TELEDYNE
ENGINEERING SERVICES

TECHNICAL PROPOSAL

PR-5792 TO COMMONWEALTH EDISON COMPANY

PROGRAM PLAN - INDEPENDENT DESIGN REVIEW
LA SALLE COUNTY NUCLEAR STATION

BOOK 1 OF 2

FEBRUARY 5, 1982

COMMONWEALTH EDISON COMPANY
P. O. BOX 767
CHICAGO, ILLINOIS 60690

TECHNICAL PROPOSAL PR-5792

PROGRAM PLAN - INDEPENDENT DESIGN REVIEW
LA SALLE COUNTY NUCLEAR STATION

BOOK 1 OF 2

FEBRUARY 5, 1982

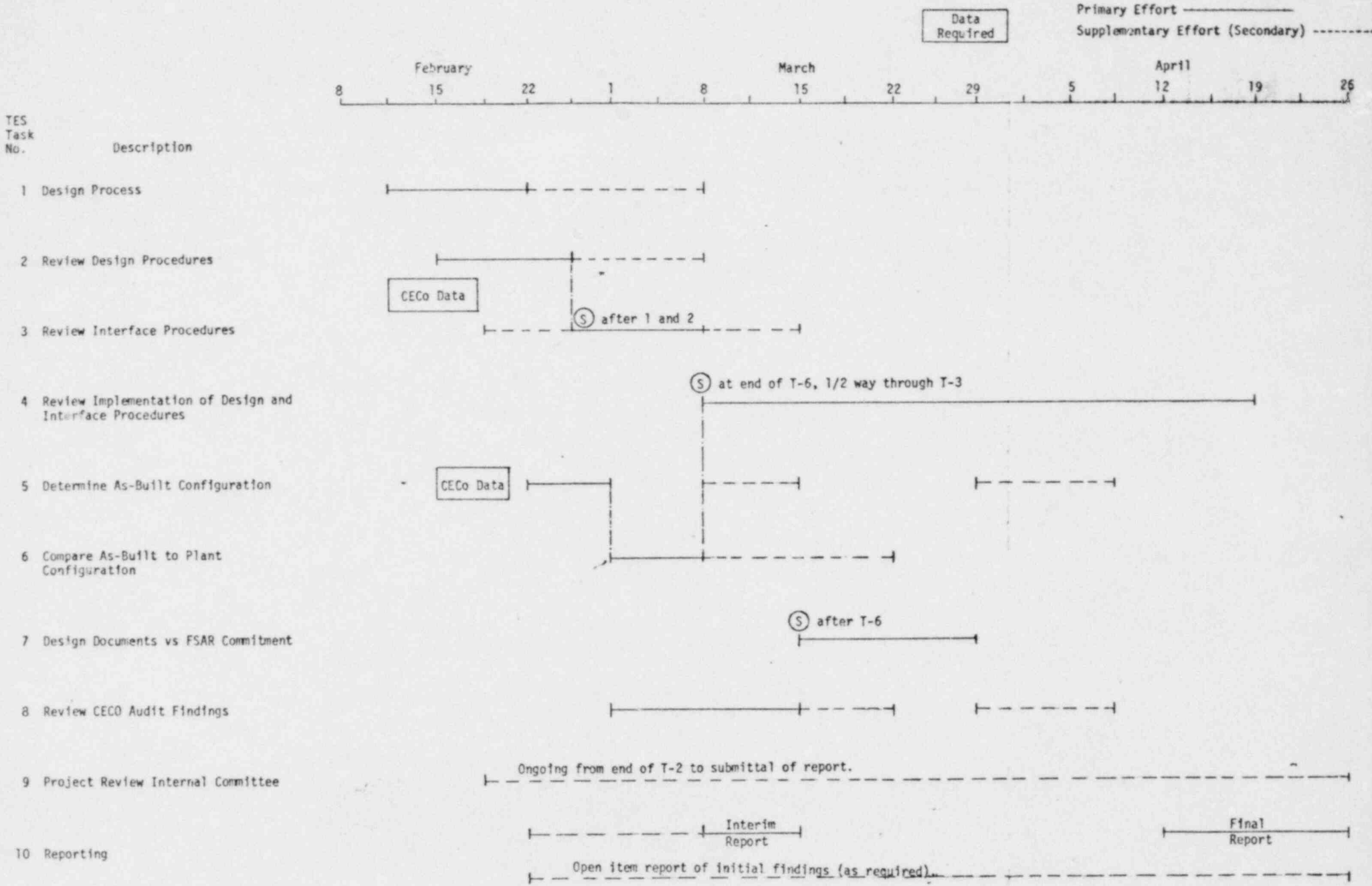
TELEDYNE ENGINEERING SERVICES

130 SECOND AVENUE
WALTHAM, MASSACHUSETTS 02254
617-890-3350

NRC Request

1. System Classification
2. Adequacy of Design Bases, Interface, FSAR Compliance
3. Review As-Built Versus Documents
4. Review Nonconformances
5. Review CAR
6. CECO Audit Findings
7. FCR, ECN Control
8. As-Built Comparison
9. Visual Inspection - Walkdown
10. FCR Versus Records

TES Task No.	Description	NRC Requests
1	Design Process	1, (2), 4
2	Review Design Procedures	(2), 4, 7
3	Review Interface Procedures	(2)
4	Review Implementation of Design and Interface Procedures	2, (7)
5	Determine As-Built Configuration	3, (9)
6	Compare As-Built to Plant Configuration	3, (8), 9
7	Design Documents vs FSAR Commitment	1, (2)
8	Review CECO Audit Findings	4, 5, (6), 10
9	Project Review Internal Committee	-
10	Reporting	-


Data Required
Primary Effort
Supplementary Effort (Secondary)
February
March
April
8
15
22
1
8
15
22
29
5
12
19
26
TES Task No.
Description
1 Design Process
2 Review Design Procedures
CECo Data
3 Review Interface Procedures
S after 1 and 2
4 Review Implementation of Design and Interface Procedures
S at end of T-6, 1/2 way through T-3
5 Determine As-Built Configuration
CECo Data
6 Compare As-Built to Plant Configuration
7 Design Documents vs FSAR Commitment
S after T-6
8 Review CECO Audit Findings
9 Project Review Internal Committee
Ongoing from end of T-2 to submittal of report.
10 Reporting
Interim Report
Final Report
Open item report of initial findings (as required).

Technical Proposal
PR-5792

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(BOOK 1 OF 2)

Technical Proposal
PR-5792

1.0 INTRODUCTION

Commonwealth Edison (CECo) has been requested by the Nuclear Regulatory Commission (NRC) to obtain the services of an outside consultant to conduct an independent design review at the LaSalle County Nuclear Station, Unit 1. The design review is limited to the Residual Heat Removal system (RHR) in the Low Pressure Coolant Injection mode (LPCI) for Loop C excluding electrical, instrumentation and equipment operational aspects which will be verified during preoperational and start-up testing.

The portion of the RHR system subject to the independent design review is shown in Figure 1 which is taken from the P&ID for the RHR system at LaSalle (Sargent & Lundy Drawing Number M-96, Sheet 3 . The piping associated with the RHR Water Leg Pumps is included in this review as being representative of all small bore piping associated with this system.

Two organizations were involved in the design of the RHR system, Loop C, at LaSalle. These organizations are Sargent & Lundy (S&L) and Quadrex.

2.0 PROGRAM PLAN OUTLINE

2.1 General

The final result of this independent review is to determine the adequacy of the design process as it relates to an operating mode of a specific system. It is anticipated that this type of review would result in conclusions that are applicable to all work performed by the organizations subject to the review. In general, the reviewer will not perform any detailed analyses to arrive at conclusions. Review of existing analyses performed by the organizations involved will be sufficient and further, will provide better insight as to the design of other plant systems for which they were responsible. This does not preclude the reviewer from performing any calculations and analyses that are deemed necessary.

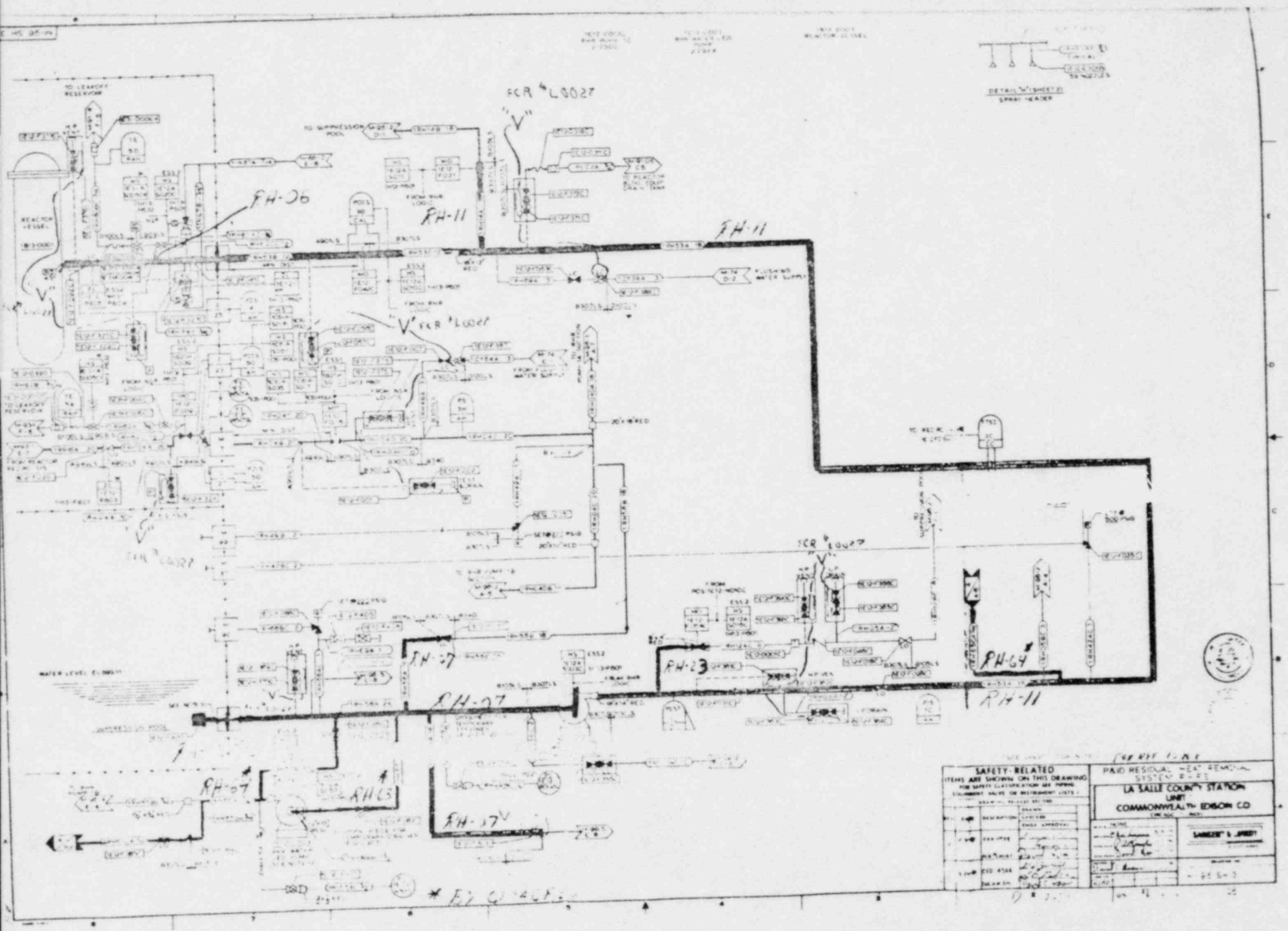

FCR "L0027
"V"
RH-26
RH-11
RH-11
"V" FCR "L0027
SCR "L0027
RH-23
RH-64
RH-11
RH-27
RH-27
RH-27
AHCS
RH-27V
SAFETY-RELATED
P&ID RESIDUAL HEAT REMOVAL
SYSTEM B-RH
LA SALLE COUNTY STATION
UNIT
COMMONWEALTH EDISON CO

EXHIBIT 1

The generation of dynamic spectra and the validation of computer programs utilized by the organizations involved is specifically excluded from review. The reviewer will accept dynamic spectra for the buildings involved as presented and will only assure that their application to the system is appropriate. It is assumed that any computer program used has already been subjected to proper validation and verification procedures.

2.2 Plan Outline

Essentially the reviewer will start with the final design package which is presented as being representative of the as-built system. From this point the reviewer will work back through the design process to the initial design assuming that interface control (internal and external) was applied.

changed to "assuring" JAF 2/11/82

The program is separated into 10 tasks as follows:

Task 1 - Design Process

Task 2 - Review Design Procedures

Task 3 - Review Interface Procedures

Task 4 - Review Implementation of Design and Interface Procedures

Task 5 - Determine As-Built Plant Configuration

Task 6 - Compare As-Built Documentation to Plant Configuration

Task 7 - Design Documents vs. FSAR Commitments

Task 8 - Review CECo Audit Findings

Task 9 - Project Review Internal Committee

Task 10 - Reporting

3.0 PROGRAM PLAN IMPLEMENTATION

3.1 General

The following sections discuss the detailed implementation of each task outlined in Section 2.0 above. It is anticipated that some tasks will proceed in parallel while implementation of others will be dependent on completion of associated tasks. Termino ogy is used in the following task descriptions that may not be particular to S&L and Quadrex. However, the intent is to define scope and method and terminology can be revised to suit the particular organizations involved.

3.2 Task 1 - Design Process and Control

The reviewer will meet with S&L to determine what process is used in taking design requirements and developing construction drawings. Further, the process of developing revisions to the design will be reviewed. Interfaces between internal organizations will be determined in following the process of:

a) specification of design requirements
b) development of preliminary design
c) piping analysis
d) support location and selection
e) support analysis
f) effect on building structure
g) equipment loading requirements
h) development of construction drawings
i) revisions to design

Interfaces between external organizations will be determined in following the process of:

a) transmittal of information to Quadrex
b) review of Quadrex procedures

c) review of Quadrex design
d) transmittal of Quadrex developed information to S&L organizations (i.e., loads on building structure, etc.)
e) dealing with Field Change Requests (FCR)
f) dealing with Engineering Change Notices (ECN)
g) dealing with nonconformance and associated corrective action.

Based on the results of this discussion a design process flow chart indicating interfaces and required design procedures will be developed.

3.3 Task 2 - Review Design Procedures

Procedures, instructions and methods associated with developing the design of the RHR system, Loop C will be made available to the reviewer. This will result in a list of procedures with associated descriptions which can be utilized with the results of Task 3 to develop a design process. The reviewer must become familiar with these procedures to assure that implementation was adhered to by the design organizations.

Since Quadrex was a subcontractor to S&L the compatibility of design procedures of both organizations will be determined. If different procedures, instructions and methods were used by each organization to perform a similar task (i.e., support design) the review must ascertain that the results are acceptable using either technique.

The design procedures will be further reviewed to determine if they are representative of the design criteria established in the FSAR. A detailed review of the Design Specification will be performed to determine its acceptability with respect to the FSAR, the Code and other design requirements.

3.4 Task 3 - Review Interface Procedures

Using the design process determined in Task 1 and design procedures obtained in Task 2 the required interface procedures or instructions to implement those procedures will be determined. A review will then be made to determine if these interface procedures or instructions are available. The reviewer will become familiar with the interface or control procedures to assure that implementation was adhered to in the design process. The interface procedures in conjunction with the design procedures of Task 2 will allow the reviewer to develop a design process for comparison with that obtained in Task 1.

3.5 Task 4 - Review Implementation of Design and Interface Procedures

A detail review of the analyses, design and construction drawings and reports will be performed to determine if established procedures were adhered to. Information requiring transmittal to others will be reviewed to determine whether interface procedures were followed and whether the information was properly interpreted and applied. This will be particularly important in relation to communication of design requirements and information between Quadrex and S&L.

All FCR's and ECN's applicable to Loop C of the RHR system will be reviewed to determine if they were implemented properly in the design process including transmittal of changes in loading to all affected design groups.

All nonconformances and resulting corrective actions applicable to Loop C of the RHR system will be reviewed to determine if they impacted design and were implemented properly in the design process.

3.6 Task 5 - Determine As-Built Plant Configuration

The reviewer will obtain the current data which represents the as-built plant configuration. Using this, a walkdown of the system will be made to develop a general feeling for the accuracy of the data. It is not intended that the reviewer perform a complete dimensional check of the system. However, dimensional checks of various portions of the system and some supports will be performed. Photographs, as deemed necessary, may be taken to provide documentation of significant areas or components of the system.

3.7 Task 6 - Compare As-Built Documentation to Plant Configuration

The reviewer will obtain from S&L or CECo the as-built documentation which is specified to be representative of the plant configuration. Having developed sufficient confidence in the data obtained in Task 5, the reviewer will make a comparison of documentation and plant configuration. Any differences which are in areas of the system not subjected to dimensional check in the field by the reviewer will need to be checked by the reviewer in detail at the site.

The as-built documentation obtained in this task is the information that will be used in the detail review outlined in Task 4. This package should represent revisions resulting from ECN's, FCR's and any applicable corrective action for nonconformances and therefore will allow the reviewer to follow the process of the design back to initiation.

3.8 Task 7 - Design Documents Vs. FSAR Commitments

The as-built documentation established in Task 6 will be used to determine if the FSAR commitments have been complied with. It is noted that a detailed review of the design specification will be performed in

Task 2 since that document forms the basis for the design approach. This review will be limited to FSAR requirements associated with the LPCI mode of operation which is a Level B service condition. The loads, load combinations and criteria will be taken from the design specification and the FSAR.

3.9 Task 8 - Review CECo Audit Findings

The reviewer will obtain CECo QA and technical audit findings related to design activities of S&L and Quadrex. The specific activities cited will be reviewed to determine if corrective action was taken and if CECo audit personnel assured that this happened.

3.10 Task 9 - Project Review Internal Committee

The reviewer will form an internal committee whose responsibility will be to review all potential findings of the project review team. This review will include the definition and accuracy of the finding and assess the impact of the potential finding on the overall design adequacy of Loop C of the RHR system.

Any potential findings determined to have an impact on design adequacy by the Project Review Internal Committee will be forwarded to the 10CFR Part 21 review committee for disposition in accordance with regulatory and company procedures.

Any potential findings that are not determined to have an impact on design adequacy will be returned to the project review team with accompanying discussion related to rejection by the committee. Should the individual reviewer or the project review team manager disagree with the review committee conclusions the potential finding may be forwarded to the 10CFR Part 21 review committee for disposition.

3.11 Task 10 - Reporting

The reviewer will provide reports to CECo on the following schedule:

Initial Status Report - March 15, 1982

Final Report - April 28, 1982

The initial status report will outline the progress to that date of the independent review and detail any findings which have been through the entire review process at that time.

The final report will contain all findings which have been processed in accordance with Task 9. ~~Only findings which impact design adequacy will be reported.~~ Observations and suggestions will be available in the reviewers records and can be forwarded at a later date if CECo wishes. JAF 2/10/82

The final report will also include details of the review process and summaries of each task.

3.12 Task Sequence

A number of the above tasks will be carried out simultaneously while others are dependent on each other. Further, the numbering of tasks does not indicate the order in which they will be performed. Based on current understanding, the following task sequence is established.

Task No.	Sequence No.
1	1
2	2
3	3
4	4
5	2

(Cont'd)	Task No.	Sequence No.
	6	3
	7	5
	8	4
	9	N/A
	10	6

Tasks 2 and 5, 3 and 6, and 4 and 8 can be carried out simultaneously but are dependent on completion of previous tasks (i.e., Tasks 2 and 5 cannot commence until Task 1 is completed).

4.0 PROJECT STAFFING

4.1 Project Review Team

The work outlined in this plan will be conducted under the general direction of Mr. Donald F. Landers, Senior Vice-President. The Project Manager for TES will be Mr. James A. Flaherty, Manager, Engineering Design and Testing. TES will provide staffing to this project as required to complete the effort outlined. The program as outlined will require the use of a number of senior level staff personnel to make the types of judgements required by this review. Further, the program will also require the use of some personnel familiar with documentation control and record retention as well as personnel with field experience to obtain as-built information. Current projections for the Project Review Team Senior Staffing are shown in Figure 4.1.

4.2 Project Review Internal Committee

This committee approach is currently used by TES for projects that involve state-of-the-art engineering. TES forms a committee in such cases composed of senior level personnel who have the necessary expertise to resolve technical issues presented by the particular project under

Project Manager

J. A. Flaherty

Tasks 1 thru 4	Task 5	Tasks 6 and 7	Task 8
G. A. Carpenter	R. H. Howard	R. M. Pace	J. A. Malonson
R. D. Hookway		R. D. Foti	
J. C. Tsacoyeanes			

Additional TES staff will be utilized as required.

Project Review Team Senior Staffing

Figure 4.1

review. In this case the committee will consist of three senior level engineers who together have a broad background in technical management, analysis, design, regulatory and Code criteria, and utility experience. Mr. Nicholas S. Celia, Manager, Projects will chair this committee. The organization is shown in Figure 4.2.

4.3 TES 10CFR Part 21 Committee

TES has a standing company policy with respect to Part 21 issues. This policy is implemented by the use of a Technical Engineering Procedure (TEP-1-004). Although the findings which appear in the final TES report may not be of a Part 21 nature we will use our Part 21 approach in establishing these findings. The two major reasons for this are:

(1) The independence of the TES Part 21 Committee

(2) The opportunity for a reviewer to appeal the Project Manager or the Project Review Internal Committee conclusions on his potential findings.

This standing committee is chaired by Mr. Ron Wray, Manager, Engineering Analysis. He has the authority to assemble a committee of his choosing based on the potential finding presented to him. In the case of this project he will be requested to review the plan presented here and establish this committee in the near future and to revise the current TEP with respect to the time allotted therein for his review. This will be done to expedite matters so that the April 28th date can be met. Since the findings being considered may not be Part 21 issues it is felt that this can be accomplished.

4.4 Overall TES Organization

The TES standard organization is shown in Figure 4.3 and the organization for this particular project is shown in Figure 4.4.

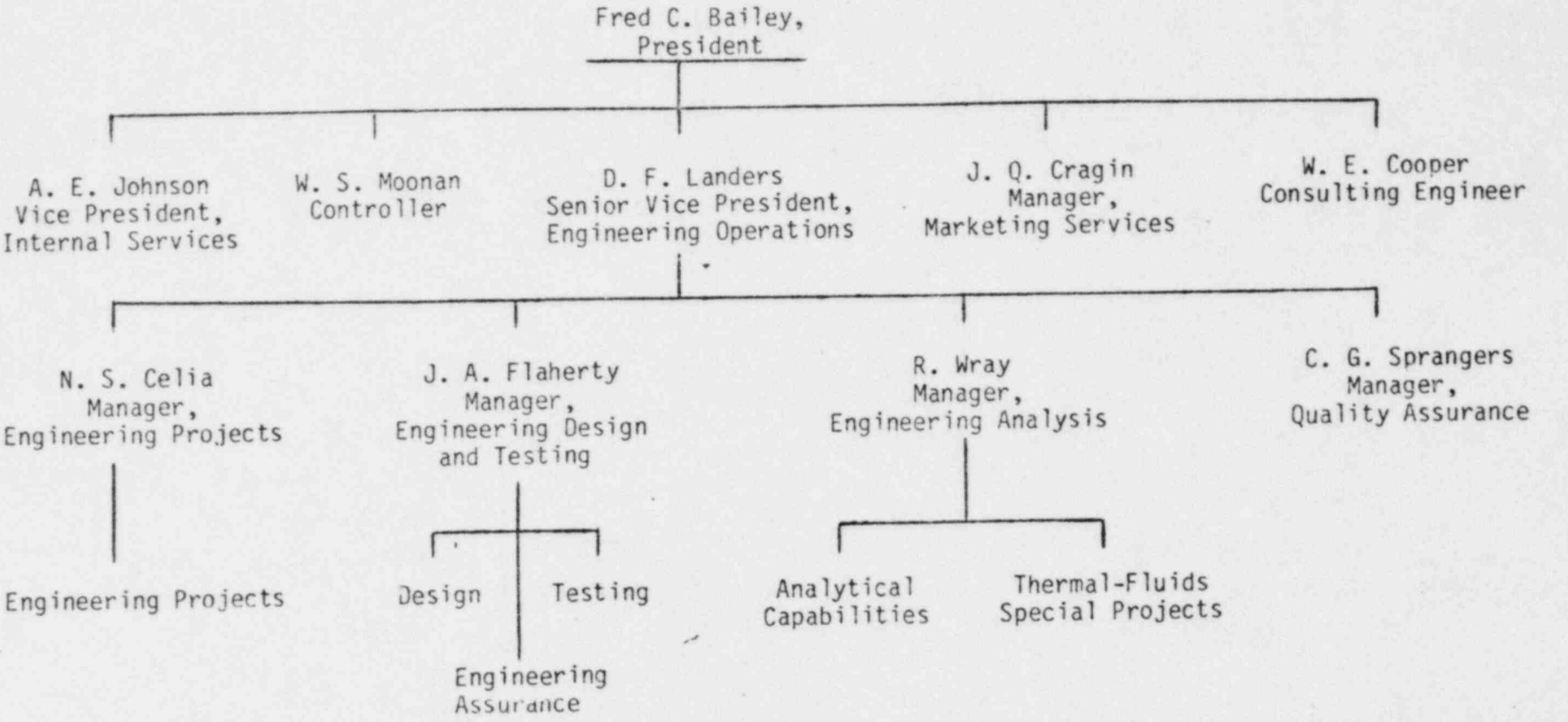
N. S. Celia - Chairman

J. W. Hanson

G. Moy

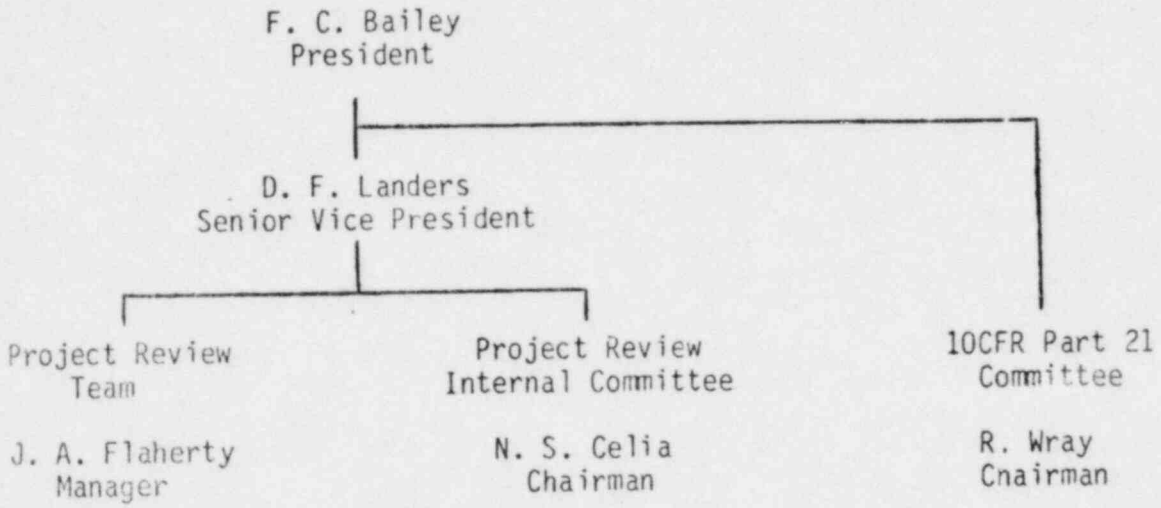
Project Review Internal Committee

Figure 4.2



TES Organization

Figure 4.3



LaSalle Project Organization

Figure 4.4

5.0 INDEPENDENCE

TES has not been under contract to CECo to peform any work associated with the LaSalle project. With respect to the design agents involved, TES has not been under contract to Quadrex in the past ten years and has had one contract with S&L in that time frame. The S&L contract was performed in 1980 and 1981 and included a management audit of the process used to perform analyses of piping systems. In the process of that audit, technical issues were discussed related to computer software and hardware used by S&L. The income to Teledyne, Inc. for the S&L contract amounted to 0.000105% of total sales for that year.

In order to qualify as an independent reviewer for the design verification program at LaSalle, all personnel assigned to the project will comply with the following:

(1) Key project personnel shall have no present or past work experience in design of the LaSalle County Nuclear Station.

(2) Project personnel shall not be active on any other CECo, S&L or Quadrex work.

(3) No project personnel shall have members of their immediate family (parents, spouse, children and grandchildren) who are employed by CECo, S&L or Quadrex.

(4) During the term of the project no project personnel and their immediate family shall have cumulative ownership interest in CECo, S&L or Quadrex which exceeds 5% of their gross family annual income.

The most important factor in completing this design verification program is competence. This competence must be based on knowledge and experience in the matters under review. The company and individuals involved should also be independent. Independence means that the individuals and company involved must be able to provide an objective, dispassionate technical judgement, provided solely on the basis of technical merit. Independence also means that the verification program must be conducted by individuals and a company not previously involved with the design activities at the LaSalle County Project. Their integrity must be such that they are regarded as a reputable company or individuals.

6.0 COMPANY QUALIFICATIONS

TES has been actively engaged in the nucler power industry since the early 1960's. Services have been provided to the industry in the areas of mechanical, structural, civil, electrical engineering, testing and instrumentation. Our engineering activities range from stress analysis to design and material procurement and include fracture mechanics, design reviews, ASME Code consulting and training activities. In the areas of testing and instrumentation we provide material testing, nondestructive examination, failure analysis and mechanical testing services. TES staff are heavily involved in ASME Code activities, the Pressure Vessel Research Committee, ANSI Standards Committees, ASTM and SESA.

TES has a staff of approximately 220 people of which 195 are involved in engineering activities. Most of the senior staff are Registered Professional Engineers who have authored numerous papers.

7.0 RESUMES

The following key personnel have been identified to participate in one of the major areas of this project:

J. A. Flaherty
N. S. Celia
R. Wray
G. A. Carpenter
R. D. Hookway
R. M. Pace
J. H. Malonson
G. Moy
J. W. Hanson
R. D. Foti
J. C. Isacoyeanes

Other personnel whose participation may be required will be drawn from the following individuals:

D. F. Landers
M. A. Revett
L. J. DiLuna
R. D. Ciatto
R. A. Enos
L. B. Semprucci
J. P. King
R. A. Smith
D. C. Neal
J. F. Maher
S. D. Wharton
D. Messinger
W. J. Carey
B. C. Ryder
J. J. Rivard
M. R. Dellorso
M. F. Moran

The resumes of these personnel follow.

Participation of the above will be subject to their demonstration of being free of substantive conflict of interest.

RESUMES

TELEDYNE
ENGINEERING SERVICES

JAMES A. FLAHERTY
Manager, Engineering
Design and Testing

Professional Resume

Education

Northeastern University, B.S. in Civil Engineering, 1964
Tufts University, M.Sc. in Civil Engineering, 1966

Experience

Teledyne Engineering Services and Teledyne Materials Research, since 1968: Engineering manager responsible for all work performed by Engineering Design and Testing Group. Responsibilities include project review, technical guidance, manpower assignment, cost and schedule review.
Direct responsibility for modification program for operating nuclear power plant components and their supports including material procurement, design, fabrication examination and testing requirements.
Provide consulting services in the area of pressure vessels, piping, valves and component supports with the particular emphasis on stress analysis and the applicability of the ASME Boiler Code and Pressure Vessel Codes.
Lecturer at Teledyne Engineering Services sponsored seminars for the nuclear power industry.

United States Army, Lexington-Blue Grass Army Depot (Kentucky), 1st Lieutenant, Corps of Engineers, 1966 to 1968: project officer in the Directorate for Data Systems; programmer and system analyst for accounting and logistic system support groups.

AVCO Corporation, Missile Systems Division, Associate Engineer, Summer 1966: structural analysis of reentry vehicles and related components involving static and dynamic loadings.

Tufts University, Graduate Teaching Assistant in Computer Center, academic years 1964-65, 1965-66: formulating, solving, and grading problems for senior/graduate course in numerical methods and computers.

Linethal-Becker-Eisenberg, Summer, 1965: analysis and design of structural components.

Membership

American Society of Civil Engineers
Welding Research Council: Pressure Vessel Research Committee
Registered Professional Engineer in Massachusetts

(over)

Authorship

"An Assessment of the Effect of Plate Flexibility on the Design of Moment-Resistant Baseplates." with L.J. DiLuna, presented at the Pressure Vessels and Piping Conference, San Francisco, California, June, 1979.

"The Field Installation of Concrete Anchorage Systems," with L.J. Diluna, presented at the ASCE Committee on Construction of Nuclear Facilities Conference, Pennsylvania State University, September, 1981.

"A Method for Digitizing, Preparing and Using Library Tapes of Ship Stress and Environment Data," with Aldie E. Johnson, Jr., and Isaac J. Walters, Ship Structure Committee Report SSC-236, 1973.

"Computer Programs for the Digitizing and Using of Library Tapes of Ship Stress and Environment," with Aldie E. Johnson, Jr., and Isaac J. Walters, Ship Structure Committee Report SSC-237, 1973.

TELEDYNE
ENGINEERING SERVICES

NICHOLAS S. CELIA
Manager, Engineering
Projects

Professional Resume

Education

Northeastern University, B.S. in Mechanical Engineering, 1960, Magna Cum Laude
University of Southern California, M.S. in Mechanical Engineering, 1967, Magna Cum Laude

Experience

Teledyne Engineering Services: Engineering manager responsible for all work performed by the Engineering Projects Group. Responsibilities include project review, technical guidance, manpower assignment, and cost and schedule review. Responsible for analysis and field survey work for nuclear and LNG projects. Analysis projects include piping, piping supports, and structural analysis.

1974 to 1980: Project Manager in charge of structural analysis, design, and modification projects. Responsibilites include technical performance, cost control, scheduling, and final reporting.

Independent Consultant, 1972-1974: analysis of loads and stresses in structures from static, dynamic and acoustic environments. Special problems encountered include pipe rupture and impact analysis, nonlinear dynamic response analysis, and acoustically-induced pipe stresses due to sonic flow through large valves. Stresses were evaluated and reported using criteria of B31.1 and Section III of the ASME Code.

Itek Corporation, 1967-1972: Senior Engineer, responsible for dynamic and structural analysis of systems subjected to shock, vibration, and acoustic environments. Design and analysis of shock and vibration isolation systems. Extensive dynamic and acoustic test experience including test specification and fixture design.

Convair, Douglas & North American Aviation, 1960-1967: Dynamic analysis and test, project review and interface, and ground support facilities and equipment design for Apollo, Saturn, MOL, and Atlas projects.

Membership

Registered Professional Engineer - State of Massachusetts
Pi Tau Sigma
Tau Beta Pi

3/81

TELEDYNE
ENGINEERING SERVICES

RONALD WRAY
Manager, Engineering
Analysis

Professional Resumé

Education

Northeastern University, B.S. in Civil Engineering, 1956
Rensselaer Polytechnic Institute, M.S. in Engineering Science, 1962

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1971: theoretical stress analysis of pressure vessels, piping systems and frame structures utilizing computer program solutions and finite element methods; performed and directed static and dynamic analysis of Nuclear and LNG Piping Systems; conducted design reviews of Nuclear Piping Systems.

Instructor at Franklin Institute of Boston, Evening Division.

AVCO Systems Division, 1962-1971: performed detailed stress and buckling analyses of various reentry vehicle shell structures under combined reentry pressure and inertia loads and heating. Designed and analyzed large vacuum and pressurized chambers for a portable sterilization/clean room facility built for NASA/Langley; responsible for the structural design and evaluation of space power systems and planetary probe systems.

Pratt & Whitney Aircraft, Canal Division, 1958-1962: performed and directed detailed analyses and design evaluation of nuclear reactor core components and pressure vessels; conducted thermo-structural analysis of system piping and heat exchangers involving liquid metal coolants under conditions of high temperature operation and severe transients; established design criteria for components exposed to long-life, high-temperature conditions.

U.S. Army Corps of Engineers, 1st Lieutenant, 1956-1958: served as project officer on military construction sites; field experience in reinforced concrete and steel erection.

Membership

ASME, Boiler and Pressure Vessel Code, Alternate Member Task Group on Dynamic Analysis.

TELEDYNE
ENGINEERING SERVICES

GEORGE A. CARPENTER, Jr.
Manager, Engineering

Professional Resume

Education

Wentworth Institute, Associate in Mechanical Engineering, 1962
Lowell Technological Institute, B.S. in Mechanical Engineering, 1971 (evenings).

Experience

Teledyne Engineering Services, and Teledyne Materials Research, 1969-1970; 1971-present: Performed and directed ASME Section III flexibility and stress analysis of nuclear Class 1, 2, and 3 piping systems in accordance with NC-3600 and NB-3650. Design, analyze and review installation of nuclear piping and supports. Directed projects relating to modification of existing nuclear and process steam fossil plant piping systems including: Project management, feasibility studies, piping design/layout/fabrication drawings, material procurement, pipe support design/selection, welding and repair procedures, field supervision, all in accordance with Sections III and XI of the ASME code and ANSI B31.1, B31.3 code requirements. Directed projects in response to NRC I&E Bulletins 79-02 and 79-14 including: technical procedures, physical testing, stress analysis, and field engineering. Sales and client relations development, East and West Coast offices.

United Shoe Machinery, 1967-1969: Design and fatigue stress analysis of plastic molding and shoe machinery; fatigue testing of materials.

Foster-Grant Company, 1965-1967: Design and improve methods of production machinery.

J. H. Horne Company, 1962-1965; 1970-1971: Design and analysis of paper mill machinery.

TELEDYNE
ENGINEERING SERVICES

ROBERT D. HOOKWAY
Principal Engineer

Professional Resume

Education

Lowell Technological Institute, B.S. in Mechanical Engineering, 1963
Northeastern University, M.S. in Mechanical Engineering, 1970

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1967: theoretical and experimental stress analysis of nuclear piping and pressure vessels using thick and thin shell computer programs and finite element techniques; temperature distribution computer solutions under transient and steady-state conditions; design of piping and piping support systems; auditing of design, and installation of power plant (nuclear and fossil fuel), process plant and Liquefied Natural Gas, piping systems; preparation of design specifications for power piping systems including Class 1 Nuclear. Analysis of piping systems including seismic and dynamic analyses using criteria of ANSI B31.1, B31.3, B31.7 and ASME B&PV, Section III Codes. Process plant experience includes oil refinery and LNG plants.

AVCO Corporation/Space Systems Division, 1965-1967: theoretical and experimental stress analysis on reentry vehicles (composite materials).

Improved Machinery Company, 1964-1965: design of pulp manufacturing machinery.

Membership

- Registered Professional Engineer in Massachusetts - No. 28626
- American Society of Mechanical Engineers
- Vice Chairman of the Pressure Vessel & Piping Subcommittee of the ASME Nuclear Engineering Division, 1976-present
- Alternate Member of Working Group on Piping Design of Section III ASME Boiler & Pressure Vessel Code
- Member Chapter 6 Subcommittee for NFPA-59A
- Member ANSI/ASME B31.10 Code Committee "Cryogenic Piping"
- Member ANSI/ASME B31.3 Code Committee, "Chemical Plant and Petrochem Refinery Piping"

Authorship

"Piping Design Manual," with D. F. Landers, AEC-RDT Standard, June 27, 1969.

USNRC Study to Determine "Effects of Postulated Events Devices on Normal Operations of Piping Systems in Nuclear Power Plants," NUREG/CR-2136, 1981.

TELEDYNE
ENGINEERING SERVICES

RAYMOND M. PACE
Senior Engineer

Professional Resume

Education

Northeastern University, B.S. in Mechanical Engineering, 1973

Experience

Teledyne Engineering Services, and Teledyne Materials Research, 1972 to present: stress analysis of pressure vessel components using finite element techniques; stress analysis of liquid metal components at elevated temperatures; ASME Boiler and Pressure Vessel Code review of design analyses; evaluation of nuclear piping systems under static and dynamic loading conditions, including postulated high energy pipe break and relief valve blowdown for hanger and support locations using finite element techniques; design, analysis, field engineering and verification associated with plant modification of existing piping systems and related structural components; verification of nuclear piping design analyses to ASME Boiler and Pressure Vessel Code. Responsible for cryogenic design, analysis and field engineering including ANSI B31.3 piping systems and AISC structural modifications associated with LNG facilities and LNG storage tanks. Design review of cryogenic (LNG) piping systems, components and structural support designs to ANSI B31.3 and The Uniform Building Code. Lead Plant Engineer BWR Mark I Torus requalification program. Assisted in the development and direction of generic and plant unique analyses for the torus structure and associated components. Responsible for coordinating and scheduling analyses and outage related modifications with the client.

Membership

Registered Professional Engineer - Commonwealth of Massachusetts.

TELEDYNE
ENGINEERING SERVICES

JAMES H. MALONSON
Project Quality
Assurance Specialist

Professional Resume

Education

Wentworth Institute, Mechanical Drawing and Machine Design, 1948-1950
Welding I & II, Shielded metal arc and oxy-acetylene
ASQC, Management of Quality Control, 1972
Northeastern University, Work Simplification, Psychology for Industry, 1962-1963
Massachusetts University Extension, AC-DC Theory and Advanced AC Theory, 1961-1962

Experience

Teledyne Engineering Services, 1979 to present: Quality Assurance Specialist on nuclear projects involving design analysis and modifications.

Masoneilan International, Inc., 1977-1979: Quality Assurance Engineer in the manufacture of automatic control valves and liquid level controllers and transmitters. Responsibility in all phases of production and quality interface with engineering, purchasing, sales and customer representatives.

Megapulse, Inc., 1975-1977: Quality Control Supervisor. Total Q.C. program responsibility on a design and development contract to produce a LORAN "C" System for the Department of Transportation.

Bowmar, Inc., 1973-1975: Quality Control Supervisor. Performed Quality Engineering/Quality Assurance function and supervised inspection activities: Incoming, machine shop, in process and final inspection in the production of both commercial and military electronics.

Gaulin Corporation, 1971-1973: As Quality Control Manager, had total Quality Assurance/Quality Control Program responsibility in the manufacture of pumps in conformance with the ASME Pump and Valve Draft Code and for Naval nuclear contracts for the production of coolant charging pumps for submarines and surface ships. Participated in the preparation of the Quality Assurance Manual and program requirements for N Stamp approval under the ASME Code.

RCA Corporation, Aerospace Systems Division, 1959-1975: Technical, administrative, and supervisory responsibility in Quality Assurance, Quality Control Planning and Inspection.

Membership

American Welding Society

TELEDYNE
ENGINEERING SERVICES

GEORGE MOY
Principal Engineer

Professional Resume

Education

Northeastern University, B.S., 1962, and M.S., 1964, both in Mechanical Engineering

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1975: ASME Code Case N-47 (1592) stress analyses of liquid metal fast breeder reactor components and piping including elastic and inelastic analyses. This work includes an elastic-plastic-creep analysis, using state-of-the-art programs, for a full size Liquid Metal Fast Breeder Reactor piping system. Lecturer for Elevated Temperature Components Seminar, part of the TES Seminar Series. Performance of ASME, Section XI fracture mechanics evaluations of flaws detected during inservice inspections. Design evaluations and analysis of petrochemical, LNG and nuclear power components and piping systems.

Bechtel Corporation, San Francisco, California, 1971-1975: Lead Stress Engineer on the FFTF project, a liquid metal fast breeder reactor test facility, responsible for the thermal, stress and seismic analysis of plant piping and related components. Work included elastic and inelastic stress analyses as well as the use of RDT Standards and ASME Codes.

The Babcock & Wilcox Co., Boston, MA, 1968-1971: thermal stress and dynamic analysis of Navy nuclear and liquid metal breeder reactor pressure vessel components. The analyses were performed in accordance with the Navy Structural Design Code, SDB-63 and Section III of the ASME B&PV Code.

Northeastern University, Boston, MA, 1966-1971: part-time Instructor in Mechanical Engineering Technology in the Lincoln College Division.

Dynatech Corporation, Cambridge, MA: 1964-1968: design and stress analysis of nuclear pressure vessels and related components in accordance with ASME and Navy Nuclear Design Codes.

Membership

American Society of Mechanical Engineers, Associate Member
Pi Tau Sigma
Registered Professional Engineer in California and Massachusetts

TELEDYNE
ENGINEERING SERVICES

JOHN W. HANSON
Manager, Projects

Professional Resume

Education

University of Houston, B.S. in Mechanical Engineering, 1965

Experience

Teledyne Engineering Services, since 1979: Field verification of nuclear plant piping systems. Testing and verification of nuclear piping support baseplates. Client liason. Fossil and nuclear plant modifications. Project Management activities related to piping supports and Torus modifications.

Houston Lighting & Power Company, 1965-1979: Engineering design review of 2-1250 MWe PWR's and 1-1150 MWe BWR including review/coordination of NSSS vendor and AE design efforts to ensure compliance with ASME Code, NRC Regulations and design criteria. Responsible for coordinating design review activities of various engineering disciplines related to new fossil plant projects including 3-750 MWe and 2-565 MWe supercritical gas-fired units and 1-425 MWe gas/oil fired unit. Assistant Plant Superintendent at a fossil plant consisting of 1-220 MWe and 1-66 MWe gas-fired units. Responsible for pre-op testing and various startup activities for new fossil units.

Membership

Registered Professional Engineer - State of Texas
American Society of Mechanical Engineers

TELEDYNE
ENGINEERING SERVICES

ROBERT D. FOTI
Manager, Projects

Professional Resumé

Education

Tufts University, B.S. in Mechanical Engineering, 1972

Experience

Teledyne Engineering Services, and Teledyne Materials Research, 1972: static and seismic analysis of nuclear power piping systems and related components. Force-time history analysis utilizing finite-element techniques with large-scale structural analysis digital computer programs. Performed audits of analytical procedures used in determining piping support systems. Performed calculations and established procedures for the layout and support placement for small piping to satisfy NB-3652 and NC-3652 of Section III of the ASME-BPVC. Established thermal flexibility modes of operation of various power piping systems. Audited restraint designs and installations for nuclear power piping. Working knowledge of B31.1 ANSI, NB-3652, and NC-3650 Piping Codes of Section III of the ASME-BPVC.

Army Materials and Mechanics Research Center, Theoretical and Applied Mechanics Section, Consultant, 1972: experimental stress analysis of composite materials using moiré techniques.

Membership

Registered Professional Engineer - Commonwealth of Massachusetts

TELEDYNE
ENGINEERING SERVICES

JAMES C. TSACOYEANES
Consulting Engineer

Professional Resume

Education

Boston University, B.S. in Aeronautical Engineering, 1959
Northeastern University, Graduate courses in Mechanical Engineering

Experience

Teledyne Engineering Services, Teledyne Materials Research, and Lessells and Associates, Inc., since 1960: stress analysis of pressure vessels and piping; application of finite element computer techniques for structural heat transfer and stress analysis; design and evaluation of liquid metal fast breeder reactor components; preparation of ASME Code Design Reports for nuclear reactor system valve and vessel components; fracture mechanics evaluation of flaws to Code non-ductile failure protection criteria; consulting on component design and criteria; lecturer for TES Seminar Series on Class 1 Design of LWR Nuclear Components and Elevated Temperature Components.

Curtiss-Wright Corporation, Propeller Division, Experimental Testing Laboratory, 1959-1960: mechanical and electrical testing of propeller controls.

Membership

American Society of Mechanical Engineers, Member

ASME Boiler and Pressure Vessel Committee
Working Group on Valves (SG-D SC III)
Safety Code Committee on Nuclear Inspectors and Specialized Professional Engineers
Task Group on Qualifications and Duties of Specialized Professional Engineers, Chairman

Registered Professional Engineer in Massachusetts

Authorship

"Valve Failures Which Impact the Safety and Operation of Light Water Nuclear Power Plants", with P. P. Raju, ANS Thermal Reactor Safety Meeting, April 7-11, 1980.

TELEDYNE
ENGINEERING SERVICES

DONALD F. LANDERS
Senior Vice President

Professional Resume

Education

Lincoln Technical Institute, A.S. in Mechanical Engineering, 1962
Northeastern University, B.B.A. in Engineering and Management, 1963

Experience

Teledyne Engineering Services, Teledyne Materials Research, and Lessells and Associates, Inc., since 1961: Engineering design, analysis and construction management for nuclear power and fossil power plant modifications; theoretical and experimental stress analysis of piping and pressure vessels; preparation of Design Reports; consulting on design criteria, design specifications, and pressure vessel and piping design and analysis; Design Review of nuclear and LNG piping systems including installation.

Arthur D. Little, 1959-1960: stress analysis and field engineering of fuel loading piping for Atlas and Titan missile bases.

Bethlehem Steel Co., Nuclear Power Section, Central Technical Dept., 1957-1959, 1960-1961: stress analysis of shipboard piping, pipe hanger design, supervision of nuclear piping installation.

Charles T. Main Co., 1955-1957: power plant and textile mill design.

U.S. Navy Weather Forecaster, 1951-1955

Membership

ASME, Boiler and Pressure Vessel Code, Section III Committee Member; Working Group on Piping Design Member; Subgroup on Design Chairman.

Welding Research Council, Pressure Vessel Research Committee

ANSI, B31.7 Code for Nuclear Piping, Member; Chairman, ANSI B31.7 Task Group on Design.

Registered Professional Engineer - Commonwealth of Massachusetts

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Authorship

"Specification Guidelines for Nuclear Pressure Vessels, " with W.E. Cooper, AEC Report NYO-3416-1, October 1964

"Nuclear Piping Design Guide," with R.D. Hookway, USAEC Division of Reactor Development and Technology RDT Standard.

"Effect of ANSI-B31.7 - 1969 on the General Piping Industry," Heating, Piping and Air Conditioning Magazine, June 1970.

Computer Software - Problems and Preferred Resolutions," ASME Booklet on Computer Software.

"Problems Occuring in Nuclear Piping System Analysis and Operation," Second International Conference on Structural Mechanics in Reactor Technology - Berlin, Germany, 1973.

"B31 Piping Design Philosphy," 1973 Annual Meeting, Mexican Society of Mechanical and Electrical Engineers.

"Design Specifications." ASME Philadelphia and Delaware Sections, 1973,1974 and 1975 Nuclear Power Plant Components Course and 1976 ASME Annual Meeting Short Course.

"Section III - Nuclear Piping Design," ASME 1975 and 1976 Annual Meeting Short Courses.

"Nuclear Piping Design - A Critique ", July 1978.

"Technical Program to Identify Signifigant Problems Related to Piping Systems in LWR Power Plants", August 1980 - Sandia Laboratories.

"Effects of Postulated Event Devices on Normal Operation of Piping Systems in Nuclear Power Plants" with R.D Hookway, TES, and K.D. Desai, USNRC - NUREG/CR-2136, May 1981.

TELEDYNE
ENGINEERING SERVICES

MARK A. REVETT
Senior Engineer

Professional Resume

Education

Holyoke Community College, Mathematics and Science Courses, 1964
United States Coast Guard Academy, B.S. in Engineering--Mechanical and Marine, 1969
Pratt & Whitney FT4A Gas Turbine School, Service and Operation of Gas Turbine Modified for Marine Propulsion, 1970
Krautkramer-Branson, Inc., Ultrasonics School, Level I and Level II training in nondestructive material examination for subsurface flaws using ultrasonic techniques, 1975 and 1976
Metals Testing Co., Inc., Level II training and nondestructive material examination for surface and subsurface flaws using magnetic particle and liquid penetrant techniques, 1975
Northeastern University continuing education course, Project Administration, 1976 and 1978
Eastman Kodak, Radiographic Film Interpretation School, 1978

Experience

Teledyne Engineering Services, and Teledyne Materials Research, 1974 to present: stress analysis of piping systems and piping support systems including seismic analysis using criteria of ANSI B31.1 and ASME B&PV, Section III Codes. Procedures and specifications for modification of nuclear power plants using criteria of ANSI B31.1; nondestructive examination techniques and procedures. QA Field Engineer for system installation and nondestructive examination. Certified Level III in ultrasonics; Level II magnetic particle, and liquid penetrant techniques. Engineering Assurance Manager, responsible for Quality Control and related QA/QC activities. ISI Code consulting, plan review, QC audit of NDE subcontractors for client utilities.

United States Coast Guard, 1969-1974: Engineering Officer, qualified in and responsible for operation, maintenance, and repair of diesel, gas turbine, and 600 psi steam turbo-electric marine propulsion systems. Plan and Specification approval for all new and altered waterborne commercial vessels, cargo and/or passenger, required to meet U.S. Flag Certification Regulations, Title 46 Code of Federal Regulations. Ferro-Cement Project Officer for West Coast.

Membership

American Society for Nondestructive Testing
Member, ASME Section XI, Subgroup on Containments

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Authorship

ASME Paper 78-NE-14, "ISI Management and the Role of the Third Party Consultant."

TELEDYNE
ENGINEERING SERVICES

LOUIS J. DILUNA
Senior Engineer

Professional Resume

Education

Cornell University, B.S. Civil and Environmental Engineering, 1974.
Northeastern University, M.S. Civil Engineering, 1979.

Experience

Teledyne Engineering Services, and Teledyne Materials Research, July 1974-present: theoretical stress analysis, analysis of nuclear power components per ASME Code Section III. Design and analysis of component supports and modifications to Mark I BWR containment systems. Study of the behavior of pipe supports using concrete expansion anchors. Elastic and inelastic analysis, using state-of-the-art programs and methods, of a full-size elevated temperature piping system, as well as smaller verification models, for a LMFBR plant.

Membership

American Society of Civil Engineers

Registered Professional Engineer, State of Massachusetts

Authorship

"An Assessment of the Effect of Plate Flexibility on the Design of Moment-Resistant Baseplates," with J. A. Flaherty, presented at the Pressure Vessels and Piping Conference, San Francisco, California, June, 1979.

"The Field Installation of Concrete Anchorage Systems," with J. A. Flaherty, to be presented at the ASCE Committee on Construction of Nuclear Facilities Conference, September, 1981.

TELEDYNE
ENGINEERING SERVICES

RAYMOND D. CIATTO
Principal Engineer

Professional Résumé

Education

Newark College of Engineering, B.S. Civil Engineering, 1965
Northeastern University, M.S. Civil Engineering, 1967
Northeastern University, Boston, Mass., 1971-1972: Lecturer in Mechanical Engineering Technology for Advanced Stress Analyses

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1971: stress analysis of nuclear components by finite element method; pressure and thermal stress analysis of Naval nuclear components. Seismic analysis of components for the Liquid Metal Fast Breeder Reactor (LMFBR) program. Nonlinear structural analyses of LMFBR components. Investigation of a concrete tunnel subjcted to high pressures caused by a break in a main steam pipe. Nonlinear impact analysis of swing check valves. Design and analysis of component supports. Investigations of structural failures including steel roof structures and prestressed concrete. Conducted column research program using analytical and experimental techniques. Project management of design and evaluation projects per ASME Boiler and Pressure Vessel Code and AISC Steel Construction Manual. Participation in ASME Code activities, Section III, Subsection NF, Component Supports.

The Babcock & Wilcox Company, Boston, Mass., 1969-1971: thermal and pressure stress analysis of a reactor vessel and steam generator; dynamic shock analysis of nuclear power piping; computer program development of piping analysis program; developed an infinite series solution for influence coefficients of rings; thermal analysis of steam generator internals.

Dynatech R/D Company, Cambridge, Mass., 1967-1969: stress analysis of nuclear pressure vessels and related components; elasticity analysis of nozzles by finite difference computer method; analyzed piping systeams for earthquakes and other dynamic loads; vibration analysis of jet engine bearing.

Membership

Registered Professional Engineer in Massachusetts, New York, Texas, and Washington
Member, American Society of Civil Engineers
Member, American Concrete Institute

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Authorship

"Linear Component Supports in Compression and Bending", presented at the ASCE Convention, Boston, Massachusetts, April 1979.

"Strength of Concrete Expansion Anchors for Pipe Supports" with R. R. Boentgen, presented at ASME Pressure Vessel and Piping Conference, San Francisco, California, August 1980.

TELEDYNE
ENGINEERING SERVICES

RICHARD A. ENOS
Senior Engineer

Professional Resume

Education

Lowell Technological Institute, B.S. in Civil Engineering, 1974
University of Lowell, M.S. in Civil Engineering, 1981

Experience

Teledyne Engineering Services and Teledyne Materials Research, June 1974 to present: static and seismic analysis of FFTF vessels for storing liquid sodium; theoretical stress analysis of pressure vessel components; flexibility analysis of nuclear piping systems and components per ASME Code Section III. Application of beam and finite element techniques utilizing STARDYNE, TMRSAP, ANSYS, BOSOR-4, and FLUSH computer program solutions. Transient dynamic force-time history analysis using modal analysis techniques. Design and analysis of component supports and modifications to Mark I BWR containment systems. Structural analysis task leader responsible for directing the quantity and quality of work performed, as well as interfacing with the client.

Membership

Society for Experimental Stress Analysis, New England Section
Registered Professional Engineer, State of Massachusetts

TELEDYNE
ENGINEERING SERVICES

LENIN B. SEMPRUCCI
Principal Engineer

Professional Resume

Education

Northeastern University, B.S. in Mechanical Engineering, 1966
Northeastern University, M.S. in Mechanical Engineering, 1968

Post Graduate Courses

"Energy Methods and Variational Techniques in Solid Mechanics," Northeastern University, 1975

"Gas Dynamics," Northeastern University, 1975/76

"Transients in Pipelines and Hydraulic Machinery," Georgia Tech, 1976

"Unsteady Gas Flow," MIT, 1977

"Advanced Engineering Math," Northeastern University, 1977

"Solar Heating System Design," Northeastern University, 1979

"RELAP 5 International .Workshop," 1981 Idaho National Engineering Laboratory

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1968: Computation of transient temperature distributions in structures using closed form, series, chart solutions and finite difference computer codes. Determination of force-time history in piping systems due to fluid transients caused by relief valve operation, turbine trip, pump trip, valve stroking and pipe rupture. Fluids range from so-called "incompressible fluids" where the fluid velocity is negligible compared to the fluid acoustic velocity to fully compressible fluids where choking and shock waves are possible. Two-phase single component problems such as the rupture of subcooled hot water lines where flashing occurs. These problems are solved with a variety of techniques from graphical solutions such as the method of characteristics to computer codes. Computer codes used are: RELAP, WHAM, FLASH, PISCES, WAVENET. Solution of steady oscillatory problems such as vortex shedding, turbulent buffeting. Sized components for steam power plants such as piping, valves, and orifices.

Analysis of plate, shell, and beam structures subject to static, seismic and time varying loads, using classical solutions, finite difference and finite element computer codes. Analysis of structures to ASME Section III and VIII criteria.

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Experience (Cont'd.)

Dynatech Corporation, 1966-1968: Co-operative Graduate Work Program: stress analysis of pressure vessels and nuclear reactor components, using Section III of the ASME Boiler and Pressure Vessel Code.

Membership

American Society of Mechanical Engineers
Pi Tau Sigma
Registered Professional Engineer in Massachusetts

Authorship

"The Application of RELAP4/REPIPE to Determine Force Time Histories on Relief Valve Discharge Piping," ASME Book, Safety Relief Valves, from 3rd National Congress on Pressure Vessel and Piping Technology, June 1979, co-author.

TELEDYNE
ENGINEERING SERVICES

JAMES P. KING
Senior Project Engineer

Professional Resume

Education

Lowell Technological Institute, B.S. in Mechanical Engineering Technology (Honors), 1972

Lowell Technological Institute, A.E. in Mechanical Engineering Technology (High Honors), 1967

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1972: flexibility analysis of LNG and SNG piping systems. Stress, fatigue and thermal evaluation of nuclear power piping systems and components, including lead project responsibility. Preparation of design guides, design specifications and stress reports to ASME Code, Section III. Design reviews of piping systems. From 1978 to 1979, an eighteen month assignment, in residence, at a utility in Spain. Duties included: introducing a Nuclear Class 1 piping analysis capability to staff engineers, supervising the Class 1 analysis of systems of a three loop PWR and interfacing with the hook-up of applicable package of computer programs. From 1980 to present, management of nuclear Class 1 piping and component analysis projects.

Lowell Technological Institute Research Foundation, 1967-1972: design and packaging instrumented experimental rocket payloads, and stress analysis of members.

Technical Operations, Inc., 1963-1967: layout and design of experimental and prototype optical hardware systems.

C. G. Sargent's Sons Corp., 1957-1963: detailing and layout of textile machinery and industrial dryers.

Authorship

"Evaluation of Class 1 Nuclear Piping to NB-3600, including NB-3200 for Thermal Stress," ASME Book, Pressure Vessels and Piping Analysis and Computers, from Miami Beach Conference, June 1974, co-author.

TELEDYNE
ENGINEERING SERVICES

ROBERT A. SMITH
Engineer

Professional Resume

Education

Northeastern University, B.S. in Civil Engineering, 1976

Experience

Teledyne Engineering Services, 1980 to present: structural design and analysis of nuclear power piping components and component supports for static, thermal, and dynamic loading conditions in accordance with ASME Boiler and Pressure Vessel Code, use of structural computer programs, field inspection and design modification of components and supports.

Stone & Webster Engineering Corporation, February 1980 to August 1980: pipe support design and analysis for seismic loading, use of structural computer programs, field verification of designs.

Bergen-Paterson Pipesupport Corporation, 1977-1980: pipe support design, use of structural computer programs, scheduling support design work, ordering and scheduling delivery of materials from manufacturing facility and outside vendors, field verification of designs.

Titan-Northeast Constructior. 1976-1977: shop drawing submittals, estimating.

TELEDYNE
ENGINEERING SERVICES

DAVID C. NEAL
Engineer

Professional Resume

Education

University of Lowell, B.S., Civil Engineering, 1978.

Experience

Teledyne Engineering Services, December 19 ; to present: Project Administration for Pipe Support analysis; Pipe Support analysis utilizing STARDYNE, SCODE and DCODE computer programs; development of Engineering Procedures for Pipe Support analysis; Base Plate and expansion anchor bolt analysis utilizing STRUDL and BOLTS computer programs; site field work for pipe supports and pipe support base plate analysis.

Charles T. Main Co., 1978 to 1979: Coal-fired fossil power plant design including structural steel, reinforced concrete, and civil design.

Uhl, Hall and Rich Engs., 1977: Inspection and engineering coordination of transmission line construction.

Membership

Engineer-In-Training, Massachusetts Board of Registration.

TELEDYNE
ENGINEERING SERVICES

JONATHAN F. MAHER
Project Engineer

Professional Resume

Education

Northeastern University, B.S. in Mechanical Engineering, M. S. in Mechanical Engineering, 1978

Experience

Teledyne Engineering Services, April 1980 to present: Determination of support locations and type for nuclear power piping systems, static and seismic criteria. ASME Code Class 1 analysis on nuclear piping components, including temperature distribution determination. Use various methods to solve steady and unsteady heat transfer problems. Generated blowdown loads for single and two-phase flows in piping systems. Calculated pipe rupture loads. Calculated steam and water hammer loads.

General Electric, Aircraft Engine Group, 6/78 - 4/80: Design and analysis of cooling configurations for jet engine parts. Redesign and structural analysis of engine parts for both static, dynamic and fatigue criteria. Coordinated test cell operations for J85 engines.

Membership

Pi Tau Sigma National Mechanical Engineering Honor Society
Tau Beta Pi National Engineering Honor Society
Engineer-in-Training, Massachusetts

Authorship

Master's Thesis: "A Design and Analysis Aid for Piping Subject to Thermal Shock"

TELEDYNE
ENGINEERING SERVICES

DONALD MESSINGER
Project Quality
Assurance Specialist

Professional Resume

Education

American Society of Nondestructive Testing training courses:
Certificates in RT--1957, PT--1958 and MT--1959
Bethlehem Steel Corp., training courses in RT and MT to meet NAVSHIPS 250-1500, 1960
General Dynamics Corp., training courses in MT and PT to meet NAVSHIPS 250-637-1 and MIL STD 271D, 1966
J. J. Devine Company, Ultrasonic School - Level I SNT-TC-1A, 1974
Ultrasonic Test Engineers, MT and PT School - Level II-SNT-TC-1A, 1975
J. G. Sylvester Assoc. Inc., MT and PT School - Level III, SNT-TC-1A, 1978

Experience

Teledyne Engineering Services, 1978 to present: Quality Assurance Specialist, responsible for internal and vendor audits to Code and client requirements. Certified Level III in Magnetic Particle and Liquid Penetrant. Qualified lead auditor per ANSI N45.2.23.

Lytron, Inc., 1976-1978: Makers of heat exchangers. Quality Assurance Manager - responsible for Q.A. Program to meet 10CFR50 Appendix B, ASME III and VIII, ANSI N45.2 and military requirements. Certified Level III in Liquid Penetrant.

The Thompson Lichtner Co., Inc., 1973-1976: Chief Inspector of structural steel, decking and precast. Responsible for inspection of fabrication, erection, welding, bolting and NDE practices in construction of schools, hospitals, banks, insurance companies.

Ultrasonic Test Engineers, 1973-1977: Consultant--Instructor/Trainer for magnetic particle and liquid penetrant applications. Level II certified in MT and PT.

General Dynamics Corporation, Shipbuilding Division, 1964-1973: Quality Control working Leader/Instructor. Inspection of completed subassemblies prior to erection. Instructor for magnetic particle and liquid penetrant.

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Experience (Continued)

Bethlehem Steel Corp., Shipbuilding Division, 1955-1963: Radiographer 1/C - crew leader responsible for X-ray of pipe, castings and structural steel and MT and PT inspections to meet commercial, military and nuclear codes. Film interpreter and dark room responsibilities.

Membership

American Society for Nondestructive Testing

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TELEDYNE
ENGINEERING SERVICES

JAMES J. RIVARD
Project Engineer

Professional Resume

Education

Lowell Technological Institute, B.S. in Civil Engineering, 1973
University of Lowell, Graduate Courses in Structural Engineering

Experience

Teledyne Engineering Services, April 1981 to present: design and analysis of nuclear component supports per ASME Code, Section III.

Metropolitan District Commission, Engineering Division, 1973 to 1981: structural analysis and design of various types of buildings, bridges, hydraulic structures, hard rock tunnels, and supports for mechanical systems. Rehabilitation of existing buildings and bridges. Hydraulic design of culverts, pipelines and intake structures. Responsible for preparation of construction estimates, contract plans and specification and review of shop drawings.

Membership

American Society of Civil Engineers
Registered Professional Engineer, State of Massachusetts

TELEDYNE
ENGINEERING SERVICES

MICHAEL R. DELLORSO
Engineer

Professional Resume

Education

University of Connecticut, B.S. in Civil Engineering, 1978
Northeastern University, Graduate Level Courses in Civil Engineering

Experience

Teledyne Engineering Services, October 1979 to present: structural analysis and modification of piping restraints and related framed structures utilizing computer program solutions. Static, thermal and seismic analysis of nuclear power piping per ASME Code Section III. Field modification of nuclear systems involving design and analysis of piping supports. Project Lead Engineer responsible for directing and controlling nuclear piping analysis effort. Structural analysis of offshore facilities.

Membership

American Society of Civil Engineers
Engineer-in-Training, Connecticut

TELEDYNE
ENGINEERING SERVICES

MICHAEL F. MORAN
Project Engineer

Professional Resume

Education

Wentworth Institute, Associate, Building Construction, 1971
University of Lowell (Evening Division), B.S. in Civil Engineering, 1979

Experience

Teledyne Engineering Services, since April 1980: stress analysis of piping systems and piping support systems using criteria of ANSI B31.1 and ASME Boiler and Pressure Vessel Section III Codes. Provided technical leadership on major structural analysis and modification projects. Represented TES at client facilities controlling interface on technical problem areas. Performed field walkdowns of Code class lines and assisted in the resolution of discrepancies at the construction site. Also field routed lines for CRD system with possible support locations and details.

G. F. Moran Construction, 1974-1980: supervised and performed work in residential and light commercial construction. Furnished designs, estimates, bids, and coordinated other subcontractors when necessary.

U.S. Army, 1971-1974: Personnel Specialist, E5.

Membership

Engineer-in-Training, New Hampshire