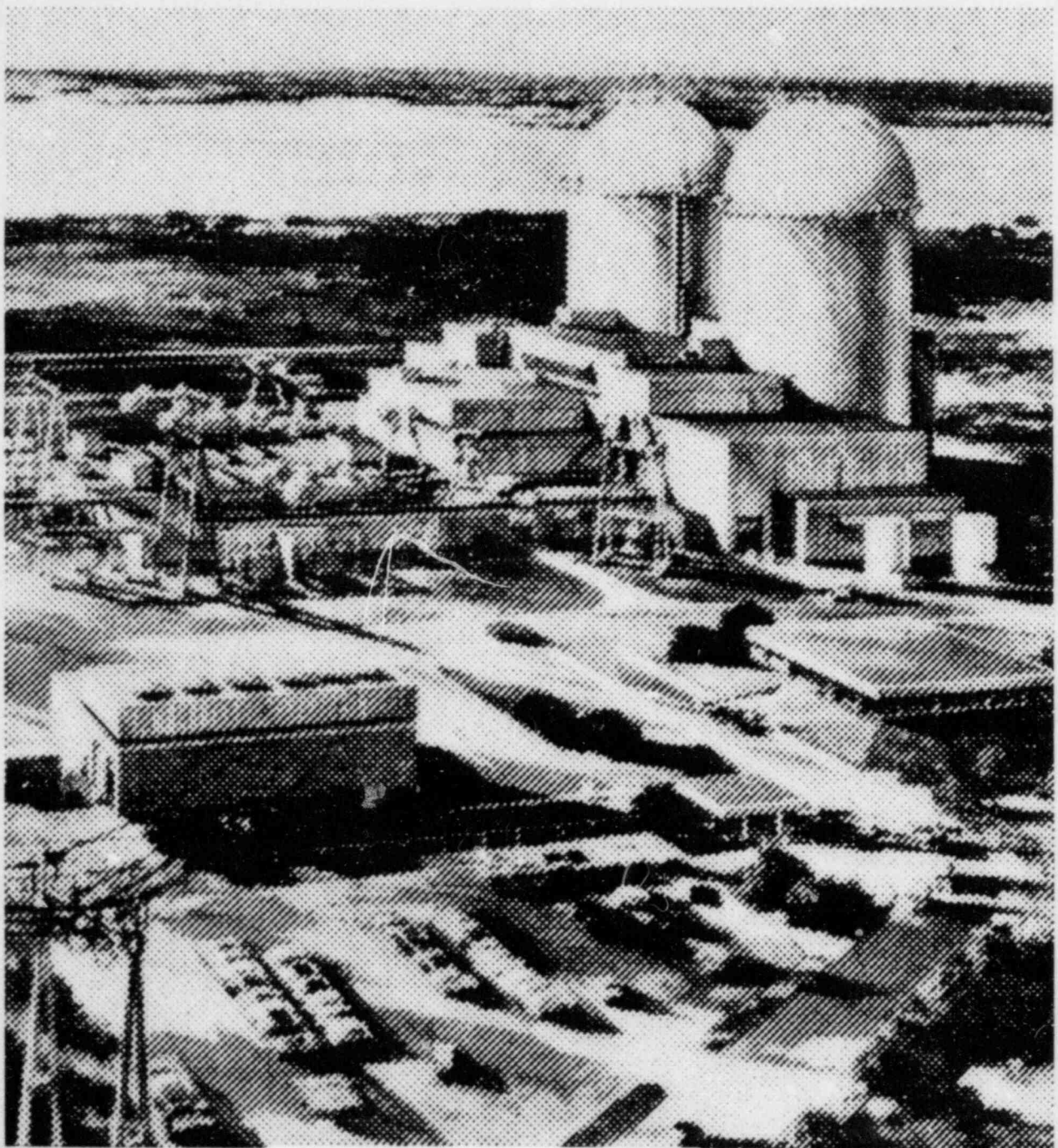
Independent Assessment Program

Texas Utilities Services, Incorporated
Comanche Peak Steam Electric Station

June 3, 1983



Proposal No. S83-12C

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LIST OF EXHIBITS

1.0 EXECUTIVE SUMMARY

At the request of Texas Utilities, Cygna Energy Services has developed an Independent Assessment Program (IAP) which will provide added assurance that Comanche Peak Steam Electric Station (CPSES) is constructed in accordance with its application and requisite design control standards. This program is intended to complement the numerous evaluations conducted to date in both the technical and quality assurance areas. As stated in a letter from Mr. S.B. Burwell of the NRC to Texas Utilities Generating Company (TUGCO), dated May 4, 1983, none of these reviews have surfaced a major breakdown in the programs at CPSES. Therefore, the NRC concluded that a design verification effort of similar scope to those performed on other plants was not warranted.

However, to address the NRC concerns regarding the numerous outstanding design changes and complexity of the design control system, Cygna plans to concentrate the IAP on the areas of design control and as-built verification. Since these specific areas have been assessed during numerous other reviews of CPSES, the implementation evaluation of the design control program will only consider the design change and interface control elements. The objectives of this program are: (1) to provide an assessment of the adequacy of the design control system; (2) to evaluate the extent of implementation of the design change and interface elements of the system; and (3) to perform a field verification of selected as-built configurations.

The Spent Fuel Pool Cooling System was chosen for this review based on the fact that it is important to safety, encompasses multiple disciplines and organizational interfaces, has undergone numerous design changes, and has been turned over to the operations department.

The program will integrate the conclusions of two separate and distinct activities. First, an overall review will confirm that an adequate design control process was established by project procedures and was implemented for

the design changes and organizational interface elements. Second, a detailed as-built walkdown will be performed on selected elements of the Spent Fuel Building and Spent Fuel Pool Cooling System to assure that the latest system design has been incorporated into the as-built.

Cygna will utilize the experience it has gained from the completion of independent reviews for Mississippi Power & Light on Grand Gulf Unit 1 and for Detroit Edison on Enrico Fermi Unit 2. Essentially, the approach involves performing the review, noting all observations, verifying the accuracy of the observations, and evaluating the potential safety impact. Throughout this process, items identified as having potential impact on plant safety are given immediate attention. This is to ensure that Texas Utilities receive timely notification of those items concluded to have a definite potential for impacting plant safety. Cygna will focus its extensive quality assurance and technical experience in this program through a two-tier approach in which every potential finding receives the attention of both the project team and senior review team.

The Independent Assessment Program will commence upon NRC acceptance of the program and authorization to proceed by Texas Utilities. The program will culminate in a final report, submitted simultaneously to the NRC and Texas Utilities, ten weeks after start of work.

In summary, Cygna believes the program outlined in this document represents a rational approach to an independent assessment. If the stated objectives are met, Cygna will be able to make a definitive statement regarding the adequacy of the Comanche Peak design control system and the extent of its implementation for design changes and interfaces. Thus, the effort undertaken will prove useful to both the NRC and Texas Utilities in assuring that the health and safety of the public has been adequately protected, and also to Texas Utilities as further assurance that the interest of its customers and the investment of its shareholders have been properly safeguarded.

2.0 INTRODUCTION

At the request of Texas Utilities, Cygna Energy Services has developed a program which will provide added assurance that Comanche Peak Steam Electric Station (CPSES) has been constructed in accordance with its application and requisite design control standards. The need for such a program was documented in a letter from Mr. S.B. Burwell of the NRC to Texas Utilities Generating Company (TUGCO), dated May 4, 1983. In that letter, it was stated that due to the numerous efforts which have been initiated by Texas Utilities to assure the quality at CPSES, and the fact that no previous verification programs have surfaced any evidence of a major breakdown in the quality assurance programs at CPSES, an independent design verification effort of similar scope to those performed on other plants was not warranted.

The NRC did express concern with regard to the complexity of the design control process and the number of design changes still outstanding. As a result, the objectives of this program are: (1) to provide an assessment of the adequacy of the design control system; (2) to evaluate the extent of implementation of the design change and interface elements of the system; and (3) to perform a field verification of selected as-built configurations.

The general approach taken to achieve the stated program objectives are shown in Exhibit 2.1. First, an independent evaluation of the adequacy of the Texas Utilities design control process as it relates to the selected scope is performed. This review is broad based and covers the design control requirements that would apply to the overall plant design effort. The degree of program implementation will then be evaluated for the design change and interface elements of the design control process. A further confirmation of the design control process implementation will be provided through an as-built field verification. This will be accomplished by means of a selective walkdowns to confirm that the installed condition is in conformance with the construction documents.

The following criteria were considered in selecting the systems or elements for this work scope:

- the design must include systems or elements important to safety;
- the design must represent a cross section of disciplines;
- the design must have several contractor interfaces over a significant period of time;
- the design should have undergone changes during this period of time;
- the design must have been turned-over to the operations group (TUGCO).

Taking the above criteria into consideration, the Spent Fuel Pool Cooling System (Train A) suction and discharge line components to the Unit 1 and 2 spent fuel pools was chosen as shown in Exhibit 4.1.

The as-built verification will encompass the mechanical, electrical, instrumentation, controls, and structural aspects of representative components within the above element.

This assessment program takes into account numerous project reviews which have been performed already and the areas specified by the NRC as requiring added assurance. For example, Texas Utilities has conducted self-initiated design inspections to ensure that all licensing commitments are being fully incorporated into the final design and the NRC staff has been doing the SALP reports over the last several years. The TMI Blue Ribbon Panel was formed to implement and support safety-related plant modifications in light of the Three Mile Island 2 accident. The INPO self-evaluation performed by Sargent & Lundy on the CPSES design control process is yet another example. Several other

design/construction reviews have been performed to date, including the Walsh-Doyle Investigation, the F.B. Lobbin QA Program Evaluation, and the NRC Construction Assessment Team Inspection. The Independent Assessment Program by Cygna Energy Services would, therefore, be one additional check providing further assurance that the plant is constructed in accordance with the design control requirements and licensing commitments.

Cygna will utilize the experience it has gained from the successful completion of independent reviews for Mississippi Power & Light on Grand Gulf Unit 1 and for Detroit Edison on Enrico Fermi Unit 2. The Cygna project team will be structured to provide a multi-leveled assessment of the technical and quality assurance aspects of any observations. There will be two functional tiers within the overall project organization: the Project Team and the Senior Review Team. The Project Team will be composed of the Project Manager, Project Engineer-Technical and Project Engineer-Quality Assurance, plus other key people with experience in quality assurance, design control, nuclear plant design and construction practices. This Project Team not only has experience in the specific areas to be addressed but several of its members performed similar functions during the independent reviews of Grand Gulf Unit 1 and Enrico Fermi Unit 2. The Senior Review Team will be made up of Messrs. B.K. Kacyra, J.E. Ward, E.F. Trainor, and L.L. Kammerzell. Mr. Kacyra, the Chief Executive Officer of Cygna Corporation, is a recognized technical expert with significant commercial and nuclear experience in the field of structural design and dynamic analysis. Mr. Ward is a recognized expert and industry spokesman on regulatory requirements and systems design. Mr. Trainor, Vice President, Quality Assurance, offers extensive experience in the fields of quality assurance and management controls. Mr. Kammerzell, Vice President and Manager of the Western Region Office, has broad-based experience in the nuclear field, including licensing, project management and systems design. This team, with assistance from in-house consultants, will review all conclusions reached by the Project Team and will be the final authority within Cygna regarding the adequacy of resolutions.

Cygna is in a unique position to provide the necessary independence and services to accomplish these design review objectives. A signed Statement of Independence stating Cygna's independence of Texas Utilities is provided in Section 7.0. Although Cygna has not participated in the design and construction of CPSES, recent and ongoing work experience includes: seismic re-evaluation of Category I piping and structures on Maine Yankee and Vermont Yankee; responses to I&E Bulletins 79-02 and 79-14 on Vermont Yankee; responses to I&E Bulletins 79-01B and 80-11 on Pilgrim 1 and Millstone 1; piping seismic analyses, retrofit design and field support services on Diablo Canyon 1 and 2, primary consultant for NRC's SEP program on Yankee Rowe, and Appendix R analyses and design modifications on Nine Mile Point 1. In addition, Cygna completed Independent Design Reviews for Mississippi Power & Light's Grand Gulf Unit 1 and Detroit Edison's Fermi Unit 2, as well as participated in Public Service Indiana's self-initiated INPO evaluation at Marble Hill. Cygna personnel have also conducted independent quality assurance evaluations for Houston Lighting and Power, Northern States Power, Arkansas Power & Light, Boston Edison and others.

In summary, Cygna believes the program outlined in this document represents a rational approach for an independent assessment of the CPSES. By satisfying the stated objectives, Cygna will be able to make a definitive statement regarding the adequacy of the design control systems and the implementation of selected elements. Thus, the effort undertaken will prove useful to both the NRC and Texas Utilities in further assuring that the health and safety of the public has been adequately protected, and also to Texas Utilities as further assurance that the interest of its customers and the investment of its shareholders have been properly safeguarded.

The Independent Assessment Program will commence upon NRC acceptance of the program and authorization to proceed by Texas Utilities. The program will culminate in a final report, submitted simultaneously to the NRC and Texas Utilities.

3.0 METHODOLOGY

This section describes the methodology for the Texas Utilities CPSES Independent Assessment Program and will be used by Cygna Energy Services as a basis for conducting the assessment.

In order to facilitate an understanding of the project approach discussed below, Exhibit 3.1 provides a listing of the specific terminology which was established with the NRC during the Independent Design Verification Programs for Mississippi Power & Light and Detroit Edison. The same terminology will be followed in this Independent Assessment Program for Texas Utilities.

Essentially, the approach involves performing the review, noting all observations, verifying the accuracy of the observations, and evaluating the potential safety impact. To accomplish this, the review will follow the basic steps listed below:

Step 1: Collect Documents
Step 2: Develop Review Criteria
Step 3: Develop Review Procedures
Step 4: Conduct Design Control Reviews and Implementation Evaluations
Step 5: Project Team Review
Step 6: Senior Review Team
Step 7: Report Results

Exhibit 3.2 shows the review process from a line item on the checklist (Step 4) to the final report (Step 7). Throughout this process, items identified as having potential impact on plant safety are given immediate attention. This is to ensure that Texas Utilities receives timely notification of those items concluded to have a definite potential for impacting plant safety. Cygna will focus its extensive quality assurance and technical experience in this program through a two-tier approach in which every potential finding

receives the attention of both the project team and senior review team. Each of these teams will draw on the specialized talents of Cygna in-house consultants, as necessary. Maximum use will be made of review criteria, matrices, checklists and observation records already developed and implemented on the independent reviews for Mississippi Power & Light and Detroit Edison.

Each of these basic steps is described in the following subsections.

Step 1: Collect Documents

Documents are collected and reviewed in two stages. During the first stage, the review teams identify those central documents which guide the design control process, such as the SAR, QA manuals, and project procedures. Reviewing these central documents provides an understanding of how the work process is structured and directed.

During the second stage of data collection, the review teams identify and gather those documents needed to complete the review. Where practical, these documents are collected from Texas Utilities for review in the Cygna offices.

All documents utilized during the course of the review are logged for inclusion in the final report.

Step 2: Develop Review Criteria

A key element in the review is the development of review criteria to measure the adequacy of the design control process. These review criteria are a composite of licensing commitments, CPSES requirements, and appropriate industry standards.

Texas Utilities' and Gibbs & Hill's QA programs will be evaluated using a matrix criteria which compares the key elements of their design control program to industry standards and licensing commitments. For an example matrix, see Exhibit 3.3.

Step 3: Develop Review Procedures

Each reviewer is guided by matrices and checklists that identify key elements to be evaluated during the design control review and implementation evaluation, respectively. Any time a reviewer determines that a line item on the matrices or checklist is inadequately addressed, an "Observation Record" is prepared. All observations are then reviewed to determine their potential impact on plant safety. For those determined to have potential safety impact, a "Potential Finding Report" (PFR) is prepared. Regardless of this determination of potential safety impact, the resolution to each observation is documented.

Matrices, Checklists, Observation Records and PFR's are described in more detail below.

Matrices

Matrices provide the reviewer with a listing of relevant licensing commitments and project requirements to be cross-correlated to Texas Utilities' and selected subcontractors' design control program documents. Exhibit 3.3 contains a typical matrix format which will be adapted to the specifics of the TUSI design control program elements. As the reviewers complete the matrix, the adequacy of the respective design control program elements is evaluated with respect to the licensing commitments and project requirements. Whenever a design control program element is found to either not address or inadequately address a matrix element, an Observation Record is prepared and its number is recorded in the comments column of the matrix.

Checklists

Checklists provide the reviewers with a listing of key design control elements to be considered in the implementation evaluation. Appendix A provides a sample checklist form for the design control review. As a reviewer checks each line item on a checklist, its adequacy is evaluated against the review criteria. If the requirements are met the line item is marked "satisfactory." Whenever significant conservatisms are identified, they are so noted in the "comments" column. If the reviewer is not fully satisfied that the requirement has been met, an Observation Record is prepared and its number is recorded in the comments column of the checklist.

Observation Record

A sample Observation Record form is provided in Appendix A. The observation number is a unique number sequentially assigned to each observation within a checklist.

Each observation record is prepared by the originator of the observation and then reviewed by a qualified person assigned by the Project Manager. Based on this review, interaction with the Project Engineer-Technical, consultation with Cygna specialists, and an informal conference with Texas Utilities, an Observation Record Review is prepared. This review record rules on the validity and potential safety impact of each observation and is approved by the Project Engineer-Technical, Project Engineer-QA and Project Manager.

The disposition of all observations, including those that are invalidated, is recorded on an Observation Log. (see Appendix A for a sample form).

Potential Finding Report

Potential Finding Report (PFR) forms are also illustrated in Appendix A. Each PFR receives a sequential number which is correlated to the observation number on the Observation Log. On this form, the cognizant reviewer records a description of the observation, an assessment as to the extent of the observation plus an evaluation of the design and safety impact.

Step 4: Conduct Design Control Review and As-Built Verification

Reviews of the CPSES design control process will be divided into three areas:

- Program adequacy
- Extent of program implementation
- As-built verification

The assessment of design control program adequacy will be performed on Texas Utilities and Gibbs & Hill, the architect/engineer. Two elements of the program, design change and interface controls, will be used to assess the extent of program implementation at Texas Utilities, Gibbs & Hill, and selected vendors. A final confirmation of the program implementation will be achieved through the field as-built walkdowns.

Each review team is composed of at least two individuals jointly capable of performing and reviewing the work from a management control and technical perspective.

These review teams are guided by the review criteria matrices and checklists described in the previous subsections. Members of the teams perform the initial reviews, complete the matrices and checklists, and originate observations.

Step 5: Project Review

Exhibit 3.2 illustrates the role of the Project Team review in the decision process. Once an observation has been originated and reviewed by a qualified individual, the Project Team review is performed to verify the accuracy of the observation, its completeness, the design impact, and the extent. Given this information, the potential safety impact is evaluated.

An integral part of the Project Team review is interfacing with Texas Utilities to confirm the accuracy of an observation and to evaluate the design impact. To maintain independence, Cygna will not disclose an observation until it has been recorded.

In addition to reviewing observations, the Project Team reviews the completed checklists to verify their completeness and accuracy.

The Project Team is responsible for the preparation of the final report.

Step 6: Senior Review Team

All valid observations and reports are reviewed by the Senior Review Team.

A cognizant member of this team, assisted as necessary by Cygna in-house consultants, will review each PFR for completeness, accuracy, and potential impact on plant safety. Based on their assessment, the Senior Review Team may do one of the following:

- Approve the Project Team conclusions.
- Direct the Project Team to perform more work, such as clarifying data, redirecting the review, or performing additional assessments within the current work scope.

The Senior Review Team will also evaluate the collective safety impact of observations that are individually concluded to have insignificant safety consequences. During the entire review process, those potential findings which are identified as having potential safety impact will receive immediate and first priority attention. Should the Senior Review Team conclude that the observation does indeed have a definite potential impact on plant safety, the finding will be reported immediately to Texas Utilities in accordance with Title 10 of the Code of Federal Regulations, 10CFR Part 21.

Step 7: Report Results

The results of the review process will be recorded in a final report issued concurrently to Texas Utilities and the NRC. This report will contain the following:

- Review criteria
- Checklists and Matrices
- Observation Log
- Potential Finding Reports
- An assessment of the effectiveness of the design control program
- An assessment of the implementation of the design change and interface elements of the design control program, based upon the selected scope
- An assessment of the as-built condition, based upon the selected scope.

4.0 SCOPE OF WORK

This section describes the scope of work for the Independent Assessment Program (IAP) of CPSES and will be used by Cygna Energy Services as a reference and basis for conducting the review. Cygna plans to concentrate the IAP on the areas of design control and as-built verification. The design control program will be reviewed for overall adequacy as well as the extent of program implementation. As these specific areas have been assessed during numerous other reviews of CPSES, the implementation evaluation of the design control program will only consider the design change and interface control elements.

To address the concerns of the NRC, the following criteria were considered in developing the scope of work:

- The scope should involve systems or elements important to safety.
- The scope should provide for a review of a cross-section of disciplines (mechancial, electrical, structural, instrumentation, etc.).
- The scope should involve a number of interfaces between various contractors involved with the design and construction of CPSES.
- The scope should involve systems or elements having undergone a significant number of design changes or improvements.
- The scope should concentrate on systems or elements already turned over to the operations group, Texas Utilities Generating Company (TUGCO).

With these criteria in mind, the Independent Assessment Program scope of work was established to include:

- the suction and discharge lines for the Spent Fuel Pool Cooling System (see Exhibit 4.1)
- the Fuel Building structure (see Exhibit 4.2) as related to the foundation for Spent Fuel Pool Cooling System equipment
- selected essential equipment such as a Spent Fuel Pool Cooling heat exchanger and pump
- instrumentation associated with the Spent Fuel Pool Cooling System
- power and control circuitry associated with vital functions of the Spent Fuel Pool Cooling System

The program will integrate the conclusions of two separate and distinct activities. First, an overall review will confirm that an adequate design control process was established by project procedures and was implemented for the design changes and interface elements. Second, a detailed as-built walk-down will be performed on selected elements of the Spent Fuel Building and Spent Fuel Pool Cooling System to assure that the latest system design has been incorporated into the as-built. Each of these review activities are discussed below in more detail.

4.1 Design Control Review

An evaluation of the Design Control Program governing design of the Spent Fuel Pool Cooling System will be performed to assure that an adequate design control program has been established and specific portions have been implemented. This evaluation will concentrate on design characteristics which

cannot be tested, or similarly verified, under actual design conditions since testing is a means of design verfication in itself. This evaluation will encompass the following goals:

- Determine whether Texas Utilities' design control activities as defined in their design control program documentation satisfy licensing commitments and project requirements.

- Determine whether the design control activities of Gibbs & Hill satisfies the CPSES SAR and project requirements.

To satisfy previously identified concerns, the emphasis has been placed in the areas of design change control and interface control systems for the implementation evaluation. The organizations responsible for various aspects of the design/construction process of the Spent Fuel Pool Cooling System are identified in Exhibits 4.3 through 4.6. This information will guide the following reviews in order to accomplish the above goals:

4.1.1 Review of Texas Utilities' Design Control Program

Cygna proposes to perform an evaluation of the key elements of the Texas Utilities design control program as applied to selected scope. The key elements to be included are:

- Design input documents
- Design analyses control
- Drawing control
- Procurement control
- Internal/external interface control
- Design verification
- Document control (controlled documents), including revisions

- Design change control
- Corrective action
- Internal/external audits and surveillances

This evaluation will encompass reviewing the Texas Utilities design control program documentation to assess how well it addresses CPSES SAR commitments and project requirements with respect to the above key design control elements. The evaluation will involve developing a quality program matrix similar to that shown in Exhibit 3.3, which identifies the quality requirements committed to with a cross correlation to the Texas Utilities design control program. Appropriate portions of the following Texas Utilities design control documents, will be used to develop the matrix:

- CPSES QA Program
- CPSES Project Quality Engineering Procedures
- CPSES Project Quality Engineering Instruction
- CPSES Site Document Control Procedure

Other documents may be added as the review progresses. Once the matrix is established, an analysis will be performed to:

- Determine the adequacy of the design control program in addressing the specific quality commitments.

- Assess the impact of the design control program deficiencies and/or weaknesses with respect to committed requirements governing design.

- Determine areas requiring concentrated attention during the design control program implementation evaluation.

4.1.2 Implementation Evaluation of Texas Utilities Design Control Program

As a second phase of the independent quality assessment, Cygna will develop a plan to evaluate the implementation of the key elements of the Texas Utilities design control system applicable to the selected scope. Due to previous NRC concerns, the key elements selected for this evaluation are design change and interface control. Specific activities in this phase of the design control review are described below:

1. Develop an implementation review checklist. The checklist is designed to focus the review activities towards key areas of the implementation process. The checklist will contain key design control element attributes (questions derived from procedural commitments to be reviewed during the review). Emphasis will be placed on developing attributes pertaining to activities which, if not properly implemented, would result in the greatest impact on quality. The checklist will serve the purpose of ensuring depth and comprehensive coverage in the review. It is intended to be utilized only as a guide during the evaluation process and will not restrict the review investigation. To provide further review continuity, the checklist will be prepared by an individual who will participate in the actual review. This will ensure that it is performed in accordance with both the content and intent of the checklist.

2. Conduct an implementation review at Texas Utilities offices. This review will concentrate on the items contained in the checklist and will be structured to identify weaknesses, assess their extent, and evaluate their impact on plant safety. The actual review will be performed by qualified personnel who will:

- Verify by examination and evaluation of objective evidence that the established design control program element has been implemented.

- Assess the degree of implementation

- Identify the impact of failures (if any) to implement the quality assurance program.

4.1.3 Review the Gibbs & Hill Design Control Program

In conjunction with the Texas Utilities design control program review, Cygna will perform a review of the Gibbs & Hill design control program. Gibbs & Hill has been selected because they are responsible for a major portion of the plant. This review will be performed to assess how well their design control program, applicable to the selected scope, addresses the commitments imposed through Texas Utilities contract documents and the CPSES SAR. As a minimum, the design control will be evaluated against the following key design control elements, as applicable:

- Design input documents
- Design analysis control
- Drawing control
- Procurement control
- Internal/external interface control
- Design verification
- Document control
- Design change control
- Corrective action
- Internal/external audits and surveillance

The evaluation will involve developing quality program matrices similar to that developed during the review of Texas Utilities' design control program which identifies the design control requirements imposed through contract documents and CPSES SAR.

4.1.4 Implementation Evaluation of Selected Contractors Interface and Design Change Control Programs

To assess Texas Utilities' control over contracted design activities, and address previous NRC concerns, Cygna will develop a plan to evaluate the implementation of selected contractor's interface and design change elements of the design control program, applicable to the selected scope. The method of performing this evaluation will be the same as that utilized for the implementation evaluation of the Texas Utilities' design control program.

Contractors chosen for this review are:

- Gibbs & Hill
- ITT-Grinnell
- Brown & Root (N-stamp review only)
- J. Oat
- Reliance
- Bingham Willamette
- Borg-Warner
- Posiseal

4.1.5 Design Control Review - Summary

Cygna will identify any observations during the course of the design control program review and implementation evaluation efforts which may have occurred due to the following conditions:

- Omissions in the design control program with respect to the key design control elements identified earlier.

- Implementation not in accordance with the documented design control program.

These observations will be reported in sufficient detail to assure that corrective action can be effectively implemented. The potential safety impact of each observation will also be evaluated.

Cygna's proposed approach to this review follows the schematic logic illustrated in Exhibit 2.1 of this document.

All findings will be reviewed by both the project team and the senior review team to assess their accuracy and completeness. As a part of the overview process, observations which individually have no impact on plant safety are assessed collectively to evaluate their cumulative effect on plant safety.

4.2 As-Built Verification

The final activity is to assure that the systems, components and structures have been installed to the latest design documents. To accomplish this, an as-built review team will perform a detailed field verification of the Spent Fuel Cooling System and selected elements of the fuel building. This team will review mechanical, structural, electrical and instrumentation and control areas. The walkdown will consider the following as a minimum:

- Identification, location and installation of piping and mechanical equipment.

- Location, configuration and detailing of pipe supports and supporting structures.

- Cable and raceway identification, installation, routing, separation and termination.

- Instrumentation location and identification.

- Equipment location, orientation, anchorage, support structures, and identification.

5.0 PROJECT ORGANIZATION

Exhibit 5.1 illustrates the organization proposed by Cygna for this Independent Assessment Program. The project is organized to provide multiple levels of review to ensure that each matter receives thorough technical and management attention. This multi-level review process involves a Project Team and a Senior Review Team. As needed, each of these teams will draw on the specialized talents available within a group of Cygna consultants.

Mr. Larry Kammerzell will act as Principal-in-Charge for the performance of this effort. As a principal of the firm, and Vice President in charge of the Western Region offices, he will ensure that the appropriate resources are concentrated on this effort. Mr. Kammerzell has the authority to represent Cygna in all matters, including contractual and commercial. He has over 20 years of nuclear-related experience and, prior to joining Cygna, held responsible engineering and management positions with Stone & Webster Engineering Corporation, United Engineers and Constructors, General Atomic Company, and the U.S. Navy.

Mr. Ted Wittig will act as Project Manager for the proposed scope of work. He will direct all aspects of the project and will be the prime contact with Texas Utilities' staff representatives. In this capacity, he will be responsible for the day-to-day monitoring of the progress of the work including performance against established budgets and schedules. Mr. Wittig has over 13 years of experience with respect to the engineering and analysis of nuclear power projects. His specific experience in the areas of quality assurance, licensing, technical review and other Independent Verification Programs (Grand Gulf Unit 1 and Enrico Fermi Unit 2) will be directly applicable to the work being performed for Texas Utilities.

Mr. Bob Hess will be the Project Engineer-Technical. He will be directly responsible for all technical aspects of the assessment program. He will ensure that the assessment criteria are fully developed, that project procedures are properly implemented, and that all resolutions consider design impact. Whenever necessary he will utilize the expertise available on the team of Cygna consultants. He will also review and approve all resolutions. Mr. Hess has over 17 years of experience covering a broad spectrum of engineering, including project management, systems analysis and design of nuclear plant systems and components.

Mr. Paul D. DiDonato will serve as Project Engineer-Quality Assurance for this project and will direct and participate in the review of the design control portion of Texas Utilities' Independent Assessment Program. Mr. DiDonato's 8 years of experience in the development, implementation, evaluation and auditing of quality assurance programs uniquely qualifies him for this scope of work. Mr. DiDonato's experience has encompassed all aspects of nuclear quality assurance. He will be assisted by highly qualified quality assurance engineers, as necessary, for this effort. Mr. DiDonato's experience on other Design Verification Reviews will also provide valuable support to this project.

Since Texas Utilities' management will be relying on the results of the this program to assess the adequacy of the construction of Comanche Peak, Cygna's approach includes the formation of a Senior Review Team to review all observations.

The Senior Review Team will be comprised of Mr. B. K. Kacyra, Chief Executive Officer (Cygna Corporation), Mr. J. E. Ward, Consultant to Cygna (MAC), Mr. L. Kammerzell, Vice President (Cygna Energy Services West Coast Regional office), and Mr. E. F. Trainor, Vice President (Cygna Energy Services). The composition of this team brings to bear Cygna's depth of experience in the areas of structural/piping analysis, system design and licensing, safety

analysis and risk assessment, and quality assurance, respectively. In addition to the key project team members discussed above, Cygna will utilize speciality consultants, as needed, in the areas of PWR design, system analysis, codes and standards, electrical, and I&C. These individuals will be utilized in a support capacity for activities which may be required, such as technical interpretation of the codes and standards as applied to the Comanche Peak corrective actions. From time to time, certain other support personnel could be utilized in order to ensure the cost-efficiency of the effort. Mr. D. Ferg will function in the limited role of project liaison support. Resumes of project members typical support personnel who would be utilized are provided in Appendix B.

6.0 QUALITY ASSURANCE

Cygna will perform the work as applicable in conformance with the requirements of the Cygna Quality Assurance Manual (QAM). The requirements set forth in the QAM are in conformance with the requirements of 10CFR50, Appendix B, ANSI N45.2, and ASME III, NCA 4000. The program has been successfully exercised and approved by and for Mississippi Power and Light, Detroit Edison Company, Pacific Gas and Electric Company, Commonwealth Edison Company, Bechtel Power Corporation, Yankee Atomic Electric Company, and Northeast Utilities Service Company, to name a few. The QAM is listed in the CASE Register of Quality Control Evaluated Suppliers.

7.0 STATEMENT OF INDEPENDENCE

This statement attests to the fact that Cygna Energy Services and the members of the Independent Assessment Program project team have no vested interest in the outcome of our effort to provide added assurance as to the adequacy of the Comanche Peak Steam Electric Station (CPSES) design control program.

Cygna Energy Services has performed no engineering design work or construction services on the Texas Utilities' CPSES project, nor for any other Texas Utilities project. However, from October 4 to October 6, 1982 Cygna conducted a seminar on general probabilistic risk assessment for management and licensing personnel.

No member of the Cygna Project Team nor of the Cygna Energy Services corporate management has ever worked for Texas Utilities nor been associated with any design activities on the CPSES project while employed by any other organization.

No member of the Project Team or any corporate officer or any relative thereof owns stock in Texas Utilities.

I believe this satisfies the current NRC requirements regarding the independence of the engineering firm.

Larry Kammerzell 6/2/83

Larry Kammerzell — Date
Vice President

8.0 SCHEDULE

The schedule proposed by Cygna to complete the effort associated with this Independent Assessment Progam is shown in Exhibit 8.1. This schedule reflects a manpower loading which is sufficient to complete the review scope ten weeks after final NRC approval of the program plan and authorization to proceed from Texas Utilities.

9.0 FINAL REPORT FORMAT

An outline of the final report to be issued concurrently to the NRC and Texas Utilities is provided below:

1.0 EXECUTIVE SUMMARY
- 1.1 Introduction
- 1.2 Scope of Work
- 1.3 Project Organization
- 1.4 Methodology
- 1.5 Results
- 1.6 Conclusions

2.0 PROGRAM REVIEW SCOPE
- 2.1 Program Objectives
- 2.2 System Element Selection
- 2.3 Design Control Review
  - 2.3.1 Review of Texas Utilities' Design Control Program
  - 2.3.2 Implementation Evaluation of Texas Utilities' Design Change and Interface Control Systems
  - 2.3.2 Review of Gibbs & Hill's Design Control Program
  - 2.3.4 Implementation Evaluation of Selected Sub-contractors' Design Change and Interface Control Systems
  - 2.3.5 As-Built Verification

3.0 REVIEW APPROACH
- 3.1 Document Collection
- 3.2 Review Criteria
- 3.3 Procedures
  - 3.3.1 Matrices
  - 3.3.2 Checklists
  - 3.3.3 Observation Records
  - 3.3.4 Potential Finding Report

(Final Report Outline, continued)

3.4 Design Control and As-Built Review
3.5 Project Review Team
3.6 Senior Review Team

4.0 REVIEW RESULTS
4.1 Introduction
4.2 Design Control Program Review Results
4.3 Implementation Evaluation Results
4.4 As-Built Verification Results

5.0 SUMMARY AND CONCLUSIONS
5.1 Program Results
5.2 Recommendations
5.3 Conclusions

6.0 APPENDICES
Appendix A: Definitions and Nomenclature
Appendix B: Documents Reviewed
Appendix C: Assessment Criteria
Appendix D: Observation Records
Appendix E: Checklists
Appendix F: Statement of Independence

EXHIBITS

EXHIBIT 2.1

INDEPENDENT ASSESSMENT ACTIVITIES

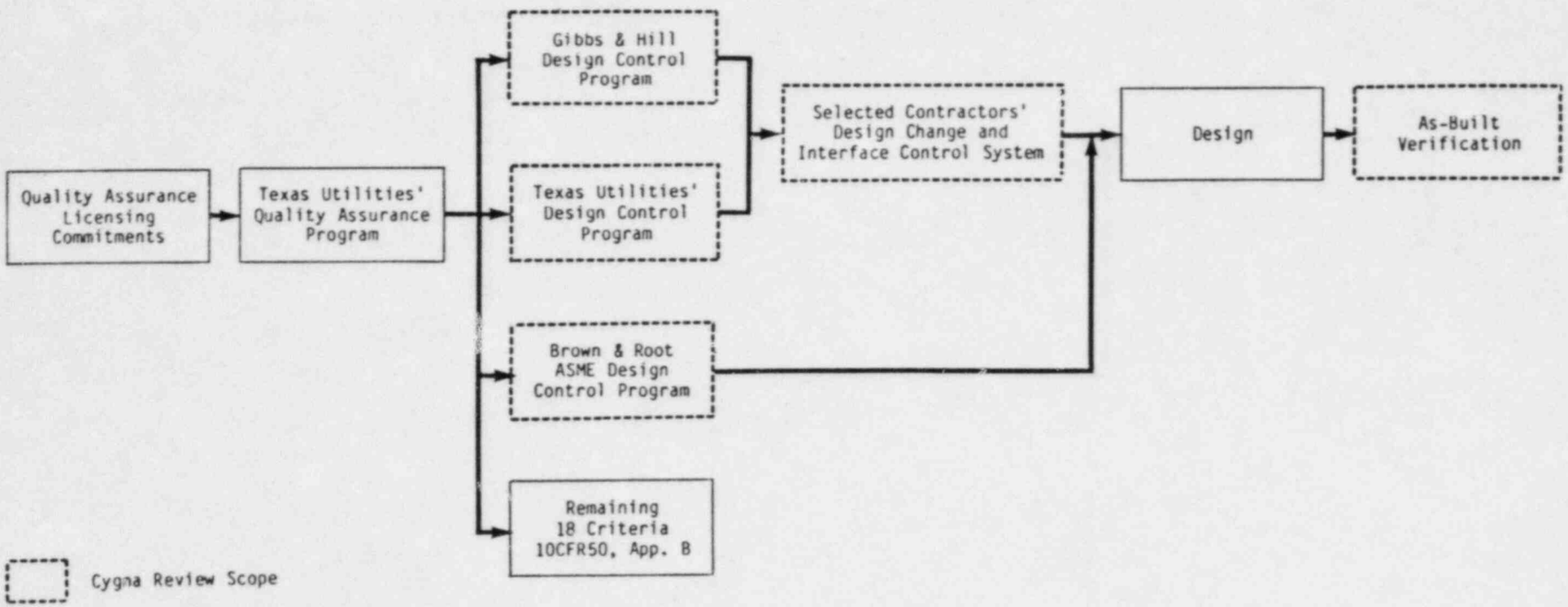


EXHIBIT 3.1

TERMINOLOGY

Term	Definition
Checklist	A listing of key items to be checked during the independent assessment. The checklist provides a guide to the reviewer; it is neither all inclusive nor limiting.
Review Criteria	A compilation of acceptable procedures and standards. The adequacy of the design control process is measured against these criteria.
Observation	Identification of an item in nonconformance with the project review criteria.
Invalid Observation	Any observation which is judged to be inaccurate as a result of further review.
Valid Observation	An accurate and complete observation as judged by the Project and Senior Review Teams.
Potential Finding	A valid observation having a potential impact on plant safety as judged by the Project Review Team.
Vertical Review	A review of selected systems or elements of the total plant design.
Horizontal Review	A quality assurance review of design control procedures and their implementation.
Definite Potential Finding	A potential finding verified by the senior review team to have a potential impact on plant safety. This is a reportable finding to TUSI and the NRC.

EXHIBIT 3.2

REVIEW PROCESS FLOW CHART

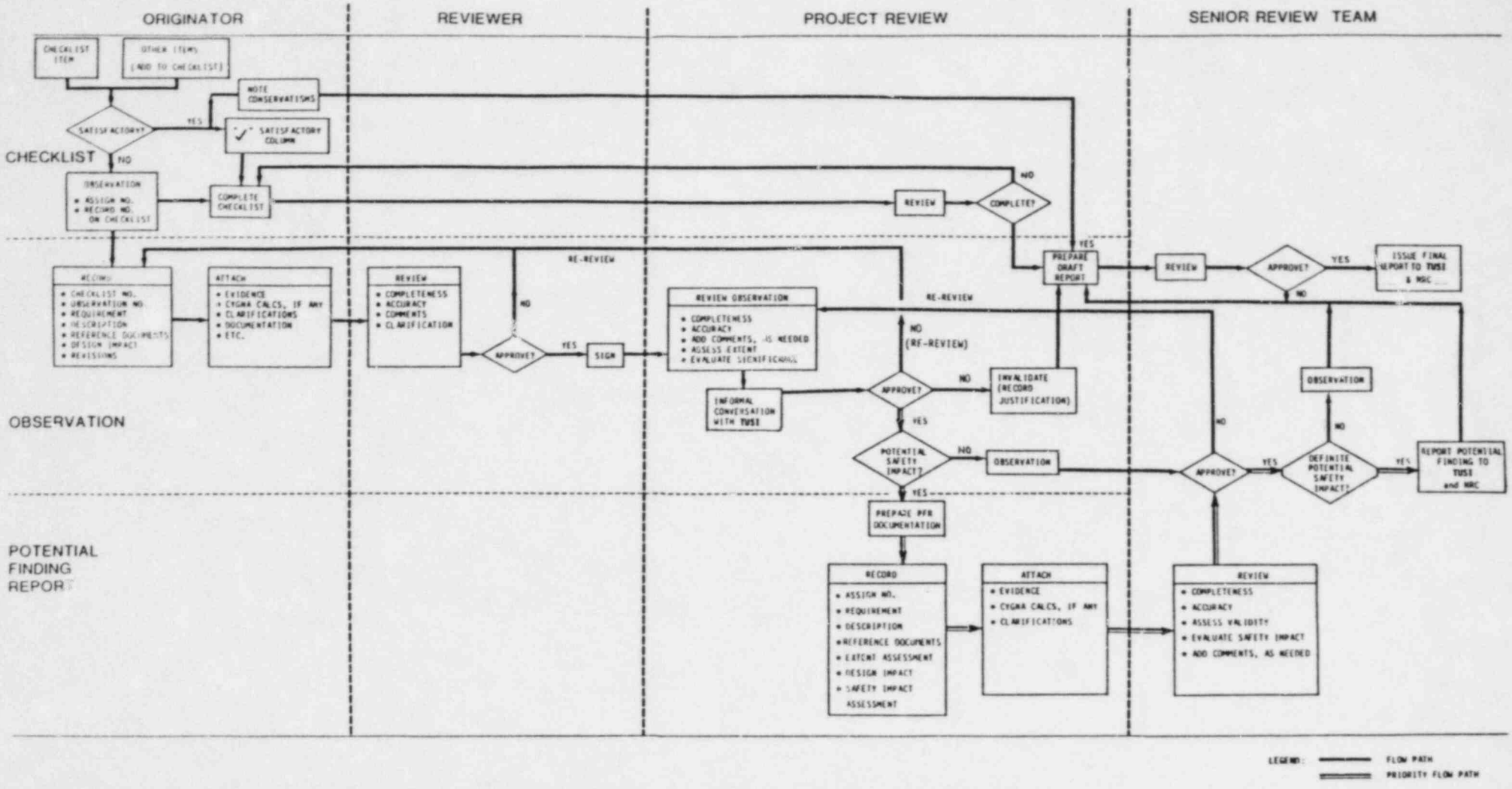


EXHIBIT 3.3

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAM	PQEP	PQEI	ETC.	COMMENTS
	General									
1	Measures shall be established and documented to assure that the applicable specified design requirements, such as design bases, regulatory requirements, codes and standards are correctly translated into specifications, drawings, procedures, or instructions (Org. responsibilities for prep, review, approval) (SRP).	4.1	III.1	17.1.3A 17.1.3B						
2	These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents.	4.2	III.2	N/A						
3	Changes or deviations from specified design requirements or quality standards shall be identified, documented, and controlled.	4.3	III.2	17.1.3C2						
4	Records of implementation of these design control measures shall be available for review.	4.4	N/A	N/A						

LEGEND

N45.2	ANSI N45.2-1977, Section 4.0, "Design Control"	QAM	Quality Assurance Manual
APP. B	10CFR50, Appendix B, Criterion III, "Design Control"	PQEP	Project Quality Engineering Procedures
SRP	NUREG 75/087, Rev. 1 - Standard Review Plan, Chapter 17, Sections 17.3, 17.6, 17.16, 17.18	PQEI	Project Quality Engineering Instructions
FSAR	Enrico Fermi Power Plant Unit 2, Final Safety Analysis Report, Chapter 17		
NS	Not Specified		

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAM	PQEP	PQEI	ETC.	COMMENTS
5	Design control measures shall provide for design analyses such as physics, stress, thermal, hydraulic, accident, compatibility of materials; accessibility for inservice inspection, maintenance and repair; and delineation of acceptance criteria for inspections and tests (Field Eng & Computer Prog) (SRP).	4.5	III.9	17.1.3A						
6	Measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the function of the structure, system, or component.	4.6	III.3	N/A						
	Interface Control									
7	Design control measures shall be applied as necessary to identify and control design interfaces and for coordination among participating design organizations.	4.7	III.4	N/A						
8	These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution and revision of documents involving design interfaces.	4.8	III.5	17.1.3D						
	Design Verification									
9	Design control measures shall be applied to verify or check the adequacy of design, such as by the performance of design reviews; by use of alternate or simplified calculational methods; or by the performance of a suitable testing program.	4.9	III.6	N/A						

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PPOGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAP	PQEP	PQEI	ETC.	COMMENTS
10	The verifying or checking process shall be performed by individuals or groups other than those who perform the original design but who may be from the same organization.	4.10	III.7	N/A						
11	Verifying or checking should consist of, as a minimum, reviewing the design, spot checking the calculations or analyses, and assessing the results against the original design bases and functional requirements.	4.11	N/A	N/A						
12	The responsible design organization shall identify the particular design verification methods utilized.									
13	Regardless of the degree of standardization or similarity to previously proven designs, the applicability of standardized or previously proven designs with respect to meeting pertinent design requirements shall be verified for each application.									
14	In those cases where the adequacy of design is to be verified by tests, the testing shall be identified.	4.17	III.8	N/A						
15	Testing shall demonstrate adequacy of performance under the most adverse conditions.	4.18	III.8	N/A						

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAM	PQEP	PQEI	ETC.	COMMENTS
16	Operating modes and environmental conditions in which the item must perform shall be considered in determining the most adverse conditions.	4.19	N/A	N/A						
17	If testing indicates that modifications to the item are necessary to obtain acceptable performance, the item shall be modified and re-tested as necessary to assure satisfactory performance.	4.20	N/A	N/A						
	Change Control									
18	Design changes, including field changes, shall be governed by design control measures commensurate with those applied to the original design.	4.21	III.10	17.1.3F1						
19	Design changes are reviewed and approved by the organizations that performed the original design, review and approval.	4.22	III.10	171.6A3						
	Standard Review Plan									
20	Errors and deficiencies in approved design documents, including design methods (such as computer codes), that could adversely affect structures, systems, and components important to safety are documented; and action is taken to assure that all errors and deficiencies are corrected.	N/A	N/A	17.1.3C1						

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAM	PQEP	PQEI	ETC.	COMMENTS
21	Organizational responsibilities are described for preparing, reviewing, approving, and verifying design documents such as system description, design input and criteria, design drawings, design analyses, computer programs, specifications and procedures.	N/A	N/A	17.1.3B						
22	Procedures are established and described for design verification activities which assure the following: a. The verifier is qualified and not directly responsible for the design. In exceptional circumstances, the designer's immediate supervisor can perform the verification provided: 1) The supervisor is the only technically qualified person. 2) The need is individually documented and approved in advance by the supervisor's management. 3) QA audits cover frequency and effectiveness of use of supervisors as design verifiers to guard against abuse. b. Design verification, if other than by qualification testing of a prototype or lead production unit, is completed prior to release for procurement, manufacturing, construction, or to another organization for use in other design activities (exceptions). In all cases, prior to fuel load.	N/A	N/A	17.1.3E2						

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAM	PQEP	PQEI	ETC.	COMMENTS
	c. Procedural control for design documents that affects the commitments of the SAR; this control differentiates between documents that receive formal design verification by interdisciplinary or multi-organizational teams and those which can be reviewed by single individuals.									
	d. The responsibilities of the verifier, the areas and features to be verified, the pertinent considerations to be verified, and the extent of documentation are identified in procedures.									
23	Procedures are established to assure that verified computer codes are certified for use and their use specified.	N/A	N/A	17.1.3E4						
	Document Control									
24	Measures shall be established and documented to control the issuance of documents such as instructions, procedures and drawings, including changes, which prescribe activities affecting quality.	7.1	VI	17.1.6A2						
25	These measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed.	7.2	VI	17.1.6A2 17.1.6A3						

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS N45.2 LINE	APP B LINE	SRP PARA.	TUSI PROGRAM ELEMENTS FSAR	QAM	PQEP	PQEI	ETC.	COMMENTS
26	Participating organizations shall have procedures for control of the documents and changes thereto to preclude the possibility of use of outdated or inappropriate documents.	7.6	VI	17.16.A2 17.16.B1						
27	Document Control Measures shall provide for:	7.7	VII							
	a. Identification of individuals or organizations responsible for preparing, reviewing, approving and issuing documents including changes.			N/A						
	b. Identifying the proper documents to be used in performing the activity.			17.1.6B1						
	c. Coordination and control of interface documents.			N/A						
	d. Ascertaining that proper documents are used.	N/A		N/A						
	e. Establishing current and updated distribution lists.	17.16B2		Pg A17.1-20 ¶1h						
	Corrective Action									
28	A system for corrective action shall be established.	17.0	XVI	17.1.16						
	AUDITS									
29	A system of planned and documented audits shall be carried out to verify compliance with all aspects of the quality assurance program.	19.0	XVIII	17.1.18						

EXHIBIT 3.3 (continued)

TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX

COMANCHE PEAK STEAM ELECTRIC STATION - UNIT 1

INDEPENDENT ASSESSMENT PROGRAM - TEXAS UTILITIES QUALITY ASSURANCE PROGRAM MATRIX - DESIGN CONTROL

ITEM NO.	QUALITY PROGRAM REQUIREMENTS	GOVERNING DOCUMENTS			TUSI PROGRAM ELEMENTS					COMMENTS
		N45.2 LINE	APP B LINE	SRP PARA.	FSAR	QAM	PQEP	PQEI	ETC.	
	Procurement Document Control	5.0	IV	17.1.4						
30	Measures shall be established and documented to assure that applicable regulatory requirements, design bases and other requirements which are necessary to assure adequate quality are included or referenced in the documents for procurement of items or services.									

EXHIBIT 4.1

SPENT FUEL POOL COOLING ELEMENT

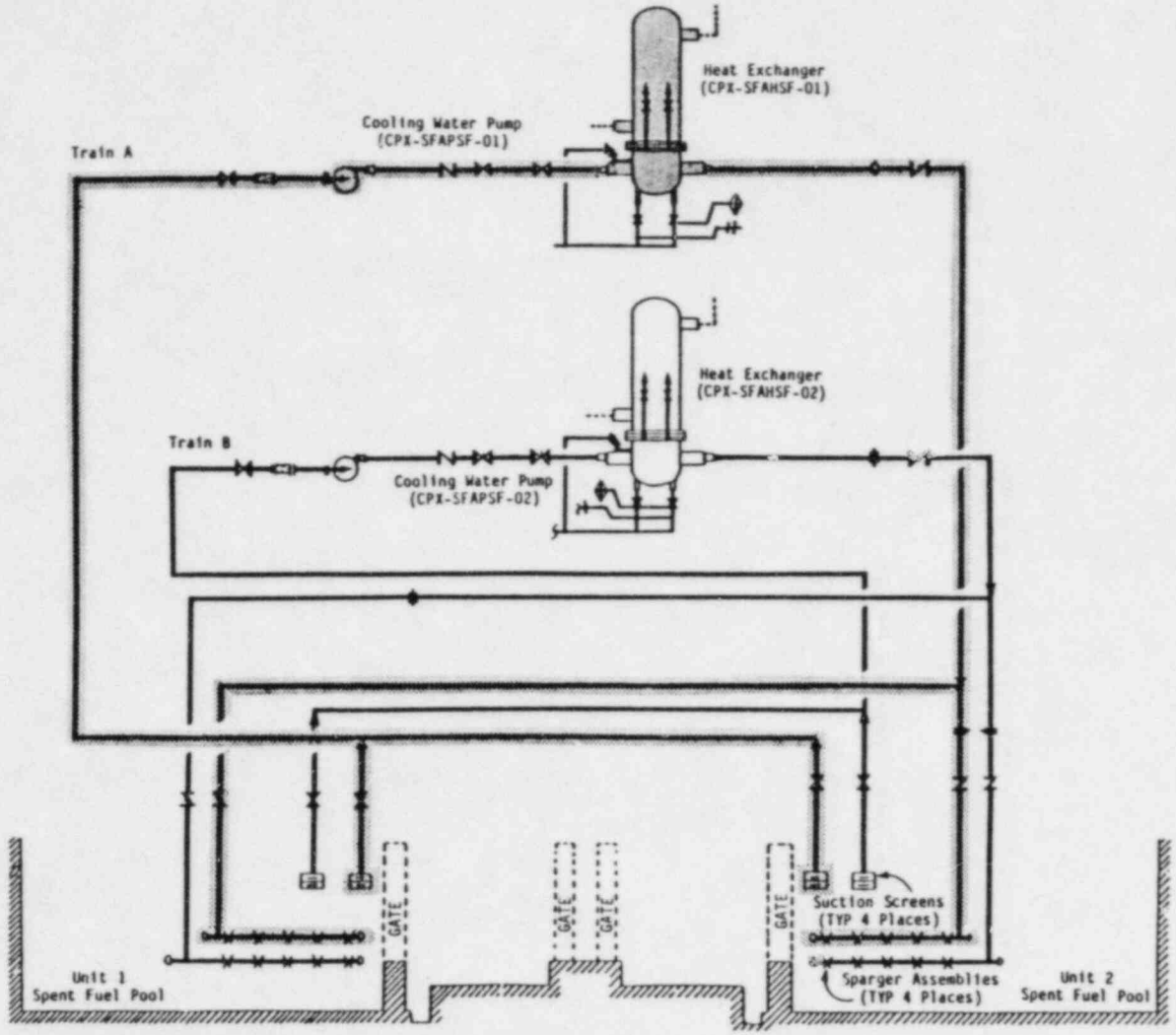


EXHIBIT 4.2

GENERAL ARRANGEMENT DRAWING,
FUEL BUILDING

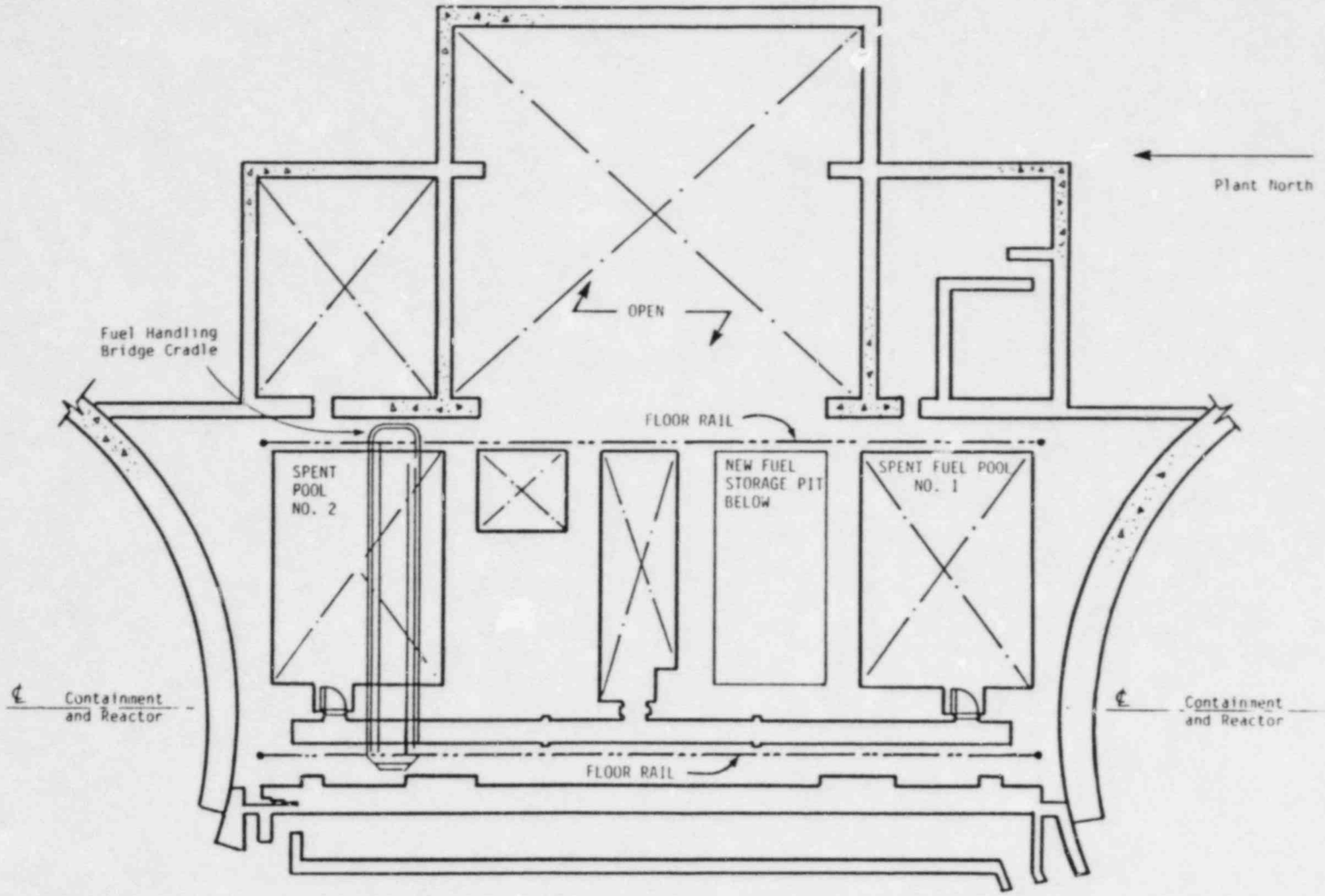


EXHIBIT 4.3

RESPONSIBILITY MATRIX (MECHANICAL)

		Texas Utilities	G&H	ITT Grinnel	B&R	NPSI
1)	Conceptual Design	X(1)	X			
2)	Design Criteria		X			
3)	System Design		X			
4)	Piping Layout		X			
5)	Pipe Stress Analysis		X			
6)	Input to Pipe Stress					
	a) ARS		X			
	b) SAM		X			
	c) Hydrodynamic Loads		N/A			
	d) Support Stiffness		X			
7)	Pipe Support Design	X		X(2)		X
8)	Pipe Anchor Design	X		X		X
9)	Equipment Supports		X			
10)	Installation				X	
11)	Purchase Specifications		X			
12)	Procurement	X				
13)	As-Built Drawings					
	a)Pipe	X				
	b)Pipe Supports	X				

(1)Approval Only

(2)Responsible for a majority of the supports

EXHIBIT 4.4

RESPONSIBILITY MATRIX
(STRUCTURAL)

		Texas Utilities	G&H	B&R
1)	Conceptual Design	X(1)	X	
2)	Design Criteria		X	
3)	Building Arrangement		X	
4)	Seismic Analysis		X	
5)	Structural Analysis		X	
6)	Input Loads			
	a) Ground Spectra		X	
	b) Other Loads		X	
7)	Structural Design		X	
8)	Final Drawings		X	
9)	Purchase Specification		X	
10)	Procurement	X		
11)	Construction			X
12)	As-Built Configuration	X		

(1) Approval Only

EXHIBIT 4.5

RESPONSIBILITY MATRIX
(ELECTRICAL AND I&C)

		Texas Utilities	G&H	Reliance	B&R
1)	Conceptual Design	X(1)	X		
2)	Design Criteria		X		
3)	Pump Motor Design Specification		X		
4)	Contractor Purchase Order	X			
5)	Equipment Qualification Requirements		X		
6)	Design Package Document		X		
7)	Cooling Pump Motor Control Panel			X	
8)	Electrical Power and Control One-Line Diagrams		X		
9)	Cable Specification and Routing Requirements		X		
10)	Cable Tray and Raceway Design		X		
11)	Instrumentation Design		X		
12)	Procurement	X			
13)	Installation				X
14)	As-Built Configuration	X			

(1) Approval Only

EXHIBIT 4.6

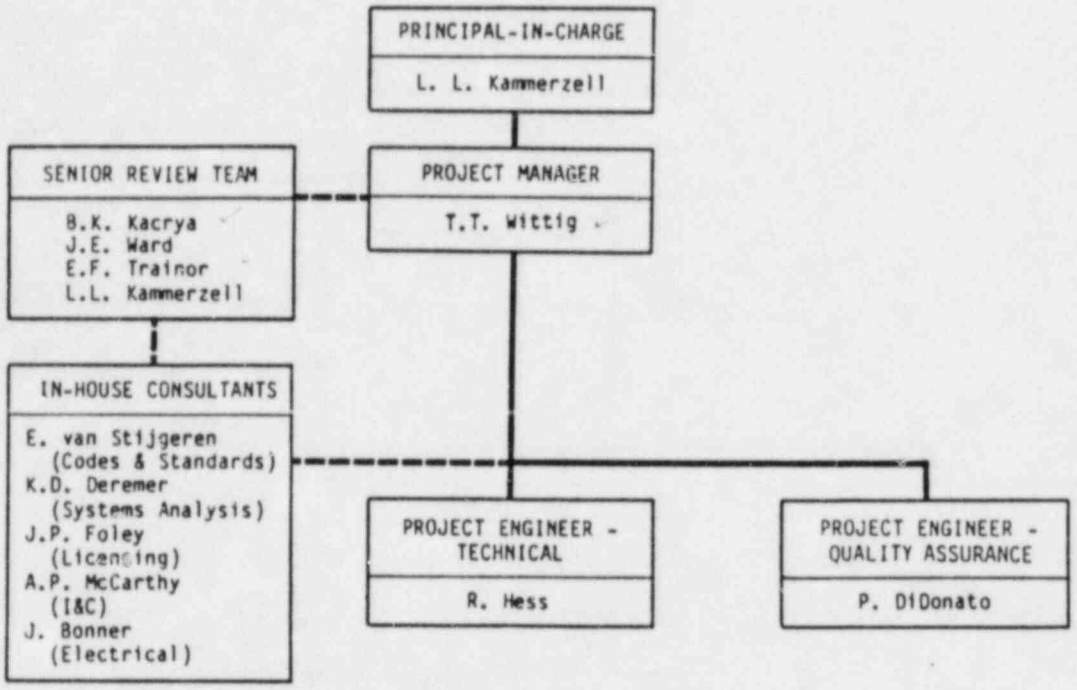
RESPONSIBILITY MATRIX
(EQUIPMENT)

		Texas Utilities	G&H	J. Oat	Bingham Willamette	Borg-Warner	Posiseal	B&R
1)	Conceptual Design	X(1)	X					
2)	Design Criteria		X					
3)	Qualification Requirements		X					
4)	Input Design Loads		X					
5)	Analysis, Qualification Reports and Fabrication Drawings							
	a. Cooling Water Pump				X			
	b. Heat Exchanger			X				
	c. Butterfly valves						X	
	d. Check and Gate Valves					X		
6)	Purchase Specifications		X					
7)	Procurement	X						
8)	Installation							X
9)	As-Built Configuration	X						

(1)Approval Only

EXHIBIT 5.1

PROJECT ORGANIZATION



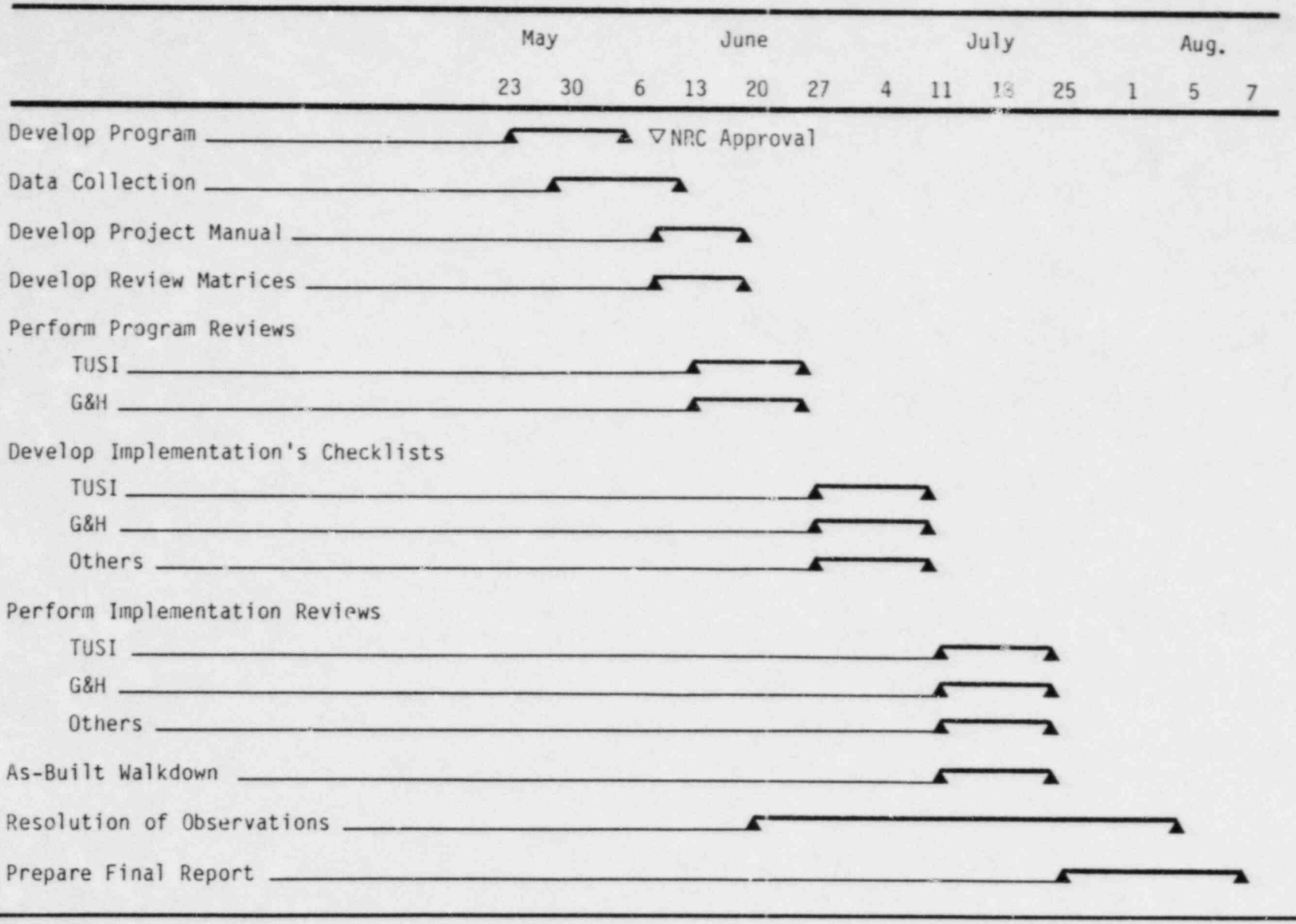
LEGEND

——— Project Direction

– – – – Consultation

EXHIBIT 8.1

INDEPENDENT ASSESSMENT PROGRAM SCHEDULE



APPENDIX A

FORMS

Design Control Process Assessment Checklist

Reviewer(s)

Checklist No.

Page of

Organization/Activities Reviewed

Review Dates

Personnel Contacted

Item No.	Review Attributes	Reference Document	SAT	UNSAT	NA	Comments

As-Built Assessment Checklist

Reviewer (s)

Checklist No.

Page of

Review Date

Item	Satisfactory Yes	Satisfactory No	Comments

Observation Record

Checklist No.	Revision No.
Observation No.	Sheet of
Originated By	Date
Reviewed By	Date

CYGNA

Observation Record Review
Attachment A

Checklist No.	Revision No.
Observation No.	Sheet of

	Yes	No
Valid Observation		
Closed		

Comments

Approved By P.E. Quality Assurance	Date
Approved By P.E. Technical	Date
Approved By Project Manager	Date
Approved By Senior Review Team	Date

Observation Log

Observation No.	Description	Classification								Rev. No.	Date
		Valid		Potential Finding		Definite Potential Finding		Closed			
		Y	N	Y	N	Y	N	Y	N	Remarks	

Potential Finding Report

PFR No.	Revision No.
	Sheet 1 of

1 Description

Requirement

Reference Documents

Extent

Isolated	Extensive	Other (Specify)

Texas Utilities Services, Inc.
Independent Assessment Program; 83059

Potential Finding Report

PFR No.

Revision No.

Design Impact

Potential Safety Impact

Originated By

Date

Approved By P.E. Quality Assurance

Date

Approved By P.E. Technical

Date

Potential Finding Report

PFR No. | Revision No.

Sheet 3 of

II Senior Review

	Yes	No
Further Review Required		
Valid Observation		
Potential Safety Impact		

Comments

Approved By Cognizant Senior Reviewer | Date

III Project Manager

Comments

Approved By Project Manager | Date

Texas Utilities Services, Inc.
Independent Assessment Program; 83059

APPENDIX B

RESUMES

RESUMES

Ben K. Kacyra
John E. Ward
Eugene F. Trainor
Larry L. Kammerzell
Ted T. Wittig
Paul DiDonato
Robert W. Hess
Lennox D. Barnes
John P. Bonner
R. Kenneth Deremer
David A. Ferg
Chuan Liu
A. Patrick McCarthy
John C. Minichiello
James P. Toner
Eric van Stijgeren
Lee J. Weingart
Nancy H. Williams

BEN K. KACYRA

EDUCATION:

M.S., Structural Engineering, University of Illinois, Urbana, IL

B.S., Civil Engineering, University of Illinois, Urbana, IL

PROFESSIONAL REGISTRATION:

Registered Civil Engineer, California

Registered Structural Engineer, California

Registered Structural Engineer, Ohio

PROFESSIONAL AFFILIATIONS:

Member, American Nuclear Society

Member, Earthquake Engineering Research Institute

Member, Seismological Society of America

Member, American Society of Civil Engineers

Member, American Concrete Institute

Member, Structural Engineers Association of California

Expert Examiner, Structural Examination, California State Board of Registration for Professional Engineers

PROFESSIONAL EXPERIENCE:

Mr. Kacyra has been practicing structural engineering for more than eighteen years, more than twelve of which have been in the field of structural analysis and earthquake engineering. His major expertise is in the fields of structural criteria development and seismic risk anaiysis. He has also gained broad experience in the development and application of advanced analytical techniques essential in the achievement of imaginative engineering designs.

As Chief Executive Officer of Cygna since 1973, he has been personally involved in all Cygna projects. His work includes problem definition, determination of criteria, establishment of procedures and evaluation of results.

Some of the significant projects he has worked on as Principal-in-Charge during the past two years are:

Seismic evaluation of the Yankee Rowe Nuclear Station in response to the NRC Systematic Evaluation Program (SEP). This project requires a wide spectrum of involvement from cost evaluation, criteria development, and analysis, to implementation of design fixes.

Methodology for structural performance criteria determination for thermal electric generation and transmission facilities, for California Energy Resources Conservation and Development Commission.

Feasibility of a rational approach to damage mitigation in existing structures exposed to earthquakes, for the National Science Foundation.

Seismic requalification of the Humboldt Bay Nuclear Power Plant structures and equipment systems which included the development of fixes for the structures and equipment.

Structural engineering and seismic risk analysis on a $80,000,000 federal complex in Anchorage, Alaska.

Seismic design criteria and structural review of the Yerba Buena Convention Center, San Francisco.

PUBLICATIONS:

"Seismic Risk Analysis Optimizes Life Cycle Costs," presented at the ASCE National Structural Engineering Conference, Madison, Wisconsin, August 1976.

"Dynamic Response of a Four Storied Building to Changes in Its Configuration," ASCE/SEAONC New Earthquake Design Provisions Seminar, November 1975.

"Application of Dynamic Analysis," with Sanford Tandowsky, ASCE/SEAONC New Earthquake Design Provisions Seminar, November 1975.

"Computer Methods vs. Hand Methods in the Lateral Analysis of Multistory Shear Wall Buildings," with Ashraf Habibullah, presented to the Advisory Board of the California State Office of Architecture and Construction, November 1975.

"Behaviour of Structures Under Earthquake Motion," presented at the Seminar of the Hospital Council of Northern California, December 1974.

Reports to the Seismology Committee of SEAONC:

"Report of the Overturning and Load Factor Subcommittee," 1970.

"Report of the Overturning Subcommittee," 1971.

"Report of the Vertical Acceleration Subcommittee," 1972.

"In-Situ Testing for Seismic Evaluation of Humboldt Bay Nuclear Power Plant for Pacific Gas and Electric Company," with N. Chauhan, Transactions of the Fourth International Conference on Structural Mechanics in Reactor Technology, San Francisco, California, August 1977.

"Seismic Evaluation and Modification of the Humboldt Nuclear Power Plant, Unit 3," with N. Chauhan et al, accepted for presentation at the Third ASCE Specialty Conference on Structural Design of Nuclear Plant Facilities, Boston, Massachusetts, April 1979.

"A Methodology for the Determination of Seismic Resistant Design Criteria," with J. Vallenas, presented at the Second U.S. National Conference on Earthquake Engineering, Stanford, California, August 1979.

JOHN E. WARD

EDUCATION:

M.S., Nuclear Physics, University of California, Berkeley, California

B.S., Naval Engineering, U.S. Naval Academy

PROFESSIONAL REGISTRATION:

Registered Professional Mechanical Engineer, California

Registered Professional Nuclear Engineer, California

PROFESSIONAL AFFILIATIONS:

Member, American Nuclear Society

Member, American Society of Mechanical Engineers

Member, Atomic Industrial Forum

Member, California Society of Professional Engineers

Member, National Society of Professional Engineers

Institutional Representative to the Pacific Coast Electrical Association

Institutional Representative to the North West Electric Light and Power Association

Institutional Representative to the Rocky Mountain Electric Association

Chairman, Reactor Licensing and Safety Committee, AIF

PROFESSIONAL EXPERIENCE:

Mr. Ward is the former Chairman and Chief Executive Officer of Cygna Energy Services with responsibility for the overall operation and performance of the Company.

Prior to joining Cygna, Mr. Ward held the position of Vice President at Sargent and Lundy. In this capacity, Mr. Ward was responsible for Sargent and Lundy's Los Angeles office, as well as for business development on a firmwide basis for the organization. Mr. Ward played an active role in the nuclear industry by chairing the Atomic Industrial Forum's Committee on Reactor Licensing and Safety. In this capacity, he was instrumental in the development of several NRC/Industry task force approaches to solving licensing issues. This work resulted in his being named the first recipient of the AIF's Clyde A. Lilly Award. This award, named for the former AIF Chairman of the Board, is given annually to an individual who is judged to have made an "outstanding contribution to the technical development, regulatory climate or public acceptance of nuclear energy. The quality of such service is measured by: leadership demonstrated by

formulating, reconciling and advancing industry position on nuclear policy, time and effort devoted to Forum programs, and effectiveness in bringing key issues to nuclear development closer to resolution."

In 1973, Mr. Ward was named General Manager of Sargent and Lundy's Los Angeles affiliate, S&L Engineers, when it was first established. He was active in establishing the facilities and procedures for this new affiliate, as well as engaging the principal staff. He was responsible for directing the administrative and engineering program, as well as business development in the western United States.

In 1968, Mr. Ward joined Sargent and Lundy as a Nuclear Project Engineer. As a Nuclear Project Engineer his principal responsibilities included the Zion Nuclear Station and the William H. Zimmer Nuclear Station.

In 1967, Mr. Ward joined the Commonwealth Edison Company in Chicago as Project Engineer on their Zion Station.

Prior to joining Commonwealth Edison, Mr. Ward spent 15 years in the Navy. His primary experience involved command-at-sea, as well as administrative assignments in the areas of practical research, development, and test and evaluation procedures for surface weapons systems.

EUGENE F. TRAINOR

EDUCATION:

M.S., Management, Rensselaer Polytechnical Institute, Troy, NY

B.S., General Engineering, U.S. Coast Guard Academy, New London, CN

Naval Nuclear Reactor Testing and Operations, Mare Island Naval Shipyard, Vallejo, CA

Executive Management, Center for Management Development, Northeastern University, Boston, MA

Production, Planning and Control, Massachusetts Institute of Technology, Cambridge, MA

Government Contract Law, Marshall Wythe School of Law, College of William and Mary, Williamsburg, VA

PROFESSIONAL REGISTRATION:

Registered Quality Engineer, California

Registered Mechanical Engineer, Massachusetts

PROFESSIONAL AFFILIATION:

Senior Member, American Society for Quality Control

Member, American Society of Mechanical Engineers

Member, ASME Main Committee on Nuclear Quality Assurance; Vice Chairman, Subcommittee on Personnel Qualifications

PROFESSIONAL EXPERIENCE:

Mr. Trainor, Vice President, Quality Assurance, has in excess of 20 years of extensive experience in quality assurance, construction, engineering, and project management of fossil and nuclear power generation projects. Prior to his association with Cygna, he was associated with a major architect/engineer for eight years serving as Manager of their Quality Assurance Department and Chief Engineer of the Engineering Assurance Division. During this period, he developed the first Quality Assurance Program approved by the then Atomic Energy Commission for an engineer-constructor. Additionally, he developed management systems needed for the effective management of a multi-faceted domestic and international quality assurance organization.

Mr. Trainor was previously associated with the shipbuilding industry in Quincy, Massachusetts, for thirteen years. At that time he was responsible for the establishment of an S5W Submarine Reactor Plant Test Program and the development and management of the DLG(N)25 Nuclear Power Unit installation program. Other assignments held by

EUGENE F. TRAINOR
(continued)

Mr. Trainor included Project Manager - Special Projects, Process Engineering Manager with responsibilities for manufacturing and industrial engineering, applied research and development and industrial laboratories, and Manager, Nuclear Quality Control, with responsibility for all aspects of quality assurance and control in the design, construction and overhaul of naval Nuclear Power Plants and Facilities.

Prior to his association with the shipbuilding industry, Mr. Trainor was employed by a chemical company complex in Springfield, MA, where he designed and constructed steam generating and chemical processing facilities.

LARRY L. KAMMERZELL

EDUCATION:

M.B.A., National University (in progress)

B.B.A., National University

Third Year Industrial Engineering, Drexel Institute of Technology

SPECIALTY COURSES:

Business Management Seminars at General Atomic Company

Naval Training:

Navy Nuclear Power School

Advanced Submarine Engineering School

Nuclear Deep Submersible Pilot and Power Plant Training

PROFESSIONAL REGISTRATION:

Professional Engineer (Nuclear), California

PROFESSIONAL AFFILIATIONS:

Member, American Nuclear Society (Past Chairman of San Diego Section)

Member, National Management Association (Past President, General Atomic Chapter)

PROFESSIONAL EXPERIENCE:

Mr. Kammerzell has 20 years of Nuclear related experience covering a broad spectrum of Nuclear Power Plant risk assessment, systems engineering, reliability analysis, testing, construction, and operations. At Cygna he is in charge of the West Coast Regional Office.

Prior to joining Cygna, Mr. Kammerzell held responsible engineering and management positions with Stone & Webster Engineering Corp., United Engineers and Constructors, General Atomic Company and the U.S. Navy. The following summarizes his activities over the past 20 years.

At General Atomic Company Mr. Kammerzell was Manager of Systems Engineering, responsible for the coordination and technical integration of the various systems and component designs into an optimum plant design and to organize, direct and administer overall systems engineering efforts on HTGR plants including Safety Analysis,

Probabilistic Risk Assessment programs, and Economic Study Evaluations.

In other positions held at General Atomic, Mr. Kammerzell was responsible for plant thermal performance evaluations including the development of Analytical techniques to determine the thermal performance risk associated with the specific plant design.

As lead nuclear engineer at United Engineers and Constructors, he was responsible for the preparation of the safety analysis report for systems and facilities supporting the nuclear steam supply. These included the radwaste, core cooling, and fuel storage systems and the associated building arrangements.

At Stone and Webster, Mr. Kammerzell was responsible for evaluation of vendor test and weld procedures. He was also responsible for the design, specification, and field erection of nuclear power plant pumps, vessels and heat exchanges.

Mr. Kammerzell held several positions in the United States Navy. Representative of this period is his assignment as Nuclear power plant prototype instructor and assignment as M/A division officer on board the NR-1 during the construction, testing, seatrials and initial service. The NR-1 is a Nuclear Powered Deep Submersible research submarine. Mr. Kammerzell had responsibility for: all phases of testing, trouble shooting, calibration and maintenance of reactor, propulsion, and turbine generating equipment; all power plant evolutions; and all underwater evolutions. He was the duty officer during power range testing and was responsible for testing during initial criticality.

TED T. WITTIG

EDUCATION:

B.S., Civil/Structural Engineering, Michigan Technological University, Houghton, MI

PROFESSIONAL REGISTRATION:

Civil Engineer, California

PROFESSIONAL EXPERIENCE:

Mr. Wittig has over thirteen years of experience in structural engineering, including Containment Building design, structural analysis, equipment qualification, seismic modeling and analysis, licensing, quality, engineering and PSAR preparation. As Manager of Projects in the San Francisco Office, Mr. Wittig is directly responsible for all project management and engineering activities on projects at this Office. In addition, Mr. Wittig acted as project engineer for the Independent Design Verification for Detroit Edison Company and project manager for the Mississippi Power & Light Independent Design Review.

Prior to joining Cygna, he was employed by a major architect/engineer. As the Civil/Structural Group Supervisor and Assistant Project Engineer for an LMFBR Study, he was responsible for the conceptual analysis and design of all structures. Prior to that he acted as liaison between the home office and client, and served as technical reviewer on the client's staff.

Mr. Wittig also functioned as the civil licensing engineer responsible for the PSAR for a commercial PWR nuclear power plant. In this assignment, he was additionally responsible for the civil/structural design criteria, soil-structure interaction seismic analysis, the seismic specification for mechanical equipment, tornado and turbine missile impact studies, and liquefaction study, as well as design and analysis for the circulating water system intake structures. The licensing, quality control, seismic and missile impact tasks required frequent interfacing with other disciplines during the design of safety systems.

Mr. Wittig's previous experience has included design of roads, railroads, and structures for a major project, including Containment Building shell and base-mat design using the axisymmetric finite element program FINEL. This experience also included seismic modeling and analysis for the Reactor Containment Building plus analysis and design of the reactor cavity, reactor, and guard vessel support structures.

PAUL D. DIDONATO

EDUCATION:

B.S., Business Administration, Industrial Technology, Northeastern University, Boston, MA

A.S., Civil and Highway Engineering Technology, Wentworth Institute of Technology, Boston, MA

PROFESSIONAL AFFILIATIONS:

Member, American Society for Quality Control

PROFESSIONAL EXPERIENCE:

Mr. DiDonato has over eight years of experience in the nuclear industry. Presently, he is assigned as the Quality Assurance Operations Supervisor, Western Region, and is responsible for the implementation of the Cygna Quality Assurance Program for all West coast Regional offices including San Francisco, San Diego, and Richland. Mr. DiDonato acted as Quality Assurance Review Group Leader for the Independent Design Review for Mississippi Power and Light Company and Detroit Edison. Prior to his assignment on the West coast, Mr. DiDonato was assigned as a Project Quality Assurance Engineer in Cygna's Boston Regional office. He was responsible for the quality assurance implementation of all Boston office based nuclear projects, in addition to interfacing with client QA organizations.

Prior to joining Cygna, Mr. DiDonato was a member of the Quality Assurance Department of a major East coast A/E. His initial responsibilities included the development and presentation of Quality Assurance training programs. He specialized in the requirements of ASME III Division I, Industry Auditing Standards and Regulatory Guides, as they relate to nuclear power plant construction.

Mr. DiDonato was subsequently promoted to the position of Engineer in the Quality Assurance Auditing Division. In that capacity, he was responsbile for the preparation and conduct of headquarters, site and sub-contractor quality assurance audits during pre-construction and construction phases of all active nuclear power plant projects. Mr. DiDonato was subsequently promoted to the positions of Quality Assurance Engineer and Lead Auditor. In the latter capacity, he assumed the responsibilities of a lead auditor for audits conducted in accordance with ANSI N45.2.23.

PAUL D. DIDONATO
(continued)

Mr. DiDonato's additional responsibilities included the coordination of all audit activities performed at the Shoreham Nuclear Power Station, annual trend analysis of quality activities, preparation/revision of audit procedures, and conduct of seminars for the purpose of auditor certification.

ROBERT W. HESS

EDUCATION:

B.S., Engineering, University of Maryland

Graduate course work in Engineering Administration, George Washington University

Basic Project Management Course, American Management Association

Air Conditioning and Refrigeration, Brevard Junior College,

Cryogenics, Genesy's Extension of University of Florida

PROFESSIONAL REGISTRATION:

Professional Engineer, Mechanical, State of California

PROFESSIONAL AFFILIATIONS:

Member, American Nuclear Society

Member, American Institute of Aeronautics and Astronautics

PROFESSIONAL EXPERIENCE:

Mr. Hess has more than 17 years of experience in engineering and management. He is currently assigned as Engineering Manager-Systems Engineering. In this capacity he is responsible for the supervision of multiple discipline groups including electrical, instrumentation and control, and mechanical, in the performance of systems analysis and design, systems modification, computer applications, and regulatory compliance projects.

Formerly associated with NUS as General Manager of its Western Engineering Office, he was responsible for the management, direction and staffing requirements of all engineering and design projects. In an earlier position as Manager, Plant Engineering with this firm, his duties included technical direction and administrative activities associated with process development and system design of modifications to nuclear and fossil fueled generating facilities. This included supervision of site investigations to determine system design requirements based on plant operations and site-specific constraints, technical approval of conceptual and detail design and management of assigned discipline engineers and designers to meet schedule and budget requirements.

As Project Engineer for the design of large waste treatment facilities for two fossil generating facilities, Mr. Hess was responsible for directing and sequencing project tasks to accomplish the workscope within budget and schedule and maintaining formal communications with the client. This assignment required close coordination of design, procurement and construction follow-up efforts of process, mechanical, electrical, I&C, and civil/structural engineers.

Other assignments with this firm included responsibilites for conceptual and detail design of make-up water and wastewater treatment systems for both nuclear and fossil power plants. Mr. Hess supervised engineers and designers in performance of discipline work scope within schedule and budget constraints; established system design criteria and coordinated inputs with other disciplines; prepared and supervised preparation of equipment specifications, construction bid packages, proposal bid evaluations, P&ID's, equipment and piping layout drawings and engineering manhour estimates. Various other project experience includes engineering design and analysis of radioactive waste treatment systems for nuclear power plants, design and review of RCP oil enclosure systems, fossil plant fire water system modifications, and addition of fire suppression systems to cable spreading rooms. While assigned to a core spray system modification project, he coordinated field engineering efforts and client inputs during analysis and modification design, in addition to being responsible for preparation of specifications and drawings and construction work packages for installation of mechanical modifications. Also prepared conceptual mechanical designs and weight analyses of shippings casks for solid waste generated by nuclear fuel reprocessing plant (concepts included both rail and truck-mounted casks for high- and low-level wastes).

Newport News Shipbuilding - Was responsible for design and review of various fluid systems required for operation and support of naval nuclear power plant. Participated in formulation and composition of technical documents detailing and justifying system design characteristics, operating principles and maintenance requirements for primary shield water, reactor plant air and evacuation and nitrogen purge systems.

Grumman Aerospace Corporation - As Lead Systems Engineer, was responsible for systems checkout and launch operations on Lunar Module Propulsion Subsystems. Position required consideration of such items as test scheduling, manpower planning, review and approval of test procedures and direct supervision of engineers and technicians during pre-launch and launch operations.

As Systems Engineer, prepared and performed test procedures for fluid systems checkout. Directed troubleshooting and repair of ground support and flight equipment. Participated in development and site start-up of high pressure gas and cryogenic loading equipment.

LENNOX D. BARNES

EDUCATION:

M.S., Nuclear Engineering, University of California, Berkeley, CA

B.S., Mechanical Engineering, University of New Hampshire

PROFESSIONAL REGISTRATION:

Registered Professional Engineer, Massachusetts

Registered Professional Engineer, California

Registered Professional Engineer, New York

NRC Senior BWR Operator's License

PROFESSIONAL AFFILIATIONS:

Member, American Society of Mechanical Engineers

PROFESSIONAL EXPERIENCE:

Mr. Barnes has over fifteen years experience in the nuclear industry, including all levels of responsibility for plant engineering, design, licensing, start-up and plant operation.

He is currently the Manager of the Systems Engineering Division in the Boston office of Cygna, responsible for all engineering activities associated with the electrical, mechanical, nuclear, and instrumentation and control disciplines. Concurrently, Mr. Barnes acts as Project Manager on various projects within his division. In this capacity, he is directly responsible for manpower planning, technical direction, project execution, fiscal performance, and serves as the management representative to the client.

Prior to joining Cygna, Mr. Barnes was the Assistant Chief Engineer of the Engineering Assurance Division of Stone & Webster Engineering Corporation. In this position he directed the development and implementation of engineering quality standards which applied to all project activities.

In a previous assignment, Mr. Barnes served as Project Engineer for the James A. FitzPatrick Nuclear Power Plant. In this capacity he was directly responsible for the engineering design and licensing activities associated with retrofit packages. He was also responsible for maintaining liaison with the client.

His experience also includes assignments with the General Electric Company in their Nuclear Energy Division. He has supervised the construction, start-up testing, and initial

LENNOX D. BARNES
(continued)

operation of BWR reactors including the Peachbottom Nuclear Power Plant. At the Dresden Nuclear Power Station Unit 2, he was assigned as Shift Supervisor, responsible for monitoring all activities during a refueling outage. Other responsibilities included fuel loading, CRD replacement, field design changes, and operational testing.

Prior to his General Electric employment, Mr. Barnes spent six years in the U.S. Navy Submarine Program.

JOHN P. BONNER

EDUCATION:

B.S., Electrical Engineering, Northeastern University, Boston, MA

PROFESSIONAL REGISTRATION:

Professional Engineer, Massachusetts

PROFESSIONAL EXPERIENCE:

Mr. Bonner has over ten years of experience in electrical engineering design for nuclear and non-nuclear power plants. He is currently a Supervising Electrical Engineer with Cygna, responsible for the analysis, design, and specification of electrical systems. He also serves as an Electrical Systems Specialist, to assure compliance with all applicable requirements of industry codes and standards such as IEEE, ANSI, NEC, and NEMA.

Mr. Bonner is currently providing detailed designs for modifications required to comply with Appendix R modifications on Nine Mile Point I including development of new logic systems for the Automatic Depressurization System (ADS). He is also developing a conceptual design for the low-low-set fix to the pressure-relief system to protect gainst SRV loads and cold-shutdown repair procedures needed for Appendix R. This includes diagnostics of system damage as a result of fire and detailed procedures for repairs that are needed to put plant in safe cold-shutdown state. He is also providing consulting services for environmental qualification and seismic qualification of control systems associated with the ADS and low-low-set modifications.

Earlier, he was part of the task force which developed the Appendix R response for Niagara Mohawk Power Corporation's Nine Mile Point - Unit 1. The effort included the analysis of fire zones, fire suppression and detection systems, associated circuits, and breaker coordination to determine the plant's capability to safely shutdown under various postulated fires.

Prior to joining Cygna, Mr. Bonner was employed by Stone and Webster Engineering Corporation as Principal Electrical Engineer for all VEPCO projects. In this capacity he was responsible for the coordination of all electrical activities in support of design change packages for station modifications at Surry Power Station Units 1 & 2. Those modifications included the implementation of Appendix R requirements, the replacement and upgrading of electrical equipment due to an environmental qualification review; addition and modification of plant safety and post-accident monitoring systems, and engineering of the plant emergency power degraded voltage modifications.

For Unit 2 of the North Anna Nuclear Power Station, Mr. Bonner coordinated the review of electrical equipment environmental qualification per NRC NUREG-0588 and IE

Bulletin 79-01(B). He also provided technical support at the NRC pre-full power license audit of Unit 2. A full power license was issued upon satisfactory completion of the audit.

While assigned to Millstone 3 for the Northeast Utilities Service Company, Mr. Bonner was responsible for the design supervision of raceway, wiring and cable scheduling, and manpower estimating. He also recommended a means by which a reduction of 50% of the isolation relays could be made, and still maintain the requirements of NRC Regulatory Guide 1.75 in the area of associated circuits.

Other duties at Stone and Webster included developing specifications, bid evaluations, and calculations for power systems analysis.

R. KENNETH DEREMER

EDUCATION:

Ph.D., Mechanical Engineering, University of Pittsburgh

M.S., Mechanical Engineering, Carnegie Institute of Technology

B.S., Mechanical Engineering, Carnegie Institute of Technology

PROFESSIONAL REGISTRATION:

Professional Engineer (Nuclear), California

PROFESSIONAL AFFILIATIONS:

Member, American Society of Mechanical Engineers

PROFESSIONAL EXPERIENCE:

Dr. Deremer has over 24 years of experience in a broad spectrum of nuclear engineering activities including probabilistic risk assessment, reactor safety, reactor kinetics and nuclear analysis.

Dr. Deremer is presently an Associate at Cygna, responsible for the management of Probabilistic Risk Analysis Studies and Safety Analysis.

Prior to joining Cygna, Dr. Deremer was a Staff Engineer with General Atomic Company. In his most recent position, he participated in the systems analysis functions of two BWR probabilistic risk assessment studies and was responsbile for the development of LWR consequence analysis capability. Dr. Deremer participated in the development of a risk assessment methodology for evaluating the proliferation resistance of various nuclear fuel cycles and provided analytical support to the AIPA study. He also directed the efforts of a nine-person group responsible for the development and application of computer programs used for calculating primary coolant response and containment atmosphere response to various accidents and the analysis of radiological impact from various accidents. He has been an instructor in PRA seminars.

As an engineer at the Bettis Atomic Power Laboratory, Dr. Deremer was responsible for the safety and environmental assessment of LWBR fuel manufacturing activities. He also served as the leader of BAPL's Emergency Environmental Monitoring Team. He has performed reactor kinetics and safeguards studies as well as nuclear analysis for the LWBR. Dr. Deremer performed analog studies of reactor stability in large reactors and thermal-hydraulic design of fuel assemblies. He also performed detailed analyses of naval reactor power plant safety studies such as water hammer and loss of flow events.

DAVID A. FERG

EDUCATION:

Ph.D., Nuclear Engineering (Electrical Engineering Minor), University of Arizona

B.S., Electrical Engineering, Valparaiso University

PROFESSIONAL LICENSES:

SRO License, Westinghouse Nuclear Training Reactor

PROFESSIONAL ACTIVITIES:

Member, Tau Beta Pi Honorary Engineering Society

PROFESSIONAL EXPERIENCE:

Dr. Ferg has over 11 years experience in the nuclear power industry. As a Project Manager with Cygna, he is responsible for planning and scheduling, budgeting and manning of those projects under his control. Dr. Ferg recently completed an assignment on a Public Service Indiana self-initiated INPO evaluation of Marble Hill and serves as Project Manager for engineering work underway with Commonwealth Edison. He also acted as the Project Manager for the Independent Design Review of Fermi 2.

Prior to joining Cygna, Dr. Ferg spent nine years with Westinghouse Electric Corporation in positions of increasing responsibility. His last position with Westinghouse was Manager of Computer Systems at the Nuclear Training Center (NTC) in Zion, Illinois. In this position, his responsibilities included the development and upgrading of the Zion and SNUPPS I plant simulator systems, management and development of a third simulator system, and development of a computer-aided project monitoring system. While at the WNTC, Dr. Ferg assisted in the development of course material and training aids and presentation of this material to various classes.

Prior to his assignment at the WNTC, Dr. Ferg was a Senior Project Engineer at the Comanche Peak Steam Electric Station. His responsibilities included the technical interface and licensing coordination between the Utility, the A/E, the NSSS Supplier and the Constructor. He was also involved in the initiation of a program for the environmental qualification of electrical equipment at Comanche Peak.

During his employment at Westinghouse, Dr. Ferg assisted in the preparation of testimony for ASLB hearings on Beaver Valley, Prairie Island, Catawba, and Jamesport. He also participated in a task force established to show compliance with the August 1973 Appendix K Acceptance Criteria for Emergency Core Cooling Systems.

DAVID A. FERG
(continued)

Dr. Ferg was an original member of Westinghouse's Campus America program which involved numerous public debates, interviews and speeches. In June/July 1979, he testified before the President's Commission in Manila, Philippines on the safety implications of the TMI accident on the Napot Point Nuclear Plant.

SCHOLARSHIPS AND AWARDS:

National Science Foundation Traineeship, University of Arizona, 1965-66, 1966-67, 1967-68, 1968-69

A. Sturm and Sons Memorial Scholarship, Valparaiso University, 1963-64, 1964-65

CHUAN LIU

EDUCATION:

M.S., Civil Engineering, San Jose State University

B.S., Civil Engineering, Chung-Yuan College, Taipei, Taiwan

PROFESSIONAL REGISTRATION:

Registered Civil Engineer, California

PROFESSIONAL EXPERIENCE:

Mr. Liu has over ten years of engineering experience, half of which has been directly related to the nuclear power industry. Mr. Liu has been responsible for the seismic evaluation and rehabilitation of nuclear power plant structures. He has acted as a pipe support group leader responsible for hanger design and review, and he has been a field taskforce team supervisor, responsible for analyzing structural problems encountered at job sites. In addition, Mr. Liu acted as Pipe Support Review Group Leader for the Independent Design Reviews for Mississippi Power and Light Company and Detroit Edison Company.

Some of the projects in which Mr. Liu has been involved have included:

- Grand Gulf Nuclear Power Plant
- Palo Verde Nuclear Power Plant
- Diablo Canyon Nuclear Power Plant
- Vermont Yankee Power Plant
- La Salle Nuclear Power Plant
- Arkansas Nuclear Power Plant
- Peach Bottom Nuclear Power Plant
- Limerick Nuclear Power Plant

Prior to joining Cygna Mr. Liu worked for several consulting firms. During these engagements his experience included structural analysis of highrise structures, masonry and precast concrete and wood structures, dynamic analysis of power plant systems and buildings and structural design of sewage treatment plants.

A. PATRICK McCARTHY

EDUCATION:

B.S., Marine Engineering, Maine Maritime Academy

PROFESSIONAL LICENSE:

3rd Assistant Engineer, Issued by U.S. Coast Guard

PROFESSIONAL AFFILIATIONS:

Senior Member, Instrument Society of America

Member, ISA SP67.10 Committee, Sample Line Piping and Tubing Standards for Use in Nuclear Power Plants

PROFESSIONAL EXPERIENCE:

Mr. McCarthy has over fourteen years of experience including engineering, design, licensing, and operation of power plants. Mr. McCarthy is the Supervisor of Instrumentation and Controls and a Project Manager in our Boston office.

While with Cygna, Mr. McCarthy has been assigned as Project Manager of an Appendix R Fire Hazards Evaluation for a Radwaste Incineration System and the seismic qualification of a series of vacuum pumps to be used in processing uranium fuel.

Prior to joining Cygna, Mr. McCarthy was employed by a major East coast architect/engineer for seven years, and held positions of increasing responsibility within the Controls System Division. His last assignment was as the Lead Control Engineer on the Millstone 3 Project, an 1150 MWe PWR currently under construction for Northeast Utilities. As a Lead Control Engineer, Mr. McCarthy, with his staff of principal and support engineers, was responsible for all aspects of engineering, design, procurement, licensing, and field construction support activities relating to instrumentation and controls for the project.

During this time, Mr. McCarthy also held the positions of both Principal and Support Instrumentation Applications Engineer, on the Shoreham Nuclear Project, an 820 MWe BWR, currently under construction for the Long Island Lighting Company.

As both of the above plants were under construction, the area of equipment qualification was continuously changing due to revisions in NRC guidelines. As a result, much time was spent working with vendors to qualify their equipment to plant specific environmental and seismic profiles.

In addition, he held the position as Controls Systems Division Specialist for safety and relief valves and installation of instrumentation and tubing on a company-wide basis.

Prior to Mr. McCarthy's employment with the architect/ engineering company, he worked for an industrial equipment engineering firm. Mr. McCarthy was employed by the Crosby Valve and Gage Company. Mr. McCarthy was initially hired as a Field Service Engineer and ultimately attained the position of Project Engineer and as a Field Service Engineer, Mr. McCarthy was responsible for all phases of safety and relief valve design, fabrication, test, and installation including the assurance of compliance to the ASME Boiler and Pressure Vessel Code - Section III and other applicable codes, the resolution of fabrication problems, the specification of appropriate non-destructive testing, research and development of new product lines, and trouble-shooting of field-related problems.

Prior to the above, Mr. McCarthy sailed for Grace Lines as a Third and Second Assistance Engineer.

JOHN C. MINICHIELLO

EDUCATION:

M.S., Applied Mechanics, Harvard University, Cambridge, MA

B.S., Mechanical Engineering, Tufts University, Boston, MA

PROFESSIONAL REGISTRATION:

Professional Engineer, Mechanical, Massachussetts and California

PROFESSIONAL AFFILIATIONS:

Member, American Society of Mechanical Engineers

Member, Tau Beta Pi Engineering Society

PROFESSIONAL EXPERIENCE:

Mr. Minichiello is assigned as a Division Manager at Cygna. He has over 12 years of experience in the nuclear industry and particularly, in stress analysis projects. His responsibilities include technical direction for assigned projects as well as the management of established project budgets and schedules.

Prior to joining Cygna, Mr. Minichiello was employed by a major architect/engineer as Stress Analysis Group Manager. His responsibilities in this capacity encompassed the overall direction of all mechanical analysis and design activities for the company's nuclear and fossil projects. Analysis activities included a full range of piping analyses as well as pressure vessel analysis.

In addition, Mr. Minichiello has held increasingly responsible positions with major consulting firms in the nuclear industry. Principal duties and responsibilities have included:

As a group leader of the component analysis section with a consulting firm in the nuclear industry, he was responsible for proposal generation, direction and completion of the analysis (thermal, stress, and dynamic) of components in accordance with ASME, ANSI, and AISC codes. Projects included direction of the analysis of a fuel pool skimmer tank for dynamic loading, the dynamic analysis of a vacuum analysis of heat exchangers. He was also responsible for technical direction for a team of 25 engineers performing the piping analysis of 200 sub-systems for the Wm. H. Zimmer Nuclear Station.

He developed a draft plan for computer aided non-linear analysis to determine operability of vacuum relief valves during the "chugging" event in BWR's. Mr. Minichiello also generated proposals for linear and non-linear (gapping) analysis of heat

exchanger component parts. His past work also includes dynamic analysis of high radiation sampling systems (panels and piping), fracture analysis of pipe welds, and analysis of various pressure vessels.

As Senior Engineer, he was responsible for the piping analysis for safety-related piping systems for the McGuire Nuclear Station. This effort involved not only the dynamic seismic evaluations required for all ASME code class piping, but also the thermal transient fatigue analysis required for ASME Class I systems. Duties included the re-routing of systems and/or resupporting to accomodate the imposed loadings within code allowables and the identification of postulated break locations per MEB 3-1 criteria for design of pipe whip and jet restraints. The above analysis efforts required and extensive use of finite element techniques and specifically in the use of the Code SUPERPIPE.

Mr. Minichiello's previous industry experience includes thermal and structural analysis of nuclear systems and components using finite element codes such as ANSYS, STARDYNE and PIPESD. These analysis included such evaluations as the dynamic response of the auxiliary cooling piping for a reactor coolant pump test loop, the dynamic response of centrifugal chiller assemblies, the dynamic response of high density spent fuel racks and the high temperature response of spect fuel shipping casks. He has performed complete stress and thermal analysis of the LOFT reactor vessel, including comparison on results to ASME code allowables and generation of the final stress report, and was responsible for the computer code generation used to pre- and post-process finite element stress output to aid in the evaluation of ASME code requirements.

As a stress engineer, Mr. Minichiello performed thermal and stress analysis of a Navy purification filter using finite-difference and shell computer codes. He performed the stress analysis of electrical plug plates per ASME Class III criteria.

Prior to his work in the consulting engineering field, he was employed by a major designer and manufacturer of missile systems. As a design engineer he was in charge of fabrication of prototype analog-digital computer interface device. Was designer engineer for components of control board for missile tracking systems.

JAMES P. TONER

EDUCATION:

B.S., Marine and Electrical Engineering, Massachusetts Maritime Academy, Buzzards Bay, MA

Quality Assurance Management, Northeastern University, Boston, MA

PROFESSIONAL REGISTRATION:

Registered Quality Engineer, California

Registered Mechanical Engineer, Massachusetts

Third Engineers License, Steam and Diesel, U.S. Coast Guard

PROFESSIONAL AFFILIATIONS:

Senior Member, American Society for Quality Control

Member, American Society for Nondestructive Testing

PROFESSIONAL EXPERIENCE:

Mr. Toner has had approximately 20 years of extensive experience in quality assurance production engineering, cost and estimating, and construction management aspects of nuclear and conventional marine and commercial power plant construction.

Recently Mr. Toner practiced as a private quality assurance consultant. Previous to that he had been the Chief Engineer of the Cost and Auditing Division of the Quality Assurance Department of Stone & Webster where he was responsible for the establishment and administration of the system for internal auditing of site construction activities and quality assurance operations.

Prior to joining Stone & Webster in 1972, he was associated with the Quincy Shipbuilding Divison of both the General Dynamics Corporation and Bethlehem Steel Corporation in a variety of increasingly responsible management positions. As Engineering Manager (MARAD Project), he was responsible for the development and marketing of four R&D projects related to coatings application.

Other assignments included management of the pipe fabrication shop and five years in the Nuclear Quality Control Department, rising from the position of engineer at the time of department formation through various assignments to Chief of Nuclear Quality control. The Quincy shipbuilding Divison activities were associated with the design and construction of nuclear and conventionally powered ocean going vessels.

ERIC VAN STIJGEREN

EDUCATION:

B.S., Mechanical Engineering, San Jose State University, CA

PROFESSIONAL REGISTRATION:

Registered Mechanical Engineer, State of California

PROFESSIONAL AFFILIATIONS:

Member, American Society of Mechanical Engineers

Member, American Nuclear Society

PROFESSIONAL EXPERIENCE:

Mr. van Stijgeren has ten years of experience in the design, analysis and installation of piping systems and mechanical equipment for nuclear and fossil power plants.

At Cygna, Mr. van Stijgeren has held several senior management positions. He is currently Project Manager of the Systematic Evaluation Program (SEP) work on Yankee Rowe, having full responsibility for technical, administrative, schedular and budgetary aspects of the project. In addition, Mr. van Stijgeren has been actively involved in the developmental execution of Cygna's pipe stress and pipe support training programs for utility clients.

Prior to joining Cygna, Mr. van Stijgeren held engineering/management positions with a major architect/engineer. His experience on several nuclear and fossil power projects included staff and project supervisory positions. Staff responsibilities consisted of establishing personnel policies for an engineering discipline, providing the projects with manpower and technical standards, monitoring the engineering effort performed on the projects, and coordinating the training and professional development of all engineers in the discipline. Project responsibilities on a two- unit BWR nuclear power plant consisted of coordinating and interfacing with construction and project engineering groups, monitoring manhour budgets and engineering schedules, assuring quality of the project engineering and design effort, issuing purchase specifications for equipment, and participating in client and project management review meetings.

Although Mr. van Stijgeren's expertise is in piping and mechanical engineering, he has had significant involvement in related engineering activities such as quality assurance, civil/structural and planning and scheduling.

ERIC VAN STIJGEREN
(continued)

During his career, Mr. van Stijgeren has participated in numerous audits of projects, area offices and construction sites. In addition to his design engineering experience, Mr. van Stijgeren has spent a considerable amount of time at various job sites assisting field personnel with construction problems and start-up test programs.

LEE J. WEINGART

EDUCATION:

B.S., Engineering, San Francisco State University, San Francisco, CA

Undergraduate studies, Mechanical Engineering, Drexel University, Philadelphia, PA

Undergraduate studies, Communications, Temple University, Philadelphia, PA

PROFESSIONAL REGISTRATION:

Registered Mechanical Engineer, California

PROFESSIONAL AFFILIATIONS:

Associate Member, American Society of Mechanical Engineers

PROFESSIONAL EXPERIENCE:

Mr. Weingart has over ten years of experience with particular emphasis in the analysis of piping systems and pipe support structures. He is presently assigned as a Senior Engineer in our San Francisco office responsible for a broad range of engineering activities in the Piping Division. He has acted as a Project Engineer for the Reactor Experiment Project as well as Pipe Stress Group leader in Susquehanna Wetwell Piping, Pilgrim, and Yankee Rowe Projects. In addition, Mr. Weingart acted as Project Engineer and Piping Analysis Review Group Leader for the Independent Design Review for Mississippi Power and Light Company. He also acted as Piping Analysis Review Group Leader for the Independent Design Verification for Detroit Edison Company.

Formerly employed as a Senior Engineer by a West coast consulting engineering firm. Mr. Weingart was instrumental in computerizing standard calculations, modeling, and analysis. He created FORTRAN programs to facilitate use of the SAGS program for computer modeling of pipe support structures, and performed static and nonlinear analysis of baseplates using STARDYNE.

As a Structural Analyst for a computer services and consulting firm specializing in structural engineering, Mr. Weingart was actively involved in customer support services in structural applications using ANSYS, EAC/EASE2, NASTRAN, SDRC/SAGS, STARDYNE and STRUDL, and in piping applications using DIS/ADLPIPE, NUPIPE and PIPESD. The capabilities of these finite element programs include linear and nonlinear static, dynamic, and heat transfer analyses of structures and piping systems. Mr. Weingart also served as the primary West coast analyst for piping graphics applications, in addition to organizing and participating (instructor) in training seminars for customers.

LEE J. WEINGART
(continued)

Prior to the above, Mr. Weingart served as an Engineer for a major west coast architect/ engineer where as part of an overall Equipment Qualification effort, he located and sized the instrumentation required to verify dynamic transient analyses which he performed (using available computer programs such as STARDYNE and ANSYS) for both nuclear and fossil fuel power plant piping systems to determine restraint sizes and locations, and to assure system acceptability within code limits (ASME B&PV Section III and B31.1). He also performed thermal flexibility, weight and seismic calculations for both small and large piping. He was also responsible for training new employees in analysis objectives and techniques, and coordinated their activities.

NANCY H. WILLIAMS

EDUCATION:

B.S., Civil Engineering, Carnegie-Mellon University, Pittsburgh, PA

Boiling Water Reactor Course, General Electric BWR Training Center

Finite Element Methods and Application, Ohio State University, Columbus, OH

Management Courses, Harvard University, Extension Program, Cambridge, MA

PROFESSIONAL EXPERIENCE:

Ms. Williams has extensive experience in the management of nuclear power facility retrofit programs. In this capacity she has been responsible for the planning, coordination, and timely implementation of all project phases from conceptual engineering to documentation of modifications. She has provided expert testimony on the management of major modification projects during the Pilgrim Station Unit I Utilities Commission hearings. As a project manager at Cygna she is responsible for the timely, accurate, and cost effective completion of projects. Prior to joining Cygna, Ms. Williams held increasingly responsible positions with Boston Edison Company including:

Project Manager of Pilgrim Nuclear Power Station's Equipment Qualification Program. Developed and input to a Project 2 seven year program to qualify all safety related equipment for design basis events such as high energy line breaks, LOCA and earthquakes. Initiated the project organization, manual, and priorities necessary to comply with existing and future regulations.

Manager of several projects involving the seismic analysis of all category I piping systems, pipe supports, base plates and building steel for an operating nuclear plant.

Responsibilities including: the development and implementation of comprehensive technical, schedule, and cost plans, the assignment of tasks; the development of cost and manhour estimates for each task; the procurement of resources; the interpretation of regulatory requirements; the development of data control systems to process project information; contract administration; cost and schedule reporting; coordination of construction, engineering, operations, licensing, purchasing, and quality assurance groups; refueling outage planning for implementation.

Project Engineer responsible for the content and coordination of technical activities of a multi-milion dollar structural evaluation project. Formulated entire evaluation program consisting of selection of acceptance criteria, analytical methodology, and determintion of loading data through the use of building seismic and pressure flow modeis. Elected member of Owner's Group committee of the development of a new masonry wall structural analysis criteria. Developed procedures for the collection of field data necessary for the structural analysis. Organized and coordinated field survey teams. Provided final technical review of project activities for compliance with codes, standards, and regulatory requirements.

Lead engineer responsible for the design and implementation of a sanitary disposal system including: two pumping stations, gravity and forced main piping layout, and leaching field. Functioned as the field engineer for the construction of:

(1) $300,000 sanitary system
(2) $1,000,000 training/office building

Structural and civil engineering functions including: seismic analysis of structures using computer codes such as ANSYS, STRUDL, and STARDYNE; seismic and thermal analysis of piping systems and pipe supports; computer program development for data reduction, information management, pipe support base plate analysis; providing construction/engineering interface for field modifications; review and approved of engineering specifications. Responsible for noise data acquisition system located on site boundaries near residential zones. Developed a computer program and user's manual to statistically analyze noise level data and assess its impact on the community. Wrote and documented a computer program currently used to analyze meteorological data including the calculation of atmospheric stabiity factors and the output of joint wind frequency distribution tables.

Ms. Williams was employed by Stone & Webster Engineering Corporation where she designed pipe supports, and resolved interferences between plant layout, piping layout and support design on Millstone Unit 3.

As a structural engineer for General Dynamics, Inc. Electric Boat division she was responsible for the construction of various tanks and foundations in the reactor compartment and engine room of the Trident Class Submarines. Provided direction for the trades and engineering resolutions for construction problems. Selected to work on the development of a construction planning program for the reactor compartment of the 688 Class Submarines.

PUBLICATIONS:

"Operational Analysis: An Approach to safety and Planning," International Meeting on Thermal Nuclear Reactor Safety, ANS/ENS, August 29 - September 2, 1982.