause Order and the completion of all corrective action for previously identified noncompliances related to AWS and ASME welding. Id. at 45.

178. As of the time the panel consisting of Saltarelli, et al., testified, approximately half of the accessible AWS welds had been reexamined. Id. at 46. Six percent of these welds contained deficiencies directly related to weld strength. Id. at 46-47. All deficiencies found had been repaired, inspected and accepted. Id. at 47. Approximately half of the accessible non-essential cooling water (ECW) ASME welds made prior to the stop work order had been reexamined and eight percent contained deficiencies. Id. In addition, 15 percent of the accessible ECW pipe welds had been reexamined and, after finding deficiencies in 83 percent of such welds, these deficiencies were repaired, inspected and accepted. Id. HL&P committed to radiographing 100% of the ECW welds in repairing all deficiencies. Id. Finally, AWS construction procedures and weld documentation were found acceptable by the task force. Id. at 30.

179. With respect to the second of the Task Forces activities, all radiographs of completed and accepted ASME welds were reviewed by certified NDE Level III examiners in radiography. Id. at 31. 25 percent of the radiographed welds that previously had been accepted were considered unacceptable. Id. In addition, the Task Force repeated code

required visual examination and liquid penetrant testing on a random sample of ASME welds that originally were accepted on the basis of similar examinations. Id. Based upon this reevaluation, the Task Force recommended and HL&P agreed that: (1) all accessible ASME welds with known deficiencies should be repaired; (2) all other accessible ASME welds should be visually reexamined, liquid penetrant tested and repaired if necessary; and (3) data from the reexamination should be used in the evaluation of the adequacy of the inaccessible ASME welds. Id. at 32. The Task Force found that the STP ASME construction procedures and documentation were substantially in compliance with the applicable code requirements. Id. at 33.

180. The evaluation of welder performance test records revealed two problems: (1) film side penetrometer placement for some of the tests; (2) the use of ASME acceptance criteria for both ASME and AWS welder qualifications. Id. at 33-34. The possible effects of the first problem were determined to be insufficient to require further investigation. Id. at 33-34. With respect to the use of ASME acceptance criteria for AWS welder qualifications it was found to not significantly affect previous test results. Id. at 24.

181. The Task Force next reviewed the nondestructive examination program (NDE). The Task Force compared the STP NDE procedures for radiography, magnetic particle, liquid penetrant and visual testing with applicable code requirements. Id. at 34. All procedures were found to be substantially in compliance with the code. Id. However, the qualification files for NDE inspectors identified various types of irregularities in the qualifications of 21 of the 70 personnel, including

uncertified personnel performing NDE, an inspector who signed at a higher level, and the expiration of an eye exam certification. Id. In addition, the review determined that documentation regarding 9 of the 21 inspectors showed insufficient training and/or experience in performing examinations. Id. The Task Force concluded, however, that program improvements implemented since the Stop Work Order of April 11, 1980 were sufficient to ensure proper control of the NDE inspector certification processes in the future. Id. at 34.

182. Finally, the Task Force reviewed the STP engineering specifications and implementing construction/QA procedures in order to determine whether applicable codes and standards were adequately identified and whether the same commitments had been made in all documents. Id. at 35. Although commitments and requirements were found to have been adequately identified in the procedures, it was recommended that procedures be simplified and clarified due to inconsistencies and ambiguities. Id. at 35. This recommendation was followed prior to welding restart. Id. at 36-37.

183. The Staff continuously monitored the activity of the Task Force. See Staff Ex. Nos. 72, 82, 88, 117, and 122. The Staff subsequently concluded that virtually all of the commitments made by HL&P relative to its safety related welding program were complete and therefore closed out show cause Item 3(a) in December, 1981. See Staff Exhibit No. 131 at 4.

184. Similarly, HL&P resolved all of the Items of Noncompliance relative to safety-related welding set forth in 79-19. Specifically, to assure that the latest document changes were incorporated into both weld

filler material specifications and other controlled documents, HL&P revised and updated all control documents and further added an administrative technician to the site HL&P QA staff to be responsible for document control. Crossman et al. following 10,010 at 22. HL&P further committed to rewriting work procedures to require protection against contamination from rain, snow, and airborne particles during welding operations. Id. at 23 and Staff Ex. No. 40. These new welding procedures were reviewed and it was verified that adequate requirements had been implemented for maintaining cleanliness during the welding process. Staff Ex. No. 40 at 7. HL&P further committed to review all radiographic film to identify discrepancies, to revise radiograph film processing procedures to clarify film processing techniques, to retrain and re-certify all NDE personnel, and to revise the requirements for recording film conditions. Crossman, et al., ff. 10,010 at 23 and Staff Exhibit No. 82. With respect to inadequate liquid penetrant examinations, all NDE personnel had been retrained in the requirements of inspection procedures with an emphasis upon the importance of adhering to such requirements. Training was followed by a reexamination and recertification of all liquid penetrant personnel. Id. at 24-25 and Staff Ex. No. 40 at 8.

185. Based on the above, the Board finds that HL&P is conducting a thorough reevaluation of the STP welding program. This evaluation has resulted in the discovery of significant defects in existing welds and significant improvements in the welding program to prevent recurrence of those defects. In addition, the welding verification and repair program leads this Board to find that there is reasonable assurance that the

welding work now in place at the STP is either in conformity with the construction permit and applicable NRC regulations or that such welded components or structures will be repaired or replaced as necessary to meet such requirements. In addition, the Board finds there is reasonable assurance that welding performed in the future will be in accordance with applicable codes and requirements.

III. INTERVENOR CONTENTIONS

A. Contention 1

186. Contention 1 asserts that due to specified construction deficiencies, the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2).[30/] Due to these alleged deficiencies, CCANP asserts that there is no reasonable assurance that the activities which would be authorized by an operating license for the STP would be conducted without endangering the health and safety of the public. Contention 1 states:

> "There is no reasonable assurance that the activities authorized by the operating license for the South Texas Nuclear Project can be conducted without endangering the health and safety of the public in that:
>
> 1. There has been a surveying error which has resulted in the eastern edge of the Unit 2 Mechanical-Electrical Auxilliary Building being

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30/ 10 C.F.R. § 50.57(a)(1) and (2) essentially authorize the issuance of an operating license upon the Commission finding that construction of the facility has been substantially completed in conformity with the construction permit and application, as amended, the provisions of the Act, and the Rules and Regulations of the Commission.

constructed one (1) foot short (in the east-west direction) from its design location. This error violates 10 C.F.R. Part 50, Appendix B, Sections X and XI.

2. There has been a field construction error and as a result, extensive voids exist in the concrete wall enclosing the containment building, in violation of 10 C.F.R. Part 50, Appendix B, Sections IX and X.

3. In violation of Quality Assurance and Quality Control requirements applicable to the South Texas Nuclear Project with regard to document control (10 C.F.R. Part 50, Appendix B, Sections VI and VIII), a field document relating to Cadweld inspections has been lost.

4. There are membrane seals in the containment structure which are damaged, indicating a violation of 10 C.F.R. Part 50, Appendix B, Sections X, XV and XVI.

5. There are steel reinforcement bars which are missing from the concrete around the equipment doors in the containment and such bars are missing from the containment structure as well, indicating violations of 10 C.F.R. Part 50, Appendix B, Sections X, XV and XVI.

6. There are cadwelds which have been integrated into parts of the plant structure which are not capable of being verified with regard to compliance with 10 C.F.R. Part 50, Appendix B, in violation of Sections IX and X of Appendix B.

7. Quality Control as per the requirements of 10 C.F.R. Part 50, Appendix B, in particular Sections III and IX, has not been complied with, because:

a. Efforts by quality control inspectors to verify that design changes were executed in accordance with the purposes of the original design were repeatedly and systematically thwarted.

b. There were personnel other than the original designer approving design changes with no first-hand knowledge of the purpose of the original design.

c. There were design changes approved by personnel unqualified in the type of design where the change was made.

d. There were numerous pour cards that were supposed to record the correct execution of concrete pours which were falsified by numerous persons.

e. There has been and continues to be assaults on the Applicant's quality control inspectors, continual threats of bodily harm to those inspectors, firing of inspectors, and other acts constituting a pattern of behavior designed to intimidate the inspectors. As a result of the intimidations, certain inspections were never done because the inspectors decided to play cards over a period of four months rather than risk their safety on the plant grounds.

8. a. As evidenced by the investigative results in Allegation 1 of I&E Report 81-28, Houston Lighting and Power management failed to assure prompt corrective action by Brown and Root in the area of access engineering in violation of Criterion XVI of 10 C.F.R. Part 50, Appendix B.

b. As evidenced by the investigative results in Allegation 1 of I&E Report 81-28, Houston Lighting and Power management does not have a consistent policy on the issuance of stop work orders in violation of Criterion 1 of 10 C.F.R Part 50, Appendix B.

c. As evidenced by the investigative results in Allegation 2 of I&E Report 81-28, Houston Lighting and Power management personnel are not committed to respecting the mandates of NRC regulations, especially Criteria I and II of 10 C.F.R. Part 50, Appendix B.

d. As evidenced by the investigative results in Allegation 4 of I&E Report 81-28, HL&P management failed to effectively implement a quality assurance program in violation of Criterion I of 10 C.F.R. Part 50, Appendix B.

As a result of the foregoing, the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) necessary

for issuance of an operating license for the South Texas Nuclear Project.

187. The Board will deal with each of the subcontentions individually in the order in which they are presented in Contention 1. For each of these subcontentions we shall examine the validity of the allegation. If shown to be valid, we shall examine the steps taken by the Applicants to both correct the defect and prevent recurrence of similar problems; the Staff review of both the allegation and any corrective action; whether there was a violation of Appendix B, as alleged; the safety implications of any defect found, and the inference its occurrence permits us to draw about our ability to make the findings required by 10 C.F.R. § 50.57(a)(1) and (2).

188. Initially, it should be noted that neither CEU nor CCANP presented witnesses in support of their contentions. However, through the witnesses of the Applicants and Staff the intervenors did present limited documentary evidence. Notwithstanding that evidence, the testimony of the Applicants and Staff witnesses essentially was uncontroverted.

1. Contention 1.1

189. Contention 1.1 asserts that there is a one-foot surveying error in the Unit 2 Mechanical-Electrical Auxiliary Building (MEAB) and that this violates 10 C.F.R. Part 50, Appendix B, Sections X and XI. Due to this error, CCANP further asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings

required by 10 C.F.R. § 50.57 (a)(1) and (2) for the issuance of an operating license.

190. The Applicants presented Richard W. Peverley to testify on this issue. Peverley direct ff. Tr. 7826. The Staff panels of Seidle, et al., direct ff. Tr. 9205 and Crossman, et al., ff. Tr. 10,010 each addressed aspects of this contention. The corrective action related to this error was reviewed and closed in Staff Ex. No. 133 at 2. Mr. Peverley was the assistant engineering project manager-special services, for Brown & Root, Inc. (B&R). Peverley direct fol. Tr. 7835 at 2.

191. Neither the Applicants nor the Staff denied this surveying error occurred. Mr. Peverley testified that in September, 1978, B&R field engineers discovered a one-foot error in the dimensions of the basemat for the Unit 2 MEAB while attempting to lay out a sump in that building. Peverley direct ff. Tr. 7826 at 3. It was Mr. Peverley's responsibility to coordinate and manage the engineering review of the incident and to formulate a corrective action plan. Id. In addition, this matter was reported to the Staff as a 50.55(e) item on October 4, 1978. Id.; Seidle, et al., direct ff. Tr. 9205 at 35; Crossman, et al., direct ff. Tr. 10,010 at Appendix C, Item 8 and Staff Ex. No. 113 at 2.

192. It was explained that the error occurred because instead of properly using the containment/reactor centerline as the point of reference to lay out this building, the Applicants surveyors laid out the building using column line RI in the fuel handling building as the point of reference. Seidle, et al., direct ff. Tr. 9205 at 35-36; Peverly direct ff. Tr. 7826 at 7, Staff Ex. 113 at 2. Apparently, the

column line RI is offset one-foot to the west of the containment/reactor centerline, resulting in the eastern edge of the MEAB being one foot short of design. Id., Seidle, et al., direct ff. Tr. 9205 at 36; Peverly direct ff. Tr. 7826 at 7. The cause of this defect was the failure of a field engineer to properly check survey calculations. Id.

193. To correct this error, equipment within the MEAB was rearranged to compensate for the one-foot dimensional error. The redesign affected only the west one-fourth of the building by eliminating excess floor space around the layout of systems and equipment in that area. The general arrangement of equipment within the redesigned area, however, remained the same. Seidle, et al., direct ff. Tr. 9205 at 36; Staff Ex. 113 at 2 and Peveley direct ff. Tr. 7826 at 5.

194. In order to prevent recurrence of this problem the field engineering department has been reorganized and certain procedural changes to the surveying process have been implemented. First, personnel within the survey group must meet increased qualification requirements before being hired. Peverley direct ff. Tr. 7826 at 9. Training meetings must be held every three to six months and must be attended by all personnel. Id. All original control work is established by one crew permanently assigned to a particular building. All survey operations are checked by the supervisor. Id. Major layouts are double-checked. Procedures also require that all building layout points are traversed back to the original point so that closure occurs. Peverley direct ff. Tr. 7826 at 9. In addition, an additional layer of supervision responsible for checking all lay-out calculations has been added. Staff Ex. 113 at 2.

195. The Staff reviewed this corrective action in May, 1981. Staff Ex. 113 at 2. Specifically, the Staff reviewed an engineering evaluation of the redesigned equipment layout against the safety criteria stated in the FSAR for layout of systems and components. The Staff further reviewed the cause of the error and the preventive measures that were implemented. Based upon that review, it was concluded this error was resolved and this 50.55(e) item was closed. Id. at 2.

196. Nothing about this incident precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was presented to show that the one foot error resulted in the plant not being built in conformity with the construction permit or would effect the ability of the plant to operate in conformity with the application as amended, the provisions of the Atomic Energy Act (the Act), or the Rules and Regulations of the Commission. In addition, since the error was properly reported to the Staff pursuant to the Applicants' reporting requirements under 10 C.F.R. 50.55(e) and resolved through the provisions of that regulation, this Board need not reach the question of whether this error constituted a violation of 10 C.F.R., Part 50, Appendix B, Sections X and XI, as alleged. Crossman, et al., direct ff. Tr. 10,010 at Appendix C, Item 8. Seidle, et al., direct ff. Tr. 9205 at 36.

2. Contention 1.2

197. Contention 1.2 asserts that there has been a field construction error and as a result, extensive voids exist in the concrete wall enclosing the containment building, in violation of 10 C.F.R. Part 50, Appendix B, Sections IX and X. Due to this error, CCANP asserts

that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

198. The Applicants presented testimony relative to this subcontention as part of "Testimony on Behalf of Houston Lighting & Power Company, et al. of Mr. Gerald R. Murphy, Mr. Gerald L. Fisher, Mr. Charles M. Singleton, Mr. Joseph F. Artuso, Mr. Ralpn R. Hernandez, and Mr. David G. Long On Several Activities Comprised Within or Related To The STP Concrete Work, Including Intervenors' Contentions Relating To The Foregoing Activities." direct ff. Tr. 6522. (Hereinafter referred to as Murphy, et al., direct). The principal spokesmen on this panel relative to Contention 1.2 were Gerald R. Murphy, Assistant Discipline Project Engineer (Civil-Structural Discipline) for the STP, and Joseph F. Artuso, President of Construction Engineering Consultant, Inc., an engineering firm providing consulting services, quality control services and materials analysis for construction projects. See Murphy, et al., direct ff. Tr. 6522 at 5-24 and 57-59. The Staff panels of Seidle, et al. direct ff. Tr. 9205, and Crossman, et al., direct ff. Tr. 10,010, each addressed aspects of this contention.

199. The fact that voids occurred during the concrete placement of the RCB is not in dispute. On October 20, 1978, the Licensee pursuant to its reporting obligations under 10 C.F.R. § 50.55(e), advised the Staff of the existence of voids in the concrete in Lift 15 of the Unit 1 reactor containment building (RCB) exterior wall from elevation 120'-0" to 130'-0". Staff Exhibit 113 at 4, Murphy, et al., direct ff. Tr. 6522

at 58; Crossman, et al., direct ff. 10,010 at Appendix C, Item 12. This deficiency was reported to be caused by the cumulative effects of inadequate preplacement planning, an unusually long pour time, longer than normal slick lines and a concrete pump breakdown. Seidle, et al., direct ff. Tr. 9205 at 36. It was also stated that procedures for stopping work due to problems encountered during an ongoing pour were not properly exercised by construction or quality control. Id.

200. As required by 10 C.F.R. § 50.55(e)(3), B&R conducted an investigation into the Lift 15 voids to determine the extent and location of unacceptable areas. Id. The initial investigation consisted of a visual examination of the external surface and tapping the liner with a hammer. Any area where tapping produced a hollow sound was regarded as potentially containing voids and was mapped on a grid system. Murphy, et al., direct ff. 6522 at 11. Where potential voids were identified, they were examined using an Olympus fiberscope to determine their extent, characteristics and relationship to the liner stiffening elements. Id. The investigation revealed that voids occurred in areas beneath shell penetrations, and/or beneath the 8 inch channel and plate stiffeners, and where high concentrations of reinforcing steel were located. Id. at 12.

201. Although the Applicants never adequately explained how this determination was made, during the investigation of voids in Lift 15 it was determined that similar voids may exist in Lift 8. Id. at 13. The voiding in Lift 8 was the subject of a 50.55(e) report on June 18, 1979. Crossman, et al., direct ff. Tr. 10,010 at Appendix C., Item 15; Seidle, et al., direct ff. Tr. 9205 at 37. Following verification of voids in Lift 8 a program was established to identify all significant voids in the

reactor containment building shell walls for both Units 1 and 2. Id. at 13. After testing similar to that performed on Lifts 15 and 8, a total of 89 void areas in Units 1 and 16 void areas in Unit 2 were identified. Murphy, et al., direct ff. Tr. 6522 at 14. As was the case in Lifts 15 and 8, voids were found only in areas of high rebar congestion beneath penetrations and beneath the 8 inch channel and plate stiffeners. Id. at 14. See also Staff Exhibit 118 at 4.

202. Following identification of the unacceptable areas on the containment wall by the techniques outlined above, see ¶ 200, supra, Masterflow 814 grout was selected as an acceptable material for filling the voids based on a program of laboratory and field tests. Siedle, et al., direct ff. Tr. 9205 at 37. Twelve locations were next selected at random for drilling to determine whether there were any ungrouted voids and to inspect the quality of the grout in place, including the grout-concrete interface condition. Id. No additional voids were found and the interface between the grout and concrete was found to be adequate. Id.

203. HL&P reviewed and monitored all phases of the void detection and repair program. Murphy, et al., direct ff. Tr. 6522 at 57-60. In addition, the Staff reviewed the corrective action pursuant to its follow up inspection program with respect to any item reported under 10 C.F.R. § 50.55(e). The Staff found the repair of the construction deficiencies adequate. Staff Exhibits 113 at 4-5 and 118 at 4-5; See also Crossman, et al., direct ff. Tr. 10,010, Corrections and Update at 3-4.

204. In order to prevent recurrence, the main preventive actions taken were to provide better visibility and access to congested areas

during a concrete pour for both construction workers and QC inspectors, and to strengthen construction and QC procedures to provide for a more orderly pour. Murphy, et al., direct ff. Tr. 6522 at 19. Visibility and access were improved by relocating the construction joint so that the 8 inch stiffeners are now located near the top of the placement making it easier to consolidate and inspect the concrete during placement. Improper concrete consolidation had been a problem in the past, see Seidle, et al., direct ff. Tr. 9205 at Appendix B, Inspection Nos. 78-01, 79-04, 79-15. Horizontal shear ties were repositioned in order to provide better access to the placement for the vibrator operators and inspectors. Murphy, et al., direct ff. Tr. 6522 at 19. It was also decided to use a fine aggregate concrete (grout) mix instead of the normal concrete mix beneath penetrations and in congested areas. Id. In addition, since faulty construction procedures were regarded as a contributing cause to the voiding, procedural changes provided for a more controlled plan and execution of each placement so that potential problems would be anticipated and dealt with adequately during the pour. Id. at 19-20. Finally, post placement meetings were established as routine to identify and resolve any problems experienced during the placement. Murphy, et al., direct ff. Tr. 6522 at 20.

205. Nothing about the initial voiding, detection or repair program precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was presented to show that there currently exists any significant voids in the reactor containment wall. HL&P first identified voids in Lift 15 and properly expanded the scope of its efforts when its investigation demonstrated the voiding problem was more

extensive. Consequently, nothing about the void detection and repair program would affect the ability of this Board to conclude that the facility has been constructed in accordance with the construction permit, will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, or the Rules and Regulations of the Commission. In addition, this Board need not establish whether this construction error constituted a violation of 10 C.F.R. Part 50, Appendix B, Sections IX and X, as alleged, because the incidents giving rise to the verification program (i.e. voiding in Lifts 15 and 8) were properly reported to the Staff pursuant to the Applicants' reporting requirements under 10 C.F.R. § 50.55(e) and resolved through the provisions of that regulation. Crossman, et al., direct ff. Tr. 10,010 at Appendix C, Items 12 and 15; Seidle, et al., direct ff. Tr. 9205 at 36-37; Murphy, et al., direct ff. Tr. 6522 at 18, 23 and 59.

3. Contention 1.3

206. Contention 1.3 asserts that a field document relating to Cadweld inspections has been lost, in violation of 10 C.F.R. Part 50, Appendix B, Sections VI and VII. Due to this error, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

207. The Applicants presented testimony relative to this contention as part of the panel consisting of Murphy, et al., direct ff. Tr. 6522, supra ¶ 198. The principal spokesmen on this panel relative to

Contention 1.3 were Gerald R. Murphy, Assistant Discipline Project Engineer (Civil-Structural Discipline) for the STP, Charles M. Singleton, Civil Quality Control Superintendent at the STP, and Joseph F. Artuso, President of Construction Engineering Consultant, Inc., an engineering firm providing consulting services, quality control services, and materials analysis for construction projects. See Murphy, et al., direct ff. Tr. 6522 at 24-39. The Staff panels of Seidle, et al., direct ff. Tr. 9205, and Crossman, et al., direct ff. Tr. 10,010, each addressed aspects of this contention.

208. Initially, the Cadwelding process should be explained. Cadwelding is a process whereby two reinforcing bars are mechanically bound together by way of a Cadweld sleeve. The two reinforcing bars are placed end to end and the ends to be joined are inserted in the Cadweld sleeve. A filler metal is then ignited and the molten filler metal fills the space between the reinforcing bars and the sleeve, thus forming a mechanical bond. In the Cadweld process, in contrast to a true weld, the rebar are not fused together. Seidle, et al., Direct ff. Tr. 9205 at 32; Murphy, et al., direct ff. Tr. 6522 at 24.

209. Acceptable completed Cadwelds were marked by the Cadweld QC inspector with a white stripe of paint to distinguish them from either uninspected or rejected Cadwelds. Murphy, et al., direct ff. Tr. 6522 at 28. These accepted Cadwelds were then ready to be moved from the lay-down yard, where they were bonded to the containment for placement. The final inspection covers, among other items, Cadwelder qualifications, the location of the Cadweld in the structures and the exact Cadweld

number. Id. The results of this inspection are recorded in the Cadweld inspection book.

210. CCANP presented no direct evidence relevant to which field document relating to Cadweld inspections had been lost resulting in an inability to make the requisite findings under 10 C.F.R. § 50.57(a)(1) and (2). However, an allegation similar to this Contention was received by the Staff on September 9, 1978. On that date the Staff received a telephone call from an individual who identified himself as an employee at the STP who alleged irregularities in Cadwelding activity, including the fact that field sketch No. FSQ-030 had been lost and was no longer available. Staff Exhibit No. 13 at 2. Upon investigation it was determined that Cadwelds 28H31 through 28H44 were those that should have been recorded on FSQ-030; however, FSQ-030 was never prepared. Staff Exhibit No. 14 at 2. B&R civil quality control inspectors verified that the Cadwelds were satisfactorily made; however, they could not verify their exact as-built locations. Id. The approximate locations, however, were noted in reactor containment building drawing 3-C-02-1-C-1545-4, SKT.2 of 8, Rev. 4. The inability of HL&P to identify the precise as-built location of the Cadwelds, which should have been recorded on FSQ-030, is of no safety significance since there was no evidence presented of any test splice failures for the Cadwelds in question. Murphy, et al., Direct ff. Tr. 6522 at 37-39.

211. During the Staff investigation of this incident, two items of non-compliance with Appendix B criteria were issued regarding Cadwelding activities. Staff Ex. No. 13 at Appendix A. Although the failure to issue and control document FSQ-030 would appear to be a violation of

Criterion VI of Appendix B, the Staff listed this matter as an unresolved matter in its initial investigation and subsequently determined that corrective action had been taken by HL&P. See Staff Ex. No. 14. And further, assuming such a failure did violate Appendix B, this Board would not find the occurrence impacts negatively on HL&P's character or competence absent further evidence that such a failure was symptomatic of a greater failure to generally meet Appendix B requirements. Evidence was not developed to establish this failure was symptomatic.

212. To prevent recurrance of similar failures in documentation, and further, in light of the other irregularities in the Cadweld procedures, additional training in Cadwelding procedural requirements was implemented and provided to the craft and inspection personnel as well as increased surveillance of ongoing Cadwelding activities by B&R QA/QC. See Staff Ex. No. 14 at 2.

213. The evidence presented supports the finding that a field document relating to Cadwelding had not been prepared, rather than the allegation that it had been lost. This finding does not preclude this Board from making the requisite findings under 10 C.F.R. § 50.57. Although FSQ-030 should have been prepared this Board need not pass on the question of whether the failure to do so constituted a violation of 10 C.F.R. Part 50, Appendix B. In light of the absence of splice failures, there is no need to know the exact as-built locations of each Cadweld within the structure to assure safety since it was established that all Cadwelds were inspected and found acceptable prior to placement. Consequently, nothing about the failure to prepare FSQ-030 would affect the ability of the Board to conclude the plant has been constructed in

accordance with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, or the Rules and Regulations of the Commission.

4. Contention 1.4

214. Contention 1.4 asserts that there are membrane seals in the containment structures that are damaged, violating 10 C.F.R. Part 50, Appendix B, Sections X, XV, and XVI. Due to this damage, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

215. The Applicants presented testimony relative to this subcontention as part of the panel consisting of Murphy, et al., direct ff. Tr. 6522. The principal spokesmen on this panel relative to Contention 1.4 were Gerald R. Murphy, Assistant Discipline Project Engineer (Civil-Structural Discipline) for the STP, Charles M. Singleton, Civil Discipline Quality Control Superintendent for STP, and Joseph F. Artuso, President of Construction Engineering Consultant, Inc., an engineering firm providing consulting services, quality control services and materials analysis for construction projects. See Murphy, et al., direct ff. Tr. 6522 at 39-45. In addition, this contention was addressed by the Staff Panel consisting of Seidle, et al., direct ff. Tr. 9205 at 52-53 and Staff Exhibit No. 32.

216. Again, CCANP presented no evidence that there currently are damages to the membrane seal that have not been adequately repaired. The Staff investigated an allegation that the waterproofing membrane seal in

reactor containment building, Unit 1, was installed at night, without proper QC inspection prior to the placement of backfill. From this the alleger apparently assumed seals were damaged. Seidle, et al., direct ff. Tr. 9205 at 53. The Staff interviewed five individuals who were involved or had previously been involved in inspection of waterproofing membrane seals and all stated that they had no knowledge of the placement of backfill against the membrane seal prior to proper completion of membrane inspections by quality control inspectors. Id., see Staff Ex. No. 32 at 3. The Applicants conceded that there had been instances of localized damage to the membrane seal during the construction process; however, the damage was identified by the QA/QC program prior to back-filling and documented in a nonconformance report (NCR). Murphy, et al., direct ff. Tr. 6522 at 43. Each time this occurred, the Applicants verified that the damage was repaired and the NCR properly dispositioned. Id. Only one instance was documented where the membrane seal had been covered by backfill prior to inspection. Murphy, et al., Direct ff. Tr. 6522 at 92. However, this was properly identified in an NCR and dispositioned by requiring construction to remove the backfill in order that the affected area of the membrane seal might be inspected. Id.

217. The further point was made that the membrane seal is a redundant, secondary means of protecting against groundwater seepage. Id. at 40. Protection against groundwater seepage is primarily achieved through (1) the continuous steel liner system, (2) the physical design of reinforcing steel that controls the potential crack widths in the concrete, and (3) the concrete mix designs, which keep the water to cement ratio low to ensure water tightness. Id. at 39-40. In addition,

the membrane seal is not even taken into account in determining whether the STP containment meets applicable leak tightness criteria. Id. at 41.

218. No evidence has been presented to indicate that currently there are unrepaired areas on the membrane seal. Moreover, evidence was presented that assuming there are unrepaired areas on the membrane seal it would have no safety significance. Consequently, nothing about the alleged damaged membrane seal would hinder the Board in concluding that the plant has been completed in accordance with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, no evidence was presented to establish, as alleged, that there was a violation of 10 C.F.R., Part 50, Appendix B, Sections X, XV and XVI relative to the membrane seal.

5. Contention 1.5

219. Contention 1.5 asserts that there are steel reinforcement bars (re-bar) that are missing from the concrete around the equipment doors in containment and that such re-bar is also missing from other areas in the containment structure, in violation of 10 C.F.R. Part 50, Appendix B, Sections X, XV, and XVI. Due to this failure, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

220. The Applicants presented testimony relative to this subcontention as part of the panel consisting of Murphy, et al., direct ff.

Tr. 6522. The principal spokesmen on this panel relative to Contention 1.5 were Gerald R. Murphy, Assistant Discipline Project Engineer (Civil-Structural Discipline) for the STP, Charles M. Singleton, Civil QC Supervisor for the STP, and Gerald L. Fisher, Discipline Project Engineer. See Murphy, et al., direct ff. Tr. 6522 at 45-52. The Staff presented testimony on this subcontention as part of the panel testimony of Seidle, et al., direct, ff. Tr. 9205 at 37-38 and 52-54.

221. No evidence was presented by the Intervenors to support the allegation that re-bar was missing from the concrete around the equipment doors or elsewhere within the containment structures. However, the Staff investigated similar allegations on two separate occassions. First, during an investigation conducted in June, 1979, the Staff, in response to a charge of missing re-bar in containment, checked the appropriate records for evidence of missing re-bar around the equipment hatch in Unit 1 containment and interviewed those persons whose names appeared on the relevant documents. Seidle, et al., direct ff. Tr. 9205 at 38. Next, in response to information appearing in a Houston Post article and in the answers of CCANP to interrogatories, the question of missing re-bar was again checked. Staff Ex. No. 54 at 3.

222. During the first investigation the pour cards and other documents examined revealed no irregularities. Seidle, et al., direct ff. Tr. 9205 at 38. Various individuals interviewed had no knowledge of any missing re-bar from any structure, including containment. Id. Moreover, during the subsequent inspection the Staff reviewed QA records related to numerous other pours that allegedly revealed re-bar was

missing, but found no documented evidence that reinforcing bars were missing. Staff Exhibit No. 54 at 10.

223. Based upon review of documentation, the Applicants similarly concluded that there is apparently no missing rebar in the containment building. Murphy, et al., direct ff. Tr. 6522 at 51. However, the Applicants explained that often re-bar cannot be erected in accordance with the design drawings. In such situations, the omitted rebar is documented through an NCR or field request for engineering action (FREA) and an appropriate design change and engineering review is performed. With that exception, the Applicants know of no instance where rebar has been omitted from any structure without appropriate review and approval. Id. at 51-52. See also Id. at 68-72.

224. No evidence was presented to substantiate the claim that there is missing re-bar around either the equipment doors in the containment building or any other area in the structures. In addition, to the extent any re-bar was omitted in contradiction to any original design drawing, there is reasonable assurance such omissions were properly documented and reviewed for acceptability. Accordingly, nothing about this allegation precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was presented to show that the plant has not been constructed in conformity with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, no evidence was presented to establish, as alleged, that a violation of 10 C.F.R. Part 50, Appendix B, Sections X, XV and XVI occurred due to missing re-bar in containment.

6. Contention 1.6

225. Contention 1.6 is the second of Intervenors' two contentions that question the adequacy of the documentation of Cadwelding activities at STP. See Contention 1.3 supra at ¶ 206, et seq. Contention 1.6 asserts that there have been Cadwelds integrated into parts of the STP that are not capable of being verified with regard to compliance with 10 C.F.R. Part 50, Appendix B, in violation of Section IX and X of Appendix B. Due to this inability, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

226. The Applicants presented testimony relevative to this contention as part of the panel testimony of Murphy, et al., direct ff. Tr. 6522. The principal spokesmen on this panel relative to Contention 1.6 were Gerald R. Murphy, Assistant Discipline Project Engineer (Civil-Structural Discipline) for the STP, Charles N. Singleton, Civil Quality Control Superintendent at STP, and Joseph F. Artuso, President of Construction Engineering Consultant, Inc., an engineering firm providing consulting services, quality control services, and materials analysis for construction projects. See Murphy, et al., direct ff. Tr. 6522 at 24-39. The Staff panels of Seidle, et al., direct ff. Tr. 9205, and Crossman, et al., direct ff. Tr. 10,010 each addressed aspects of this contention.

227. The Intervenors presented no evidence in support of this subcontention. However, neither the Applicants nor the NRC Staff maintained that there had not been problems in the area of cadweld documentation. See Staff Ex. Nos. 13 and 14. Allegations had been made as early as May, 1978, relative to irregularities in Cadwelding procedures. Seidle, et al., direct ff. Tr. 9205 at 21-23 and Staff Exhibit No. 7. However, no non-compliances were found. Id. In September, 1978, the Staff confirmed that Cadwelding procedures were not in conformity with specifications and that there was a lack of quality control inspectors covering the Cadweld operation during one of the shifts. Seidle, et al., direct ff. Tr. 9205 at 32 and Staff Ex. No. 13. In response to concerns over Cadweld verification, a stop work order was issued by HL&P during this same period on concrete placements scheduled in the Unit 1 containment area, until such time that existing Cadweld splices were checked to assure they were properly installed. Seidle, et al., direct ff. Tr. 9205 at 33. A visual Cadweld reinspection program was instituted for Cadwelds in place, and a training session for all Cadwelders and inspectors was also given to assure proper understanding of the procedural requirements in both Cadweld construction and inspection. Cadweld inspectors had been assigned to both day and night shifts and construction procedures were revised to require that Cadwelder surveillance to be performed each shift rather than only once during a 24 hour period. Id. at 33 and Staff Exhibit Nos. 15 and 16.

228. Approximately six months later in January of 1979 the Staff was still receiving allegations relative to improper Cadwelding activities. See Staff Exhibit No. 17. During the investigation of these

allegations, it was determined from a review of the Cadweld records that Cadweld examination checklists were being transcribed by individuals other than on-site Cadweld inspectors. It was determined that this activity affects quality control, and accordingly, a notice of violation was issued. See Staff Exhibit No. 17. HL&P again resolved this procedural irregularity. Staff Exhibit No. 19.

229. Allegations continued that there were widespread discrepancies in the documentation of Cadweld as-built locations. See Staff Ex. No. 26 and 32. Contemporaneous with these Staff investigations into irregularities in the Cadweld documentation area, HL&P established a Cadweld documentation task force to conduct a review of Cadwelding records. Murphy, et al., direct ff. Tr. 6522 at 87-88. All Cadweld records were reviewed. Id. at 88. Approximately 190 of the 36,000 Cadweld records reviewed were lacking inspection records. Id. Of the 190, 150 of these Cadwelds could be pinpointed to specific pours and the pour cards corresponding to these placements demonstrated that those Cadwelds had been inspected during preplacement inspection and were found acceptable. Id. Accordingly, there remain approximately 40 Cadwelds that can not be documented for acceptability.

230. The fact that 40 Cadwelds may be imbedded in the structures without having been subjected to in-process and visual inspection is of no safety significance. First, the rejection rate of Cadwelds is low (approximately 1% of the 36,000 Cadwelds reviewed had been rejected upon visual inspection). Murphy, et al., direct ff. Tr. 6522 at 30. Moreover, even those Cadwelds, which had been visually rejected, met tensile strength requirements. Id. Thus, the probability of a Cadweld

which had not been inspected failing is low because, as evidenced by the above, the Cadwelding procedure is very reliable. Id. at 38. And further, the STP structures are designed conservatively, in a manner such that even if there were 40 instances where Cadwelds were below design strength or completely omitted from the structure, the structure would still perform its design function. Id. at 61-62.

231. Nothing about the inability to verify the adequacy of an extremely low percentage of as-built Cadwelds precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. Evidence was presented establishing that there is reasonable assurance that the structures can perform their intended functions without these Cadwelds. Accordingly, the Board finds that the facility was constructed in substantial conformity with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. This Board need not establish whether this failure constituted a violation of 10 C.F.R., Part 50, Appendix B, Sections X and XI, as alleged. Cadwelding activities have been the subject of items of noncompliance by the Staff in the past and the Staff has demonstrated it is adequately monitoring this aspect of construction. See Staff Exhibit Nos. 13, 16 and 20.

7. Contention 1.7

232. Contention 1.7 first asserts generally that the quality control program at STP has not met the appropriate requirements. This contention next sets forth five examples where the quality control

program has allegedly failed to meet the requirements of 10 C.F.R. Part 50, Appendix B, Sections III and IX. Due to these alleged breakdowns in the quality control program, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license. Each of the five examples where the quality control program allegedly failed to meet the requirements of Appendix B constitute a subpart to Contention 1.7. Each of these subparts will next be addressed in term.

i. Contention 1.7(a)

233. Contention 1.7(a) asserts that efforts by quality control inspectors to verify that design changes were executed in accordance with the purposes of the original design were repeatedly and systematically thwarted.

234. The Applicants presented Richard W. Peverley to testify on this issue. Peverley direct ff. Tr. 7835. The Staff panel consisting of Seidle, et al., direct ff. Tr. 9205 at 26 similarily addressed this subcontention. Mr. Peverley was the assistant engineering project manager-special services for Brown and Root, Inc. at the STP site. Id. at 2.

235. It should be initially noted that because the Intervenors did not put a direct case on with respect to this subcontention, both the Applicants and Staff were left guessing as to the Intervenors' specific concerns based upon discovery and the plant's I&E record. The Applicants

began to address this subcontention by clarifying the design change process at STP and the role of quality control inspectors in that process. Prior to the Show Cause Order, all requests from personnel at the construction site for changes to, deviations from, or clarifications of requirements contained in the design documents were controlled through a system called Field Requests for Engineering Action (FREA's). Peverley direct ff. Tr. 7834 at 5. Once the request portion of the form was completed the request was sent to engineering and one of four options was exercised: (1) disapprove the request; (2) grant a deviation from design requirements; (3) change the design requirements; or (4) clarify the design requirements. Id. at 5-6. Procedures required that FREA's be controlled and subjected to the same review and approval cycle as original design documents. Id. at 6. In addition, all FREA's that were written against safety related or Seismic Category I documents required formal design verification. Id. The role of the QC inspector in this process is to provide documented verification that the work performed by construction was in accordance with appropriate procedures, specifications and other related documents. Id. at 4. The QC inspector plays no role in the verification of design changes, or the acceptability of that change. This is the sole responsibility of the engineering department. Id. at 4. Therefore, the premise of this contention (that it was a function of the quality control inspectors to verify that design changes were executed in accordance with the purposes of the original design) is without foundation.

236. The Board finds that the failure on the part of the intervenors to establish the premise of this contention is sufficient to

determine the contention is without merit. Nevertheless, the Applicants presented evidence attempting to explain why such a misconception might be held. In April, 1979, a memo was written to all civil QC inspectors limiting communications between them and design engineering to "a level no lower than lead inspectors." See "Applicants Testimony On The Operation Of B&R's Site QA/QC Program And Allegations Of Harassment And Intimidation Of Quality Control Inspectors," direct ff. Tr. 8032 at 19 (hereinafter referred to as Warnick, et al. direct). It was explained that this memo was not intended to prevent QC inspectors from obtaining design engineering clarifications, but rather was directed at a concern of both construction personnel and QA management that inspectors were spending too much time away from their assigned inspection areas discussing design issues with design engineers by telephone. Id. at 19. The Staff similarily found no evidence that efforts by QC inspectors to verify design changes with design engineers was thwarted. Seidle, et al., direct ff. Tr. 9205 at 26.

237. Nothing about this allegation precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was developed, as alleged, that efforts were made to repeatedly and systematically thwart quality control inspectors in their communication with relevant design personnel. The only evidence which might be interpreted as an effort to thwart QC inspectors from talking to design personnel was a management decision to have such concerns channeled through the lead inspector. The Board cannot find this procedure entirely inappropriate.

238. The Board finds nothing presented in regard to this subcontention as a violation of 10 C.F.R., Part 50, Appendix B, Sections III

and IX. In addition, nothing about this contention precludes this Board from finding that the facility was constructed in accordance with the construction permit and will operate in conformity with the application, as amended, the Atomic Energy Act, and the Rules and Regulations of the Commission.

ii. Contention 1.7(b)

239. Contention 1.7(b) asserts that there were personnel other than the original designer approving design changes with no firsthand knowledge of the purpose of the original design. Again, Intervenors presented no evidence to prove their contention. The Staff found no evidence of the alleged practice. Seidle, direct ff. Tr. 9205 at 26. Nonetheless, the Applicants, after generally denying the substance of the Contention, made an effort to explain an incident that may have been construed by the Intervenors to be a practice of permitting an individual not familiar with the original design to make design changes.

240. Mr. Peverley attempted to explain what he felt were the concerns behind Contention 1.7(b). Peverley, direct ff. Tr. 7835 at 7-10. At the direction of HL&P, B&R reviewed its organization to provide for the assignment of design engineers at the site. It had been estimated by B&R that it would take approximately three to six months to implement this organizational change fully. B&R, however, had an experienced civil engineer already stationed at the site to assist in geotechnical activities. This individual was Mr. Douglas Robertson. Id. at 7 and 8. Procedures were revised to allow Mr. Robertson to review certain FREA's at the site. Mr. Robertson was given the authority to

review all civil/structural FREA's and, if in his judgment he had the technical expertise, to approve any of these FREA's he believed were justified. Id. at 8. All FREA's involving disciplines other than Civil/Structural were immediately sent to the responsible design discipline in Houston. Id. Even before Mr. Robertson exercised his authority in the Civil/Structural area two conditions had to be met. First, he was required to gain knowledge of the situation through discussions with construction personnel or visual inspections. Id. at 8. Second, he was required to contact the appropriate design engineer back in Houston and discuss the disposition by telephone. Id. The responsible design engineer essentially had veto power over Mr. Robertson's initial judgments. Id.

241. Mr. Robertson would then record on the FREA form the date of the telephone conversation and the name of the person with whom he spoke. Construction was then allowed to proceed with implementing the change. The responsible design engineer in Houston then performed all activities required by procedures in order to have safety-related FREA's processed through the design verification cycle. Id. at 9. This process exposed HL&P to the risk of having certain work redone if the resolution of the FREA was ultimately rejected by Houston, but did not violate any rules of the Commission. Id. Thus, although it may be correct to state that Mr. Robertson may have approved design changes with no firsthand knowledge of the purpose behind the original design, it cannot be said that the verification against the original design never occurred.

242. Nothing about this incident precludes this Board from making the requisite findings under 10 C.F.R, § 50.57. No evidence was

presented that there were personnel other than the original designer approving design changes with no firsthand knowledge of the purpose behind the original design. Mr. Robertson always had to have the telephone concurrence of the appropriate design engineer. There was no evidence that the Staff found this practice inappropriate. Further, no evidence was presented to show that this procedure would affect the Board's ability to conclude the plant was built in accordance with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, it was not established that this practice constituted a violation of 10 C.F.R., Part 50, Appendix B, Sections III or IX, as alleged.

iii. Contention 1.7(c)

243. Contention 1.7(c) asserts that design changes were approved by personnel unqualified in the type of design to which the change was made. It is further alleged that this practice violates 10 C.F.R. Part 50, Appendix B Sections III and IX and results in an inability of this Board to make the requisite findings under 10 C.F.R. § 50.57. No evidence was presented by the Intervenors to support the substance of this allegation. The Staff found no incidents where design changes were approved by personnel unqualified in the type of design to which the change was made. Seidle, et al., direct ff. Tr. 9205 at 26.

244. Again the Applicants, although not admitting the basis of this Contention, attempted to explain from events on the site why the Intervenors may have been under this misconception. Mr. Peverley

suggested that this Contention similarly involves the assignment of Mr. Robertson as the single civil/structural site design engineering representative. Peverley, direct ff. Tr 7835 at 10. In light of the fact that Mr. Robertson needed a telephonic concurrence from the appropriate design engineer before authorizing any design change, and that the change is eventually reviewed by the appropriate design engineer, his qualifications relative to each and every design change seem irrelevant. However, it was established through Mr. Peverley's testimony that Mr. Robertson is an experienced engineer in the civil disciplines. See Peverley, direct ff. Tr. 7835 at 10-11. Mr. Robertson was a degreed civil engineer who, at the time of his assignment, had approximately 20 years experience in earthwork construction, surveying, soils and concrete testing, and construction project management where piping, steel erection and contrete structures were involved. Id. at 10.

245. In the absence of any contradictory evidence, nothing about this Contention precludes this Board from making the requisite findings under 10 C.F.R., § 50.57. No evidence was developed that design changes were approved by personnel unqualified in the type of design to which the change was made. The evidence showed only that temporary authority was given to construction to proceed with an approved design change at the risk that the appropriate design engineer would overrule Mr. Robertson's initial decision. Nothing about this occurrence precludes this Board from finding that the facility has been constructed in accordance with the construction permit, and will operate in conformity with the Application, as amended, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, no evidence was established

to warrant this Board in finding that this practice constituted a violation of 10 C.F.R., Part 50, Appendix B, Sections III or IX, as alleged.

iv. Contention 1.7(d) and (e)

246. Contentions 1.7(d) and (e) allege that pour cards were falsified and inspections were not performed as a result of a pattern of intimidation of QC inspectors, resulting in inspectors playing cards rather than performing their inspections. Specifically, Contention 1.7(d) asserts that there have been numerous pour cards that were supposed to record the correct execution of concrete pours that were falsified by numerous persons in violation of 10 C.F.R., Part 50, Appendix B, Sections III and IX. Through discovery it was determined from CCANP's responses to interrogatories that the alleged falsifications of pour cards referred to in Contention 1.7(d) were the result of the same card games occurring in 1976-1977 that form the basis of Contention 1.7(e). Contention 1.7(e) asserts that due to a pattern of behavior designed to intimidate QC inspectors, certain inspections were never performed because the inspectors decided to play cards over a period of four months rather than risk their safety by performing inspections on plant grounds, in violation of 10 C.F.R. Part 50, Appendix B, Sections III and IX. Due to these falsifications and failures to perform inspections, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

247. Initially, the Board notes that the Intervenors failed to put on a direct case on these contentions, but that both Contention 1.7(d) and (e) appear to be examples of the more general charge set forth in other issues in this proceeding. Specifically, Contention 2 asserts that NRC inspection records indicate that STP construction records have been falsified. See ¶ 274 et seq., infra. Similarly, implicit in Board Issue A is the question of whether there was a pattern by, or condoned by, management of intimidation and harassment of QC inspectors. Therefore, any instance of document falsification, other than those arising out of the alleged card games, will be addressed in response to Contention 2. Any other examples of harassment or intimidation have been addressed in response to Board Issue A, Section II.A.1 and 2.

248. The Applicants presented the following witnesses to address Contention 1.7(d) and (e): Dr. Knox M. Broom, Senior Vice President of the Brown & Root Power Group (Broom, et al., direct ff. Tr. 3646); Charles M. Singleton, Civil Discipline QC Superintendent for Brown & Root (Warnick, et al., direct ff. Tr. 8032); and Stephen H. Grote, Vice President, Brown & Root Power Group (Tr. at 47-49). In addition, the Board called Mr. John B. Duke (Tr. at 6459). The Staff panel consisting of Seidle, et al., direct ff. 9205, also addressed these subcontentions.

249. The alleged card playing, nonperformance of inspections and resultant document falsification were supposedly triggered by an incident in July, 1977, in which a B&R construction foreman, Joe Bazea, assaulted and injured a B&R quality control inspector, James Marshall during a disagreement over a concrete QC inspection. Staff Exhibit No. 4 at 2. It was further alleged that at the same time a B&R construction

superintendent had advised his workers that any B&R civil QC inspector who reported unacceptable items during concrete placement inspections would be liable for a beating. Id. Due to this alleged intimidation and harassment by construction, it was asserted that the QC inspectors took a vote in favor of not performing inspections and that they simply played cards for a four month period. The inspectors would sign off on pour cards when requested by construction without performing inspections. The time relevant to this contention is July, 1977 through the end of that year. Id.

250. In response to this contention, quality control inspectors acknowledged that cards were played during this period; however, they were only played during lunch or periods of low construction activity. Warnick, et al., direct ff. Tr. 8032 at 26; Duke at Tr. 6461. Both Messrs. Singleton and Duke, alleged card players, denied that the card games interfered with inspection activities. Warnick, et al., direct ff. Tr. 8032 at 27; Duke at Tr. 6462. Although the Staff, upon investigation, found an inordinate amount of friction between construction and QC inspectors, it did not find a pattern of intimidation, nor did it find that any inspectors failed to perform their inspections due to the friction. Staff Ex. No. 4 at 4.

251. Both B&R and the Staff later investigated the charge of widespread card playing and noninspections by QC inspectors after receiving allegations in late 1979. Broom, et al., direct ff. Tr. 3646 at 32-33; Seidle, et al., direct ff. Tr. 9205; and Staff Exhibit No. 32 at 2. B&R interviewed QC inspectors and reviewed civil inspection records for 1977 and determined inspections were being performed. Broom,

et al., direct ff. Tr. 3646 at 33. It was determined that during that time period design deficiency reports (DDRs) were being written; thus, indicating that inspections were both being performed and deficiencies were being reported. Grote at Tr. 4837. Similarly, the Staff interviewed nine inspectors who were at the site during the time of the alleged card games and none were aware that such games occurred in 1977. NRC Staff Exhibit No. 32 at 3. Two of the individuals stated that card games took place in 1976, however, such games were not of the scope alleged and did not have adverse impact on the performance of inspections by QC personnel. Id. No evidence was presented to establish that either inspections were not performed or that records were falsified.

252. Thus, the Board finds that although there were instances of harassment of quality control inspectors during the time when concrete pour cards were allegedly falsified and inspections not performed, quality control inspectors continued to perform their duties. Similarly, although there were card games during this period, they were only held during lunch or periods of low construction activity and did not cause the inspectors not to perform their function. Nothing in the record on Contentions 1.7(d) or (e) precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was developed that as a result of harassment quality control inspectors failed to perform their inspections. Accordingly, nothing would affect the ability of the Board to conclude the facility was constructed in accordance with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, no evidence was

presented upon which this Board could conclude a violation of 10 C.F.R., Part 50, Appendix B, Sections III or IX, occurred as alleged.

8. Contention 1.8

253. Contention 1.8 consists of four subparts. This contention was admitted after the hearing was well underway on December 16, 1981. See Fourth Prehearing Conference Order at 7. The basis for admitting this new contention was Staff Inspection and Enforcement Report 81-28, which detailed an investigation conducted in July and August, 1981. See generally Staff Exhibit No. 124. Each subpart to Contention 1.8 will next be addressed in turn.

i. Contention 1.8(a)

254. Contention 1.8(a) asserts that, as evidenced by the investigative results in allegation 1 of I&E Report 81-28, HL&P management failed to assure prompt corrective action by B&R in the area of access engineering in violation of Criterion XVI of 10 C.F.R. Part 50, Appendix B. Due to this violation, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

255. The Applicant presented Messrs. R. A. Frazar, J. L. Blau and H. G. Overstreet to testify on this subcontention. Frazar, et al., direct ff. Tr. 10,123. The Staff introduced I&E Report 81-28 as Staff Exhibit No. 124 and presented H. S. Phillips, Resident Reactor Inspector

for the STP, and R. K. Herr, Senior Investigator, Region IV, for cross-examination on this report. Tr. 10,011.

256. Inspection and Enforcement Report 81-28 was conducted as a result of allegations of improper activities by HL&P QA management concerning: nonsupport of a QA department requested stop work order; nonsupport of QA audit personnel in writing NCR's against licensed documents; nonsupport of QA procurement personnel in initiating NCR's; and disguised welding rework activities. Staff Exhibit No. 124 at 2. Allegation 1 maintains that HL&P management disagreed with an HL&P QA personnel who wanted to issue a stop work order to Brown & Root design engineering. The reason it was felt a stop work order should be written was that B&R design engineering was falling behind construction activities and that this might in turn produce construction errors. In effect, Contention 1.8(a) maintains that due to the failure of HL&P to issue a stop work order, as opposed to other methods they might have employed, they failed to effectuate prompt corrective action. The Board finds that the issuance of a stop work order was not mandatory, but rather discretionary, and that the alternate approach to the problem chosen by HL&P was both proper and effective.

257. The HL&P quality assurance employee who decided to draft the stop work order stated that his intent in drafting the order was to get B&R management's attention relative to problems in the access design engineering area and not to stop ongoing work. Frazar, et al., direct ff. Tr. 10,123 at 6. There was no concern that irreparable construction deficiencies would result from continued work. Id. It was explained that the decision to issue a stop work order is not the result of the

application of a mechanical test but rather involves the exercise of a QA employee's judgment. Id. In short, the point was made that a stop work order was not the only means to gain the attention of B&R engineering relative to design engineering. Recognizing this, the HL&P QA employee responsible for having the stop work notice issued agreed that HL&P management should be given an opportunity to get B&R management's attention focused on the design issues. Both HL&P management and HL&P QA personnel were in agreement that the matter giving rise to the stop work notice was satisfactorily resolved in a timely manner through that alternate method. Id. at 9. From the outset of this process, it appears HL&P management acknowledged HL&P QA's authority to issue the stop work notice and no pressure appears to have been brought to bear upon the QA inspectors not to issue the order. Id. at 6. The inspectors seemed to be in agreement that the issue was not whether QA should be issuing a stop work notice but rather what means would be most effective to force Brown & Root to make a timely correction in the design access area. Staff Exhibit No. 124 at 5.

258. Accordingly, nothing in the evidence presented relative to Contention 1.8(a) suggests that HL&P management failed to assure B&R implemented prompt corrective action relative to access engineering activities. Accordingly, nothing about this incident precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was presented that would affect the ability of the Board to conclude the facility was built in accordance with the construction permit and will operate in conformity with the application as amended, the provisions of the Atomic Energy Act, as amended, and the Rules of

Regulations of the Commission. In addition, this Board need not establish whether this incident constituted a violation of 10 C.F.R. Part 50, Appendix B, Section XVI, as alleged. In particular, the Staff reviewed the substance of this contention as Allegation 1 in I&E Report 81-28 and no item of noncompliance was found. Staff Exhibit No. 124.

ii. Contention 1.8(b)

259. Contention 1.8(b) asserts that, as evidenced by the investigative results in Allegation 1 of I&E Report 81-28, Houston Lighting & Power management does not have a consistent policy on the issuance of stop work orders in violation of Criteria 1 of 10 C.F.R., Part 50, Appendix B. Due to this error, CCANP apparently asserts that there is no reasonable assurance that the plant can be operated without endangering the health and safety of the public and that the Commission cannot make the required findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license. The Applicants and Staff presented the same witnesses and exhibits relative to this sub-contention as were presented in response to Contention 1.8(a). See § 255, supra.

260. Initially, the Board notes the Contention's reference to Criteria I of 10 C.F.R. Part 50, Appendix B, is misleading. This criterion relates to organization and does not appear to impose a duty on an Applicant to have a consistent policy on the issuance of stop work orders. However, as explained by HL&P's Mr. Overstreet, stop work procedures contain no mechanically applied test to determine when a stop

work order should be exercised. Frazar, et al, direct ff. Tr. 10,123 at 6. Judgment must be exercised based upon the experience of the QA/QC employee. Due to the many situations wherein the question of whether to issue a stop work notice may arise, this would seem to be the only workable approach. Consequently, nothing about HL&P's failure to have a formalized, mechanical policy (the interpretation we give the Intervenors' insistence upon a consistent policy) prevents this Board from making the findings required by 10 C.F.R. § 50.57. No evidence was presented that would affect the ability of this Board to conclude the plant was built in accord with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, no evidence was presented that would force this Board to conclude a violation of Criterion I of 10 C.F.R. Part 50, Appendix B, occurred, as alleged. Specifically, the Staff investigated the substance of this contention in Allegation 1 as part of I&E Report 81-28 and found no violation. Staff Exhibit No. 124.

iii. Contention 1.8(c)

261. Contention 1.8(c) asserts that, as evidenced by the investigative results in Allegation 2 of I&E Report 81-28, HL&P management personnel are not committed to respecting the mandates of NRC regulations, especially Criteria I and II of 10 C.F.R., Part 50, Appendix B. Due to this failure, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the

findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

262. Initially, the Board stresses that a single failure to meet the requirements of Appendix B is insufficient to make a finding that a utility's management generally is not committed to respecting the mandates of NRC regulations. We have stressed that such a determination can only be made by viewing a utility's conduct as a whole. See Opinion Section III.B. Nevertheless, the Board will examine the validity of this contention and consider it when judging HL&P's overall commitment to respecting the mandates of NRC regulations.

263. The Applicants and the Staff presented the same witnesses in response to Contention 1.8(c) as were presented in response to Contention 1.8(a) amd (b). See ¶ 255, supra.

264. Allegation 2 in I&E Report 81-28 asserts that HL&P management told HL&P audit personnel not to write up NCR's on things that were out of compliance with the FSAR or the new QA program description given to NRC because "it is just a licensing document not a regulatory item." Staff Exhibit No. 124 at 6. Mr. Frazar identified himself as the HL&P QA manager who was alleged to have given this instruction. Frazar, et al., direct ff. Tr. 10,123 at 12.

265. To understand the thrust of this allegation, some clarification is necessary. Applicants typically file general quality assurance program descriptions with the Office of Nuclear Reactor Regulation (NRR), the licensing office of the NRC. Similarly, these general program descriptions are set forth in the Applicants' quality assurance manual. These general, or "upper tier" documents are

particularized through quality assurance procedures and implementing instructions for the field inspectors and auditors. See Frazar, et al., direct ff. Tr. 10,123 at 10-12.

266. Apparently, in the late spring and early summer of 1981, various "upper tier" documents were being used by HL&P QA personnel as check lists during field audits of the effectiveness of B&R's site QA program. Id. at 10. This fact caused confusion between HL&P and B&R because B&R field personnel performed their work in accordance with the more specific implementing procedures. Id. at 11. Based upon this confusion, Mr. Frazar agreed that HL&P auditors should complete their field audits using the specific implementing procedures rather than the general program description documents. Id. at 11. However, in Mr. Frazar's direction to his staff, his comments were interpreted to mean that audit deficiency reports should never be written against upper tier documents because they were mere licensing documents and not requirements. Id. at 11. Due to Mr. Frazar's absence from the office throughout much of July, 1981, this confusion was not resolved until a clarifying letter was issued on August 24, 1981, wherein the intent of his original remarks were explained to the HL&P auditors. Id. at 12.

267. The Staff concluded that although a great deal of misunderstanding occurred relative to the meaning of Mr. Frazar's remarks, that misunderstanding had been cleared up as a result of the August explanatory letter. Staff Exhibit No. 124 at 3, 6-7. The Staff issued no item of noncompliance based upon this investigation.

268. Nothing about this incident precludes this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was

presented that based upon Allegation 2 in I&E Report 81-28 HL&P management personnel are not committed to respecting the mandates of NRC Regulations. Nothing about this incident precludes this Board from finding that the facility has been built in accordance with the construction permit and will operate in conformity with the application, as amended, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, no evidence was presented warranting this Board in concluding that a violation of Appendix B to 10 C.F.R. Part 50, occurred. This is particularly so because the Staff investigated the very allegation that forms the basis of Contention 1.8(c) and found no item of noncompliance.

iv. Contention 1.8(d)

269. Contention 1.8(d) asserts that, as evidenced by the investigative results in Allegation 4 of I&E Report 81-28, HL&P management failed to effectively implement a quality assurance program in violation of Criteria I of 10 C.F.R Part 50, Appendix B.

270. The Applicants and Staff presented the same witnesses in response to this contention as to Contention 1.8(a)-(c), ¶ 255, supra. Allegation 4 in I&E Report 81-28 asserts that two individuals within HL&P's QA procurement department were "screwing up everything" because of no experience. In addition, it was asserted that these individuals were the only authorized HL&P people to write up an NCR, and that rather than doing so they referred other HL&P QC inspectors to B&R for writing-up any infraction found. Staff Exhibit No. 124 at 8. A review by the Staff of the experience of both individuals involved in this allegation by the

Staff resulted in the conclusion that they had adequate education and experience for their respective positions. Id. at 8 and 9. It was conceded by their former supervisor, Mr. Frazar, that in the past one of the two individuals did not have enough guidance due to numerous other commitments Mr. Frazar had back in Houston. Id. at 9. The insufficiently supervised HL&P QA employee is now under the supervision of Mr. Geiger, who recognizes that this individual did not have adequate supervision in the past. Id. He further stated he believed this individual to be a capable employee if given proper guidance. Id.

271. With respect to the practice of referring HL&P personnel to B&R personnel for the writing up of NCRs, HL&P procedures manual PSQP-A9, p. 7, ¶ 6.3.3.3, states in part: "nonconformance reports and/or corrective action requests shall be generated by B&R or HL&P." Id. Therefore, the practice of referring HL&P inspectors to Brown & Root inspectors for the purpose of writing up NCRs was not in violation of the relevant specifications. Id.

272. As stated with respect to other contentions, the Board is hesitant to make generalizations from specific instances absent a pattern of conduct. Here, as elsewhere, even if an individual within HL&P's QA department did not have the requisite experience, it would not follow that HL&P management failed to effectively implement a QA program in violation of Criteria I of 10 C.F.R. Part 50, Appendix B. The most that could be said would be that with respect to a single incident they failed.

273. With respect to Contention 1.8(d) our task is substantially easier since nothing in the record suggests the validity of this

contention. Accordingly, nothing in this record prevents this Board from making the requisite findings under 10 C.F.R. § 50.57. No evidence was presented to support the finding that, based upon I&E Report 81-28, HL&P management failed to implement an effective QA program. Further, no evidence was presented that would affect the ability of the Board to conclude that this facility was constructed in accordance with the construction permit and will operate in conformity with the application, as amended, the provisions of the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission. In addition, it was not established that any violation occurred under 10 C.F.R, Part 50 Appendix B, as alleged.

B. Contention 2

274. Contention 2 asserts that NRC inspection records, particularly 77-03 and 78-08, indicate that the STP construction records have been falsified by employees of HL&P and B&R in violation of 10 C.F.R. Part 50, Appendix B, Sections VI and VII. Due to these falsifications, CCANP asserts that there is no reasonable assurance that the STP can be operated without endangering the health and safety of the public and that the Commission cannot make the findings required by 10 C.F.R. § 50.57(a)(1) and (2) for the issuance of an operating license.

275. The Staff has had reason to investigate allegations of document falsification on several occasions. See Staff Exhibits Nos. 1, 2, 3, 7, 60, and 67; see also CCANP Exhibit No. 10. The Applicants presented testimony relative to this contention through the panels of W. Stephen McKay and Timothy K. Logan (hereinafter McKay, et al., direct

ff. Tr. 6227), and Richard Buckalew and John B. Duke (hereinafter referred to as Buckalew, et al., direct ff. Tr. 6265). The Staff panels of Seidle, et al., direct ff. Tr. 9205, and Crossman, et al., direct ff. 10,010, also addressed this contention. Each of the document falsification allegations will next be addressed, beginning with the I&E Reports cited in the contention.

276. On February 1, 1977, the Staff was notified by HL&P that an employee of Pittsburgh Testing Laboratory had been detected by a fellow employee documenting tests that had not in fact been performed by that individual. Seidle, et al., direct ff. Tr. 9205 at 11-12 and Staff Ex. 1 at 3. The Staff investigated this charge by interviewing the employee who detected the irregularity. This individual alleged that the suspected individual approved concrete sand gradation on January 26, 1977, even though the actual tests to determine gradation were not performed. Staff Ex. No. 1 at 3. Apparently, the site manager confronted the suspected individual with the allegation on January 28, 1977, and this person readily admitted that he had turned in test data without actually performing the tests. Seidle, et al., direct ff. Tr. 9205 at 12. This employee was terminated on January 31, 1977. Id.

277. The Staff found that neither the Applicants' management, or its subcontractors, knew of the document falsification prior to the reporting by the fellow employee and that therefore management was in no way culpable. Id. at 14. Moreover, the Applicants took prompt action to remove the employee at fault once the falsification was discovered. In addition, the document falsification was found to have no safety significance. It was determined that several other tests were performed

on the aggregate that similarly assured the adequacy of the concrete gradation. Id. at 12-14. The Applicants performed a statistical analysis of the concrete test data based upon a comparison of the work performed by the falsifier versus the work performed by other Pittsburgh Testing Laboratory inspectors, and no significant difference was found. Id. Thus, the fact I&E Report 77-03 verified an instance of document falsification does not preclude this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2).

278. The only additional I&E Report CCANP cites in Contention 2 in support of its claim that construction records have been falsified by employees is I&E Report 78-08. The Staff has reviewed I&E Report 78-08 in light of Contention 2 and has found nothing relevant to the question of falsified construction records. Seidle, et al., direct ff. Tr. 9205 at 15 and Staff Exhibit No. 3. The Applicants suggested that CCANP intended to reference I&E Report 78-07 and proceeded to explain why the situation in that report did not involve document falsification. McKay, et al., direct ff. 6227 at 11-13 and CCANP Exhibit No. 10. In that report, a question arose about a QC record that stated a bolted beam to column connection had been completely inspected when in fact it had been only partially inspected. Rather than involving an instance of document falsification, the discrepancy stemmed from a lack of uniformity in the manner in which QC inspectors documented their inspections. Id. Specifically, QC inspectors were not provided a uniform distinction of a "joint" from a "connection" for purposes of inspecting beam to column connections, and accordingly, inspections were not uniform. Id. at 7-8. A notice of noncompliance was issued for unclear procedures. CCANP

Exhibit No. 10 at Appendix A and 8. Thus, even assuming CCANP intended to support its contention with 78-07 rather than 78-08, nothing in that report precludes this Board from making the required findings under 10 C.F.R. § 50.57(a)(1) and (2), as alleged.

279. The next incident of document falsification came to the attention of the Staff when it received a telephone call from an anonymous source stating that Cadweld records had been falsified. Staff Exhibit No. 7 at 2. Specifically, in May, 1978, an alleger maintained that the as-built location of approximately 900 Cadwelds were arrived at by guesswork and recorded due to inadequate documentation. Id. The Staff investigated this claim by reviewing Cadweld records in the storage vault, making an on the spot inspection of Cadwelds within the containment structures, and subsequently reviewing the documentation relating to those Cadwelds, as well as interviewing all persons within the QC civil department. Id. at 4-5. Based upon interviews with all inspectors, it was determined that the identification markings on certain Cadwelds had been made illegible from weathering. Id. at 5. As a result there was some difficulty in identifying the Cadwelds as the rebar was picked up from the lay-down yard to be placed in the containment--the time when the as-built record was being made. However, it was explained that in any case where the Cadweld identifying number was unclear two and sometimes three opinions were obtained as to the number that was represented on the Cadweld. In no case, was the complete number obliterated. Id. In all cases, the Cadwelds that were being placed had been taken from the lay-down yard and the rebar in that area had been correctly made, tested and accepted per required procedures.

Accordingly, the Staff found no evidence that Cadweld records had been falsified by guessing the as-built location of identified Cadwelds. Seidle, et al., direct ff. Tr. 9205 at 22 and Staff Exhibit No. 7.

280. The Applicants presented John B. Duke, a QC Cadweld inspector at the time of 78-09, and Mr. Richard Buckalew, a systems engineering technician in B&R's construction department at STP, to testify on this issue. Buckalew, et al., direct ff. Tr. 6265. These witnesses verified that at the time of placement certain identification numbers were hard to read, either because they were covered with rust or because they were on the underside of the Cadweld. Buckalew, et al., direct ff. Tr. 6265 at 6. There was no instance in which two or three of the inspectors looking at the same number found themselves unable to agree on the Cadweld identification. Id. at 7. Thus, no evidence was developed to indicate that this incident involved document falsification or preludes this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2).

281. The next incident involving document falsification was reported to the Staff on May 6, 1980. Staff Exhibit No. 80 at 3. Resident Reactor Inspector H. Shannon Phillips, was contacted by an individual who alleged that B&R management altered construction records, changed draft nonconformance reports, promoted unqualified personnel and were intimidating quality control inspectors. Crossman, et al., direct ff. Tr. 10,010 at 13. Specifically, the individual contacting the Resident Inspector indicated that a fabrication checklist containing a "hold point" was not inspected as required and yet the record was falsified to indicate that the inspection had in fact occurred. Id. In addition, it was alleged a draft nonconformance report written by a QC

inspector on this matter was rewritten on November, 1979, by the site QA manager and/or his staff and pertinent information was purposely deleted. Id. It was also alleged that a QC subcontractor inspector received a formal warning of improper inspection practices and that this warning was removed from his personnel file without proper authorization. Id. at 13-14.

282. The Staff investigated these charges in June, 1980. With respect to the falsified fabrication checklist, the individual allegedly falsifying this document admitted he did not inspect the "hold point" yet initialed and dated the document. Id. at 14. With respect to the rewriting of a draft nonconformance report, it was determined that the first draft of the nonconformance report identified both the passing of a "hold point" by a Pittsburgh Des Moines (PDM) welder and the backdating of the PDM checklist by the individual mentioned in the first allegation. The subsequent B&R nonconformance report, only reflected the passing of a "hold point" as a nonconformance and does not address the backdating previously mentioned. Upon investigation, B&R explained it considered the matter of backdating an internal B&R personnel matter and therefore omitted mention of this incident in its formal nonconformance report. Id. at 14. The allegation that a formal warning against the individual involved in this incident was not given, was also not substantiated. Id.

283. Staff Ex. No. 60 confirmed this as an incident of document falsification. This falsification was done by a field inspector without the knowledge of either HL&P or B&R management. Moreover, this was not condoned by management as prompt correction action was taken. This

matter was referred by the Staff to the Justice Department for enforcement considerations and it declined prosecution. Crossman, et al., direct ff. Tr. 10,010 at 15. Accordingly, nothing about its occurance precludes this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2) relative to Contention 2 or that HL&P has the requisite competence and character to operate the STP.

284. The next instance of document falsification or false statements was reported to the Staff on July 22, 1980. Staff Exhibit No. 67. At that time, the NRC Resident Reactor Inspector was contacted by an individual who alleged that B&R maintenance records had been falsified. The individual explained that over the past two months two employees had been terminated by B&R for falsification of records. Crossman, Et al., direct ff. Tr. 10,010 at 15. The alleger explained that recently a foreman was identified as falsifying records; however, the individual was not terminated because he had some "stroke" with higher supervision. Specifically, this person alleged that this foreman falsified permanent plant maintenance records identified as Cards No. M-1018BM-1019B wherein the equipment was not inspected as required and yet the records were falsified to indicate that the inspection had occurred. Crossman, et al., direct ff. Tr. 10,010 at 15-16.

285. During the Staff investigation it was determined that a foreman falsified the maintenance card concerning a vacuum degasifier pump when he signed off the maintenance card indicating he rotated the shaft of the pump. Id. at 16. He went on to indicate that in fact he had not rotated the shaft. This foreman also indicated that during a training inspection, he ordered a subordinate to sign off on a couple of

maintenance cards on equipment that they could not inspect due to the fact the equipment was located inside a locked building. Id. at 16. The foreman offered the explanation that someone (identification unknown) in upper management told him not to report discrepancies if the discrepancies had been previously reported. Id. Relative to corrective action, it was determined that the individual making this allegation quit. Id. at 17. Supervisors S&T in I&E Report 80-21, identified as fostering this behavior, were transferred offsite 6 and 16 months, respectively, after the investigation. Id. at 17. Both individuals, however, were immediately removed from all safety related work on the STP. Tr. 4159 (Vurpillat); 3781 (Broom); 4946 (Broom).

286. Staff Ex. No. 67 confirmed another incident of document falsification. Again, the falsifier was a field level employee, however, the extent of field managements' involvement with or knowledge of this incident is less clear. Again, corporate management had no knowledge and did not condone this type of activity. This incident was also referred to the Justice Department for enforcement considerations and it declined to prosecute. Crossman, et al., direct ff. Tr. 10,010 at 17. Accordingly, nothing about its occurrance precludes this Board from making the findings required by 10 C.F.R. ¶ 50.57(a)(1) and (2) relative to Contention 2 or that HL&P has the requisite competence and character to operate the STP.

287. In summary, document falsification has been verified in Staff Exhibit Nos. 1, 60 and 67. In none of these cases has corporate management been involved or provided an atmosphere fostering this behavior. All document falsifiers were at the field level. Nothing

about the occurrence of these three incidents preclude this Board from finding that there is a reasonable assurance that the STP has been built in accordance with the construction permit and will operate in conformity with the application, as amended, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission.

IV. CONCLUSIONS OF LAW

Based upon the foregoing findings of fact which are supported by reliable, probative, and substantial evidence as required by the Administrative Procedure Act, and the Commission's Rules of Practice, and upon consideration of the entire evidentiary record in this proceeding, the Board makes the following conclusions of law, recognizing that such conclusions may be subject to change based on the record in the forthcoming Phases of this hearing:

(1) HL&P's performance in the management of design, construction and planning and preparation for operation of STP demonstrates that HL&P presently has the necessary managerial competence and character (including commitment to safety) to operate STP safely and in compliance with all applicable NRC requirements.

(2) There is reasonable assurance that safety-related construction work thus far completed at STP is adequate to perform its intended purpose or that appropriate repairs will be made as necessary to make such construction work adequate to perform its intended purpose, in conformity with its construction permits, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission.

(3) HL&P is managing, planning, and implementing its program for the balance of design and construction of STP, including its QA program, in a manner which provides reasonable assurance that future construction work at STP will be in compliance with the construction permits, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission.

(4) No construction deficiencies have been identified which would preclude this Board from making the findings required by 10 C.F.R. § 50.57(a)(1) and (2); completed construction work has been completed in conformity with the construction permits, the Atomic Energy Act, as amended, and the Rules and Regulations of the Commission, and further, there is reasonable assurance that the STP will operate in conformity with the above Act and regulations.

V. ORDER

WHEREFORE, IT IS ORDERED, in accordance with 10 C.F.R. §§ 2.760, 2.762, 2.785, and 2.786, that this Partial Initial Decision shall become effective and shall constitute, with respect to matters covered herein, the final action of the Commission thirty (30) days after the date of issuance hereof, subject to any review pursuant to the above cited rules.

Exceptions to this Partial Initial Decision may be filed by any party within ten (10) days after service of this Partial Initial Decision. Within thirty (30) days thereafter (forty (40) days in the case of the Staff) any party filing such exceptions shall file a brief in support thereof. Within thirty (30) days of the filing and service of the brief of the appellant (forty (40) days in the case of the Staff),

any other party may file a brief in support of, or in opposition to, the exceptions.

IT IS SO ORDERED.

FOR THE ATOMIC SAFETY AND LICENSING BOARD

Ernest E. Hill, Administrative Judge

Dr. James C. Lamb, Administrative Judge

Charles Bechhoefer, Chairman, Administrative Judge

Dated at Bethesda, Maryland
this 4th day of October 1982.

Appendix A

Contentions Accepted by Licensing Board*/

1. (CCANP, CEU)

There is no reasonable assurance that the activities authorized by the operating license for the South Texas Nuclear Project can be conducted without endangering the health and safety of the public in that:

1. There has been a surveying error which has resulted in the eastern edge of the Unit 2 Mechanical Electrical Auxiliary Building being constructed one (1) foot short (in the east-west direction) from its design location. This error violates 10 C.F.R. Part 50, Appendix B, Sections X and XI.

2. There has been field construction error and as a result, extensive voids exist in the concrete wall enclosing the containment building, in violation of 10 C.F.R. Part 50, Appendix B, Sections IX and X.

3. In violation of Quality Assurance and Quality Control requirements applicable to the South Texas Nuclear Project with regard to document control (10 C.F.R. Part 50, Appendix B, Sections VI and XVII), a field document relating to cadweld inspections has been lost.

4. There are membrane seals in the containment structure which are damaged, indicating a violation of 10 C.F.R. Part 50, Appendix B, Sections X, XV and XVI.

5. There are steel reinforcement bars which are missing from the concrete around the equipment doors in the containment and such bars are missing

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*/ Following CEU's withdrawal from this proceeding, the only contention remaining to be litigated beyond Phase I is CCANP Contention 3.

from the containment structure as well, indicating violations of 10 C.F.R. Part 50, Appendix B, Sections X, XV and XVI.

6. There are cadwells which have been integrated into parts of the plant structure which are not capable of being verified with regard to compliance with 10 C.F.R. Part 50, Appendix B, in violation of Sections IX and X of Appendix B.

7. Quality Control as per the requirements of 10 C.F.R. Part 50, Appendix B, in particular Sections III and IX, has not been complied with, because:

a. Efforts by quality control inspectors to verify that design changes were executed in accordance with the purposes of the original design were repeatedly and systematically thwarted.

b. There were personnel other than the original designer approving design changes with no first hand knowledge of the purpose of the original design.

c. There were design changes approved by personnel unqualified in the type of design where the change was made.

d. There were numerous pour cards that were supposed to record the correct execution of concrete pours which were falsified by numerous persons.

e. There has been and continues to be assaults on the Applicant's quality control inspectors, continual threats of bodily harm to those inspectors, firing of inspectors, and other acts constituting a pattern of behavior designed to intimidate the inspectors. As a result of the intimidations, certain inspections were never done because the inspectors decided to play cards over a period of four months rather than risk their safety on the plant grounds.

8. a. As evidenced by the investigative results in Allegation 1 of I&E Report 81-28, Houston Lighting and Power management failed to assure prompt corrective action by Brown and Root in the area of access engineering in violation

of Criterion XVI of 10 C.F.R. Part 50, Appendix B.

b. As evidenced by the investigative results in Allegation 1 of I&E Report 81-28, Houston Lighting and Power management does not have a consistent policy on the issuance of stop work orders in violation of Criterion 1 of 10 C.F.R. Part 50, Appendix B.

c. As evidenced by the investigative results in Allegation 2 of I&E Report 81-28, Houston Lighting and Power management personnel are not committed to respecting the mandates of NRC regulations, especially Criteria I and II of 10 C.F.R. Part 50, Appendix B.

d. As evidenced by the investigative results in Allegation 4 of I&E Report 81-28, Houston Lighting and Power management failed to effectively implement a quality assurance program in violation of Criterion I of 10 C.F.R. Part 50, Appendix B.

As a result of the foregoing, the Commission cannot make the findings required by 10 C.F.R. §§ 50.57(a)(1) and (2) necessary for issuance of an operating license for the South Texas Nuclear Project.

2. (CCANP, CEU)

NRC inspection records (Inspection and Enforcement Reports #77-03, 2/77; #77-03, 4/77, and #78-08, 5/78) indicate that South Texas Project construction records have been falsified by employees of Houston Lighting and Power Company and Brown and Root, in violation of 10 C.F.R. Part 50, Appendix B, Sections VI and XVII.

As a result, the Commission cannot make the findings required by 10 C.F.R. §§ 50.57(a)(1) and (2).

3. (CCANP)

South Texas Project Units 1 and 2 are pressurized water reactors. Such reactors have experienced about thirty reported instances (most of which occurred during startup or shutdown) in which temperature-pressure limits of the reactor vessels (as reflected in plant technical specifications) in the reactor coolant-system have caused excessive pressures on reactor pressure vessels. The South Texas Nuclear Project does not incorporate design features or administrative procedures which are adequate to prevent or ameliorate such pressure transients nor have any technical specifications been proposed for this purpose. The South Texas Nuclear Project will, therefore, not be in compliance with 10 C.F.R. Part 50.

4. (CEU)

The South Texas Project (STP) Category I structures and equipment are inadequately designed and constructed with respect to wind loadings as demonstrated by the fact that actual wind velocities associated with hurricanes which have occurred along the Texas Gulf Coast have exceeded wind loadings for which STP structures have been designed and evaluated. Further there are non-Category 1 structures containing equipment which if destroyed or damaged would jeopardize the safe operation of STP. These non-Category 1 buildings are not designed to withstand winds generated by hurricanes and if damaged would provide missile type projectiles which could penetrate Category 1 structures which are inadequately protected.

5. (CEU)

Information is available**/ which indicates that the Staff's treatment (in the construction-permit FES, Section 5.4.1.3 and Table 5.7) of bioaccumulation of radionuclides in aquatic organisms is inadequate or in error.

6. (CEU)

Staff and Applicant calculations of radionuclides deposition rates do not take into account the relatively high and continual humidity in the area of STP to determine compliance with 10 C.F.R. Part 50, Appendix I.

7. (CEU)

Due to soil conditions peculiar to this area, inadequate water flow in the Colorado River and diminishing groundwater supply, Applicant will not be able to maintain the 7,000 acre cooling pond at a sufficient level to allow continued safe operation of STP.

**/ Toombs, George L. and Culter, Peter B., Lower Columbia River Environmental Radiological Survey in Oregon, contracted by the U. S. Public Health Service and Oregon State Board of Health.

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8. (CEU)

Proposed amendments to 10 C.F.R. Part 50, Appendix E (43 Fed. Reg. 37473, August 23, 1978) are to be used as "interim guidance" in evaluating inter alia applications for operating licenses. Such amendments require that emergency plans must, in defined circumstances, extend, as appropriate, to areas beyond the Low Population Zone (LPZ). Such requirements are applicable in the case of STP because of the following:

a. Matagorda Elementary School with an enrollment of more than 80 students, is located approximately 8 miles from STP in a south- southeasterly direction. Persons at the school would have to travel towards STP in order to evacuate since the only evacuation route, State Highway 60, ends in Matagorda.

b. At the end of State Highway 60 in Matagorda there begins a secondary road, 2031, which crosses the intracoastal canal and continues 6.6 miles down the peninsula, ending on the Gulf. There are numerous residents in this area who have no other route than Highway 60 for evacuation.

c. The evacuation plan formulated by the Texas Department of Public Safety is only "in case of nuclear war." An incomplete plan by the Texas Health Department would not apply to Matagorda as it only covers a 5-mile LPZ.

Accordingly, the STP emergency plan does not conform to the requirements of the above referenced proposed amendments to 10 C.F.R. Part 50, Appendix E which are currently effective as interim guidelines.

Appendix B

QA/QC ISSUES

In addition to Contentions 1 and 2 (attachment to Memorandum and Order dated August 3, 1979), the following QA/QC issues are admitted into controversy as a result of the Commission's Memorandum and Order dated September 22, 1980 (CLI-80-32):

Issue A. If viewed without regard to the remedial steps taken by HL&P, would the record of HL&P's compliance with NRC requirements, including:

(1) the statements in the FSAR referred to in Section V.A.(10) of the Order to Show Cause;

(2) the instances of non-compliance set forth in the Notice of Violation and the Order to Show Cause;

(3) the extent to which HL&P abdicated responsibility for construction of the South Texas Project (STP) to Brown & Root; and

(4) the extent to which HL&P failed to keep itself knowledgeable about necessary construction activities at STP,

be sufficient to determine that HL&P does not have the necessary managerial competence or character to be granted licenses to operate the STP?

Issue B. Has HL&P taken sufficient remedial steps to provide assurance that it now has the managerial competence and character to operate STP safely?

Issue C. In light of (1) HL&P's planned organization for operation of the STP; and (2) the alleged deficiencies in HL&P's management of construction of the STP (includ g its past actions or lack of action, revised programs for monitoring the activities of its architect-engineer-constructor and those matters set out in Issues A and B), is there reasonable assurance that HL&P will have the competence and commitment to safely operate the STP?

Issue D. In light of HL&P's prior performance in the construction of the STP as reflected, in part, in the Notice of Violation and Order to Show Cause dated April 30, 1980, and HL&P's responses thereto (filings of May 30, 1980 and July 28, 1980), and actions taken pursuant thereto, do the current HL&P and Brown

& Root (B&R) construction QA/QC organizations and practices meet the requirements of 10 C.F.R. Part 50, Appendix B;*/ and is there reasonable assurance that they will be implemented so that construction of STP can be completed in conformance with the construction permits and other applicable requirements?

Issue E. Is there reasonable assurance that the structures now in place at the STP (referred to in Sections V.A.(2) and (3) of the Order to Show Cause) are in conformity with the construction permits and the provisions of Commission regulations? If not, has HL&P taken steps to assure that such structures are repaired or replaced as necessary to meet such requirements?

Issue F. Will HL&P's Quality Assurance Program for Operation of the STP meet the requirements of 10 C.F.R. Part 50, Appendix B?

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*/ Following B&R's replacement by Bechtel and Ebasco, this issue has considered the construction QA/QC organizations and practices of Bechtel and Ebasco.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S PROPOSED OPINION, FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER IN THE FORM OF A PARTIAL INITIAL DECISION" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or, as indicated by an asterisk, by deposit in the Nuclear Regulatory Commission's internal mail system, this 4th day of October, 1982.

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

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

Mr. Ernest E. Hill
Administrative Judge
Lawrence Livermore Laboratory
University of California
P.O. Box 808, L-46
Livermore, CA 94550

Melbert Schwarz, Jr., Esq.
Baker and Botts
One Shell Plaza
Houston, TX 77002

William S. Jordan, III, Esq.
Harmon & Weiss
1725 I Street, N.W.
Suite 506
Washington, D.C. 20006

Brian Berwick, Esq.
Assistant Attorney General
Environmental Protection Division
P.O. Box 12548, Capitol Station
Austin, TX 78711

Jack R. Newman, Esq.
Lowenstein, Newman, Reis, Axelrad & Toll
1025 Connecticut Avenue, N.W.
Washington, DC 20036

Mrs. Peggy Buchorn
Executive Director
Citizens for Equitable Utilities, Inc.
Route 1, Box 1684
Brazoria, TX 77442

Mr. Lanny Sinkin
Citizens Concerned About Nuclear Power
2207 D. Nueces
Austin, TX 78705

Kim Eastman, Cocoordinator
Barbara A. Miller
Pat Coy
Citizens Concerned About Nuclear
Power
5106 Casa Oro
San Antonio, TX 78233

Docketing and Service Section*
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. David Prestemon*
Legal Counsel
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety and Licensing Board
Panel*
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Atomic Safety and Licensing Appeal
Board Panel*
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Jay M. Gutierrez
Counsel for NRC Staff