LONG ISLAND LIGHTING COMPANY
175 EAST OLD COUNTY ROAD
HICKSVILLE, NEW YORK 11801

TECHNICAL REPORT TR-5633-1

PROGRAM DESCRIPTION

INDEPENDENT DESIGN REVIEW FOR THE SHOREHAM NUCLEAR STATION

MAY 19, 1982

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASSACHUSETTS 02254
617-890-3350

TABLE OF CONTENTS

1.0 INTRODUCTION

Teledyne Engineering Services (TES) submits this program description in response to a request by Long Island Lighting Company (LILCO) to perform an Independent Design Review of a portion of the Low Pressure Core Spray System of the Shoreham Nuclear Station.

2.0 OBJECTIVES

The objective of the Independent Design Review will be to verify and confirm that for the as-installed piping, components and supports:

2.1 The design criteria, design bases, implementation, and documentation were consistent with FSAR/DAR requirements.

2.2 The design data used by interfacing internal and external design organizations and disciplines were properly controlled and consistently applied.

2.3 The design modifications resulting from field and engineering change requests were properly reconciled or incorporated into the final design.

2.4 The Quality Assurance Program properly monitored and documented the design, procurement, and installation procedures utilized on Shoreham.

2.5 The "as-built" documentation reflects the actual plant configuration and has been properly reconciled to the as-designed condition.

3.0 SCOPE OF WORK

The Independent Design Review will be performed on one loop of the safety-related, seismic Category I, Low Pressure Core Spray System (E21).

The extent of review is indicated within the boundaries that are shown darkened in Figure 1.

The review program is separated into eight tasks as follows:

Task 1	-	Review Design Process and Procedures
Task 2	-	Review Design Requirements
Task 3	-	Review As-Built Design Documents
Task 4	-	Determine As-Built Plant Configuration
Task 5	-	Compare As-Built Documentation to Plant Configuration
Task 6	-	Review LILCO and S&W QA/QC/EA Process and Documentation
Task 7	-	Project Review Internal Committee
Task 8	-	Reporting

Figure 2, following, depicts a schedule for each of the eight program tasks.

4.0 IMPLEMENTATION

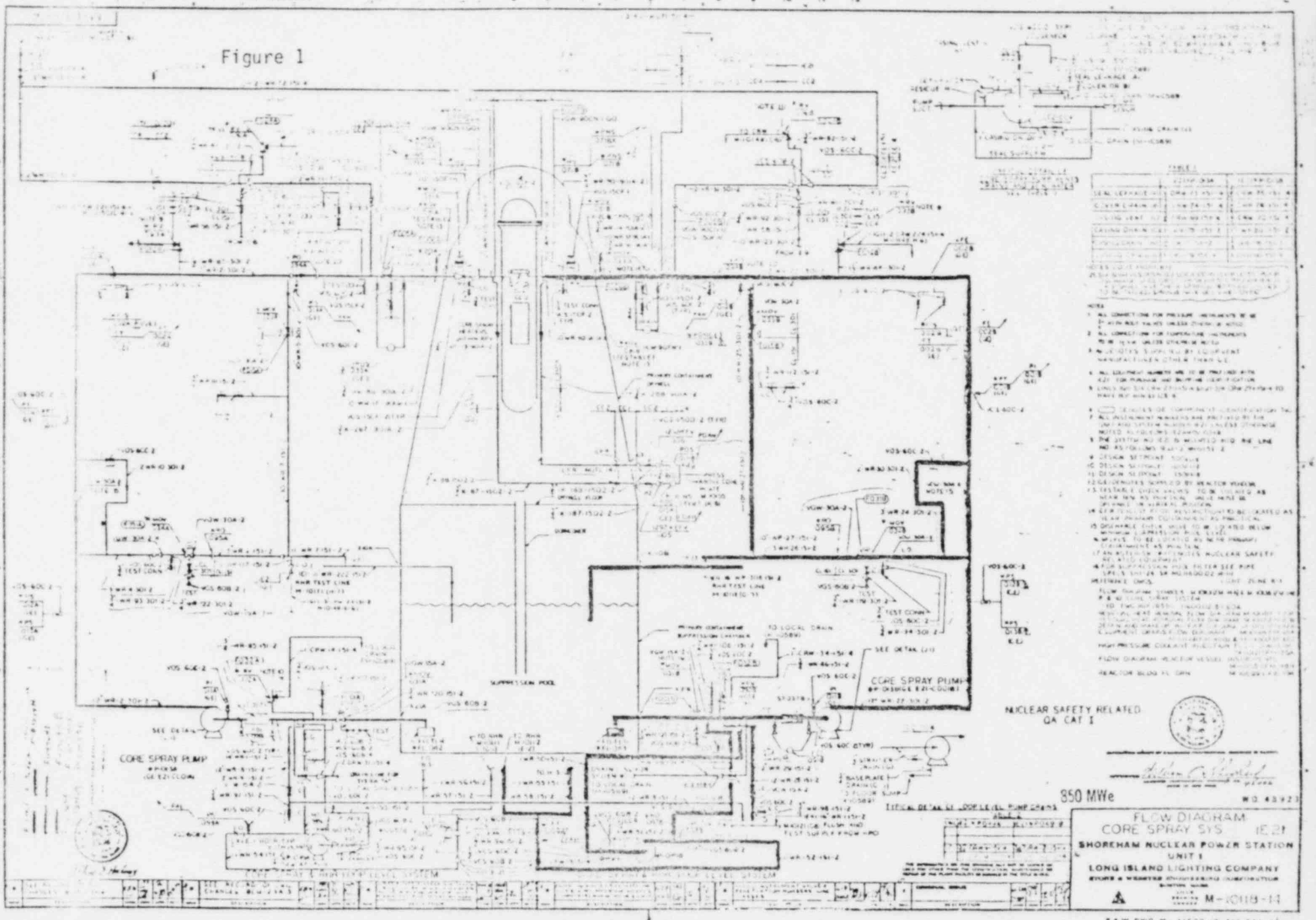
4.1 General

The following sections discuss the detailed implementation of each task outlined in Section 3.0 above. It is anticipated that some tasks will proceed in parallel while implementation of others will be dependent on completion of associated tasks. Terminology is used in the following task descriptions that may not be particular to S&W and/or LILCO. However, the intent is to define scope and method and terminology can be revised to suit the particular organizations involved.

4.2 Task 1 - Design Process and Procedures

The reviewer will meet with S&W to determine what process is used in taking design requirements and developing construction drawings.

Figure 1


CORE SPRAY PUMP
CORE SPRAY PUMP
SUPPRESSION POOL
NUCLEAR SAFETY RELATED
QA CAT I
850 MWe
FLOW DIAGRAM
CORE SPRAY SYS
SHOREHAM NUCLEAR POWER STATION
UNIT 1
LONG ISLAND LIGHTING COMPANY
M-10118-11

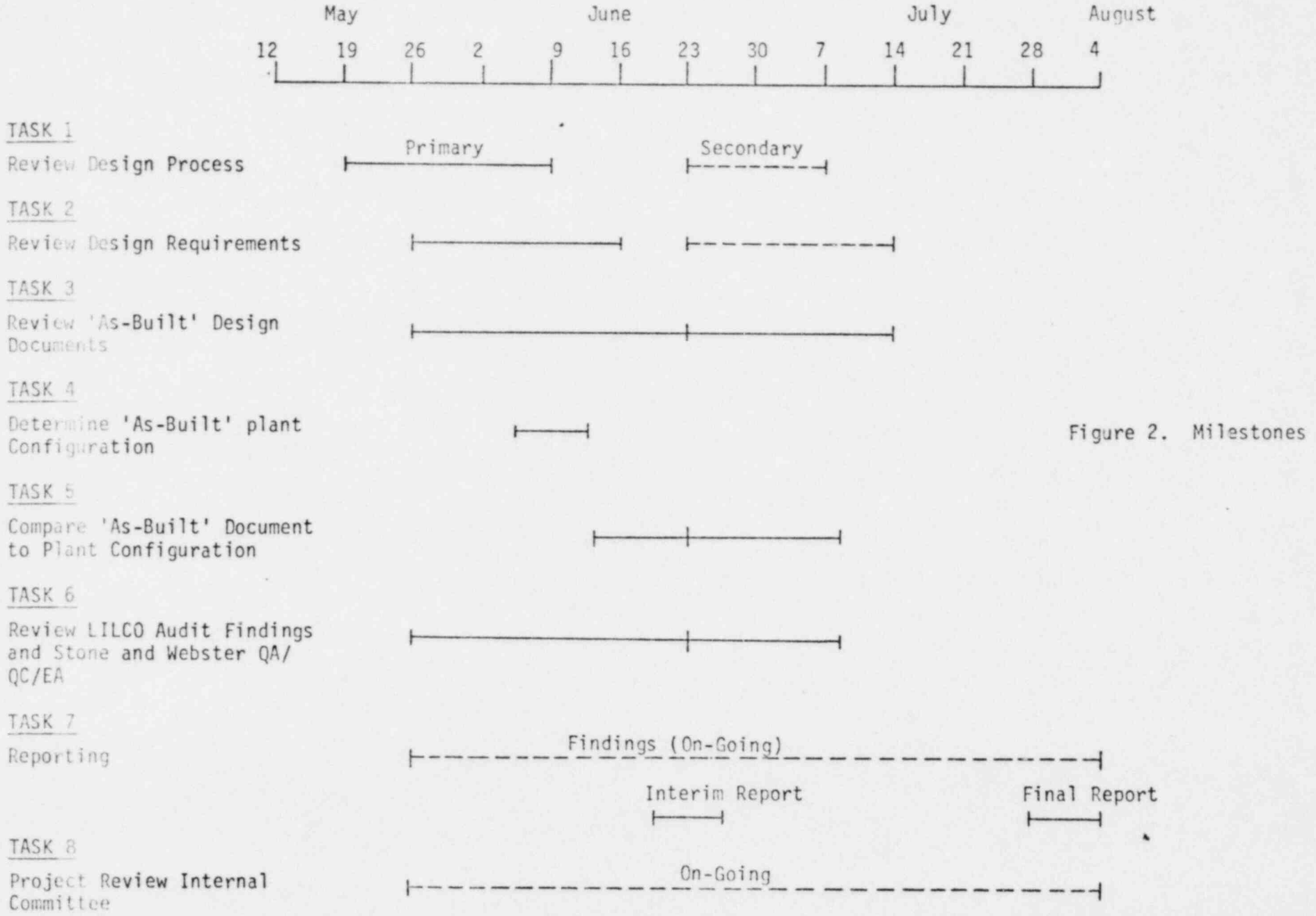


Figure 2. Milestones

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 the external organization

b) review of procedures

c) review of design

d) transmittal of developed information to vendor organizations

e) dealing with Field Change Requests (FCR)

f) dealing with Engineering Change Notices (ECN)

g) dealing with nonconformance and associated corrective action

Procedures, instructions and methods associated with developing the design of the LPCS system will be made available to the review-

er. The reviewer must become familiar with these procedures to assure that implementation was adhered to by the design organizations.

4.3 Task 2 - Review Design Requirements

The adequacy of the design requirements as delineated in the General Electric (GE) and S&W LPCS system specifications, standards and procedures will be reviewed for compliance with FSAR commitments and NRC requirements. This review will include piping, supports, pipe and floor mounted equipment and containment penetration.

The documents subject to review will be determined in Task 1.

4.4 Task 3 - Review As-Built Design Documents

The as-built documentation supplied by S&W will be reviewed to determine compliance with FSAR and Design Specification commitments. A detailed review of the Design Specification will be performed in Task 2 since that document forms the basis for the design approach. The review of as-built design documents will cover the piping, supports, and selected pipe or floor mounted mechanical and electrical components. Other mechanical and electrical components that have previously received third-party review by S&W or G.E. to current NRC (SQRT) guidelines, not reviewed in detail above, will be reviewed for satisfaction of interface requirements only.

4.5 Task 4 - Determine As-Built Configuration

A field walkdown of the system will be performed. This walkdown will develop the geometry of the as-built piping and supports for all accessible locations. Clearances at any penetrations, pipe whip restraints or other structures or components will be determined. The as-built stress isometric will be traced by TES. The TES isometric will

not include dimensions or support locations. This information will be obtained at the site. It is anticipated that a team of three individuals will require five to seven days at the Shoreham site to perform this task.

4.6 Task 5 - Compare As-Built Documentation to Plant Configuration

The reviewer will obtain from LILCO or S&W the as-built documentation which is specified to be representative of the plant configuration. The as-built configuration obtained in Task 4 will be compared with the submitted documentation.

The as-built documentation used in this task is the same package that will be used in the detailed review of Task 3. This package should represent revisions resulting from ECN's, FCR's and any applicable corrective action for nonconformance and therefore will allow TES to review the process of the design through a number of revisions.

4.7 Task 6 - Review LILCO QA and S&W QA/QC/EA Process and Documentation

The reviewer will obtain LILCO QA audit findings related to activities at S&W. The specific activities cited will be reviewed to determine if corrective action was taken and if LILCO audit personnel assured that this occurred. Audit schedules and implementation will also be reviewed.

With respect to S&W activities the following review will be performed on a sample basis.

a) training and qualification records of construction personnel

b) identification and control of material, parts and components

c) control of special processes

d) nonconformance and dispositioning report process

e) receiving inspection records

f) material certification records

g) NDE records

Additionally, the reviewer will obtain S&W QA and EA audit findings related to activities on the LPCS system at Shoreham. Schedule implementation and follow-up on corrective action will be reviewed.

4.8 Task 7 - Project Review Internal Committee

TES 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 any finding and assess the impact of the finding on the overall design adequacy of the LPCS system.

Potential findings determined to have an impact on design adequacy by this committee will be designated a finding and returned to the Project Manager for inclusion in the Final Report.

Potential findings that are not determined to have an impact on design adequacy will be returned to the Project Manager with accompanying discussion related to rejection by the committee. In this case, the Project Manager and/or the individual reviewer may appeal this decision to the TES 10CFR Part 21 committee for disposition.

4.9 Task 8 - Reporting

TES will provide reports to LILCO and the NRC on the following schedule assuming all needed information is transmitted to TES on a timely basis:

Findings - within three working days
of determination by TES

Initial Status Report - June 23, 1982

Final Report - August 4, 1982

The Initial Status Report will outline the progress to that date of the review and detail any findings which have been through the entire review process at that time. Areas which have been reviewed and are still under discussion by the review team on the internal committee will be noted without specification.

The final report will contain all findings which have been processed and found to be of significance in accordance with Task 7. For each finding, the report will document an assessment of its extent, evaluation of safety impact and recommendations. Observations and suggestions will also be listed with a discussion of their resolution by either the review team or the internal committee.

All reports, findings, observations and suggestions will become TES QA records and will be available for review by LILCO or the NRC.

5.0 PROJECT STAFFING

The TES project organization for the Independent Design Review of Shoreham Plant is shown in Figure 3. The TES standard organization is shown in Figure 4.

5.1 Project Management

The work outlined in this proposal will be conducted under the general direction of Mr. Donald F. Landers, Senior Vice-President. The

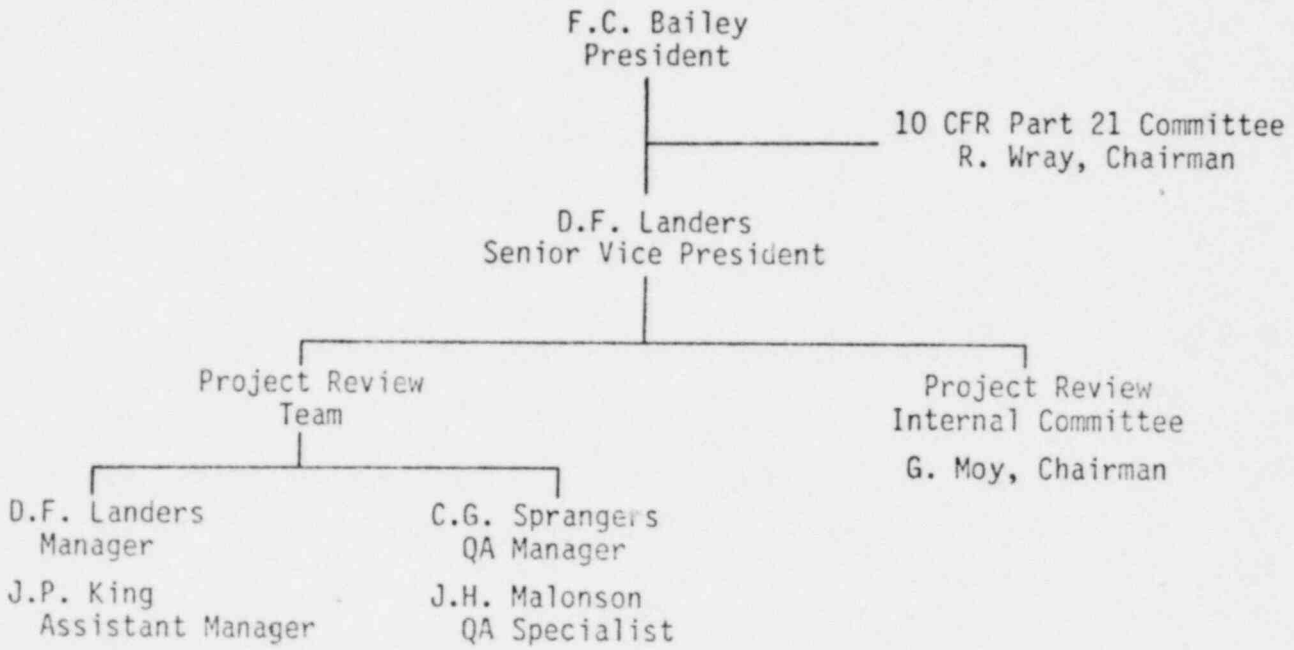


Figure 3. Shoreham Project Organization

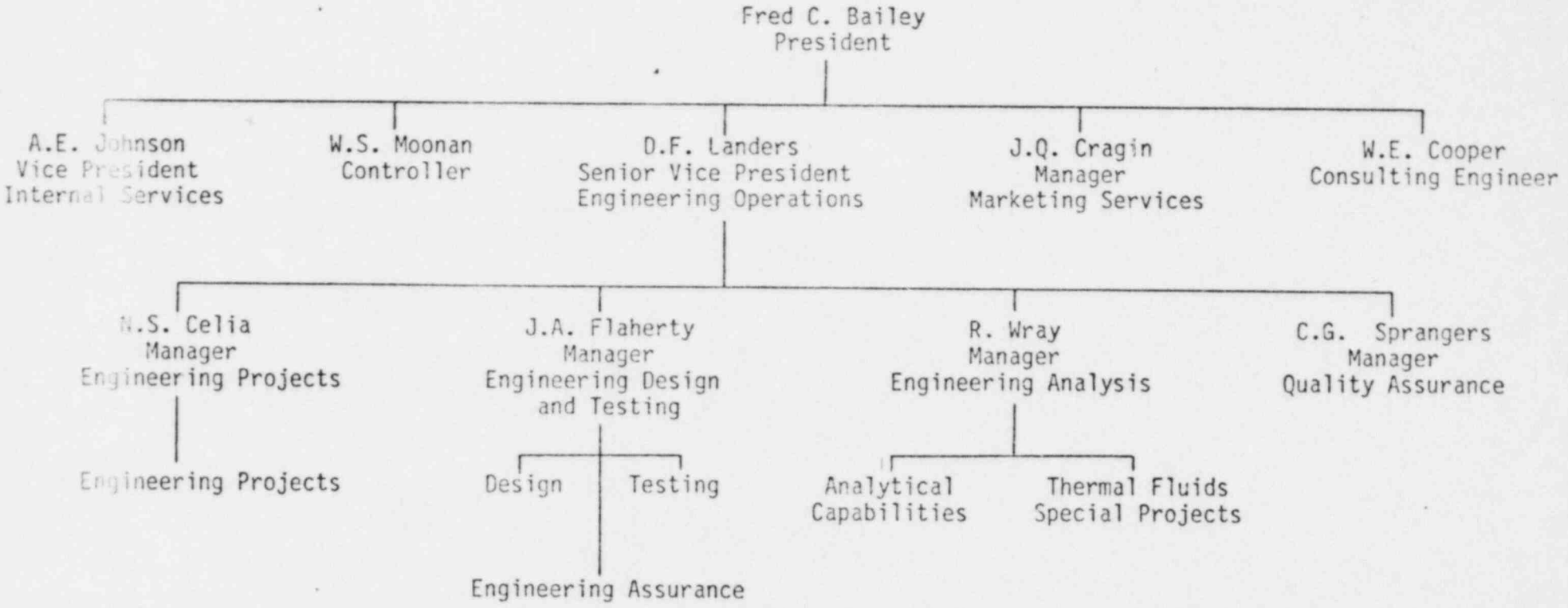


Figure 4. TES Organization

Assistant Project Manager for TES will be Mr. James P. King, Manager, Class 1 Piping. A listing of TES personnel assigned to this project, along with a copy of their professional resumes, is presented in the Appendix to this report.

5.2 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 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. George Moy, Manager, Analysis, will chair this committee.

6.0 INDEPENDENCE

TES has not been under contract to LILCO to perform any design work associated with the Shoreham project. With respect to the design agents involved, TES has not been under contract to S&W or GE to perform any work associated with the Shoreham project. TES has been under contract in the past with GE to provide services but in the past five years none of these were with the NSSS division. TES is currently under contract to S&W to provide services related to analysis of Class 1 piping for a plant other than Shoreham. This contract was awarded at the direction of the utility and S&W, as the utilities agent, administers the contract.

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

(1) Key project personnel shall have no present or past work experience in design, construction or quality assurance of the Shoreham Nuclear Power Station or LILCO.

(2) No project personnel or members of their immediate family (parents, spouse, children and grandchildren) shall be employed by LILCO, S&W or GE.

(3) During the term of the project no project personnel and their immediate family shall have cumulative ownership interest in LILCO, S&W or GE which exceeds 5% of their gross family income.

The most important factor in completing this 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. Their integrity must be such that they are regarded as a reputable company or individual.

7.0 COMPANY QUALIFICATIONS

7.1 General

TES is a consulting engineering firm headquartered in Waltham, Massachusetts with a West Coast Office in Hayward, California. TES has grown from the consulting engineering practice originated in the late 1930's by Professor John M. Lessells of MIT. The present organization is the result of incorporation in 1949, acquisition by Teledyne, Inc. in 1966, and the adoption of the current name in 1976. Clients include utilities, architect-engineers, manufacturers and government agencies.

The diversity of problems addressed by the staff is equally broad: from plant modification projects to fatigue testing; from ultrasonic evaluation of pressure components to sophisticated dynamic analysis of structures.

Most of the senior staff are registered professional engineers, hold graduate level degrees, and are active in professional, technical society and code and standards development activities. Their backgrounds embrace mechanical, civil, structural, electrical and metallurgical engineering.

7.2 Specific

A brief discussion on some of the services offered by TES follows:

7.2.1 Plant Modification and Construction

Design layouts, feasibility studies, analysis, fabrication and construction drawings, material procurement, technical on-site field support, project and construction management are offered to the industry. TES has completed a number of projects involving plant modifications associated with increasing plant efficiency, repairs, upgrading of systems and components and NRC regulatory requirements. TES can assemble a project staff on short notice to provide efficient, timely and experienced services in this area. We have a staff that is experienced in providing the required engineering, material procurement, procedure preparation and management in the time frame associated with refueling outages. Our participation in code and standards preparation activities provides our staff with a comprehensive understanding of regulatory and code requirements associated with repairs and replacements.

7.2.2 Piping Design and Analysis

TES is one of the leaders in the industry in providing piping design and analysis services. Our staff has over 20 years of experience in this area and has provided guidance to the industry in developing criteria, solving operating problems, and qualifying design techniques. TES services range from the design and analysis of new systems to resolving inservice problems such as vibration. A brief list of services follows:

- Design and analysis per ASME Section III and ANSI B31.1
- Deadweight, thermal expansion, seismic and time-history analysis
- Fluid dynamics associated with rapid opening and closing valves such as relief valve operation or turbine trip conditions
- Heat transfer analysis to determine effects of thermal fatigue
- Pipe rupture and pipe whip analysis
- Associated pipe support design

An integral part of the piping services provided is the design and analysis of associated supports and structures. TES has developed unique techniques for designing and analyzing supports and has developed a piping guide which allows in-situ support of piping systems.

7.2.3 Structural Analysis

TES has extensive experience in the design and analysis of reinforced and prestressed concrete structures as well as steel structures subjected to both static and dynamic loads. Our experience ranges from the analysis of concrete structures due to dynamic fluid loads to the seismic response of reactor and auxiliary building structures. We are currently involved in the design modification analysis of five Mark I containment structures subjected to hydrodynamic loads associated with suppression pool loading.

7.2.4 Mechanical and Materials Testing

TES has the capability and equipment available to perform static, dynamic and fatigue testing of materials and components. Extensive experience in developing and providing instrumentation for measuring strain, pressure, displacement, frequency and acceleration exists at TES. The capability of bringing together testing and experimental techniques provides TES clients with a unique combination. In the solution of an engineering problem TES can combine both analytical and experimental capabilities to provide a definitive result free from many of the assumptions which may be required in using purely analytical techniques. Two examples of this approach are: (1) The analytical-experimental solution used by TES to resolve the variables associated with responding to NRC I&E Bulletin 79-02. This work involved the experimental development of shear-tension interaction curves and fatigue resistance of concrete expansion anchor bolts as well as the analytical development of a computer program to analyze baseplate and anchor bolts used by the fifteen utilities who participated in the TES generic program. (2) For Mark I torus structures the loads generated in the generic program for main steam relief valve operation were excessively high and TES instrumented the torus structure with strain gages and pressure transducers during actual relief valve operation. The data

resulted in loads which were significantly less than those specified and significant modifications were avoided.

7.2.5 Fracture Mechanics and Flaw Detection

TES has extensive experience in the use of fracture mechanics techniques to determine the ability of a component or structure to accommodate existing flaws without failing. This capability has been applied to a large number of components in nuclear plants throughout the world resulting in continued plant operation.

Services in nondestructive examination techniques are also provided by TES. The staff includes experienced Level III examiners in the fields of ultrasonic, magnetic particle, and liquid penetrant examinations and in radiography interpretation. In addition to performing these examinations TES has provided services in examination procedure development, personnel qualification and auditing of examinations by others.

7.2.6 General Consulting Services

Based on the broad background of experience and the expertise of members of the staff, TES provides general consulting services to the industry in a number of areas associated with criteria development, specification preparation, Code interpretation, licensing activities and design and construction reviews.

APPENDIX

Resumes

The following TES personnel are assigned to the Independent Design Review for the Shoreham Nuclear Power Station. A copy of their professional resume is presented herein.

Donald Landers
George Carpenter
Cornell Sprangers
James Tsacoyeanes
James Malonson
William McBrine
James Ondzes
Ronald Wray
George O'Connor
Robert Hookway
Val Chauhan
Stanley Levine
Leo Barron
Eric Woods
George Moy
James King
Richard Enos
Eric Solla
Stanley Wharton
Herkea Jea

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

(over)

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

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

RONALD WRAY
Manager, Engineering
Analysis

Professional Resume

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 analyses 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 analysis 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 an 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 an steel erection.

Membership

ASME, Boiler and Pressure Vessel Code, Chairman, Special Working Group on Dynamic Analysis.

TELEDYNE
ENGINEERING SERVICES

CORNELIS G. SPRANGERS
Manager, Quality Assurance

Professional Resume

Education

The Hague, The Netherlands, A.B., Industrial Relations, 1957

Experience

Teledyne Engineering Services, and Teledyne Materials Research, since 1972: Quality Assurance of ASME Section III Components; Engineering Computations Supervisor.

Smithsonian Astrophysical Observatory, Section Manager, Upper Atmospheric Studies, 1962-1971.

Mutual Administration Office, The Hague, Group Supervisor, Evaluation of legal cases relative to the Social Laws and its jurisprudence, 1953-1960.

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

JAMES P. KING
Manager, Class 1 Piping

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: From 1980 to present, management of Nuclear Class 1 piping and component analysis projects. Independent 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 1972 to 1977: 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. Flexibility analysis of LNG and SNG piping systems.

Lowell Technological Institute Research Foundation, 1967-1972: design and packaging of 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

RICHARD A. ENOS
Manager, Projects

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, BORSOR-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

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

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.

10/81

TELEDYNE
ENGINEERING SERVICES

VAL M. Chauhan
Senior Engineer

Professional Resume

Education

Detroit Institute of Technology, B.S. in Civil Engineering, 1971
California State University, San Jose, completed 18 units out of 30 units for M.S. in Civil Engineering, 1973

Experience

Teledyne Engineering Services, 1982: Nuclear power piping and pipe support analysis per ASME Section III.

Enconi, Inc., 1981: Contract Engineer to Bechtel Power Corporation. Designing and reviewing pipe supports and anchors for ASME Class I, II, and B31.1 piping systems.

Pacific Gas and Electric Company, 1974-1981: Lead Engineer. Reviewed the stress analysis performed by other engineers. Developed response spectra for appropriate pipe. Developed criteria for NRC Bulletin 79-14 for acceptable deviation. Developed criteria for pipe support design.

Bechtel Power Corporation, 1973-1974: Structural steel design for colstrip units 3 and 4.

URS/John A. Blume Associates and Engineers, 1971-1973. Performed seismic analysis of piping systems for Diablo Canyon Nuclear Power Plant, Units 1 and 2. Reviewed the analysis performed by other engineers, located pipe supports, developed response spectra for seismic analysis.

Authorship

"Seismic Evaluation of Piping and Supports at Diablo Canyon Site Units 1 and 2, for the Postulated Hosgi Earthquake," presented at ASME, Pressure Vessels and Piping Conference, San Francisco, California, June 25-29, 1979.

TELEDYNE
ENGINEERING SERVICES

GEORGE E. O'CONNOR
Senior Engineer

Professional Resume

Education

Rochester Institute of Technology, B.S. in Mechanical Engineering, 1968
New York State Maritime College, 1962 - transferred to RIT after 3 years
Qualified, Engineering Officer of the Watch SIC Nuclear Plant

Experience

Teledyne Engineering Services, 4/82 to present: Senior Engineer in projects.

Stone and Webster Engineering Corporation, 9/81 to 4/82: Principal Nuclear Engineer on the Boston Edison continuing services contract in the Operations Service Division.

Teledyne Engineering Services, 1/80 to 9/81: Senior Project Engineer on BWR Mark I containment modifications per the ASME Codes, including specification, purchasing, calculations and utility/AE/Fabricator interface; also Assistant Project Manager for the Nine Mile Point Control Rod Drive Discharge Modifications in charge of specification and purchase of all material based on pipe and support calculations.

Yankee Atomic Electric Company, 11/75 to 1/80: Senior Mechanical Engineer performing analysis, specification, and project management for the Maine, Vermont, and Rowe Nuclear Plants; Chairman of the Technical Review Committee on the Mark I BWR containment program which was a 45 million dollar test and analytical effort funded by 16 utilities; Project Engineer during outages for modifications, approving all procedures after specifying the jobs to fabricator installers.

Knolls Atomic Power Lab, 6/73 to 11/75 and 6/68 to 11/71: Core design and materials testing for Naval Nuclear plants; Mechanical Engineer at the SIC nuclear prototype site on plant maintenance, testing, and refueling outage planning; qualified as Engineering Office of the Watch, trained naval officers to operate the plant, and was responsible for supervision of site personnel.

Combustion Engineering, 6/71 to 6/73: Design Engineer on several CE nuclear plants in the NSSS structural support areas.

Membership

Registered Professional Engineer, State of Texas

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

3/31

TELEDYNE
ENGINEERING SERVICES

STANLEY D. LEVINE
Project Quality
Assurance Specialist

Professional Resume

Education

Roger Williams College, Providence, Rhode Island, A.S. in Mechanical Engineering, 1972 and B.S. in Industrial Engineering, 1972

ITT Grinnell Corporation, Providence, Rhode Island, 1974-75; UT, PT and MT Certificates

Experience

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

Ebasco Services Corp. of New York and Elcen Metal Products Co. of Smithfield, Rhode Island, 1976-79: Quality Assurance Engineer (Lead Auditor ANSI N45.2.23) on nuclear projects per ANSI, ASME and Regulatory Guides' requirements. Internal audits, vendor surveillances and material source inspection. Assisted in the development of Quality Assurance Program and Award of ASME NPT and MS Certificate of Authorization.

ITT Grinnell Corp., Providence, Rhode Island, 1974-76: Quality Control Manager-Industrial Piping Laboratory, for nuclear related items.

TELEDYNE
ENGINEERING SERVICES

ERIC A. SOLLA
Project Engineer

Professional Resume

Education

Rensselaer Polytechnic Institute, M.S. in Civil Engineering, 1977.

Rensselaer Polytechnic Institute, B.S. in Civil Engineering, 1976.

Experience

Teledyne Engineering Services, 1979 to present: Stress analysis of piping systems and piping support systems including seismic analysis using criteria of ASME Section III. Analysis of restraints for piping in nuclear power plants relating to NRC IE Bulletin 79-02 and 79-14. Field inspection and design of modifications for pipe restraints using latest AISC specifications. Field inspection of electrical equipment for IE Information Notice 80-20.

American Electric Power Service Corporation, 1977 to 1979: Analysis and design of concrete walls and slabs, footings, pile foundations, sheet pile retaining walls and cofferdams. Stability analysis of a hydroelectric plant relative to ACI standards.

Membership

Engineer-in-Training, New York.

TELEDYNE
ENGINEERING SERVICES

STANLEY D. WHARTON
Project Engineer

Professional Resume

Education

Northeastern University, Associate Degree, 1980
Northeastern University, Courses leading to Bachelors Degree, 1980-1981

Experience

Teledyne Engineering Services, Teledyne Materials Research, since 1971: reduction and analysis of data from ship hull bending research programs; detail, layout and isometric drawing of nuclear power plant piping and support systems; material testing and failure analyses of system components. Analytical work in flexibility, thermal and finite element analysis in accordance with ANSI B31.1, B31.3, B31.7 and ASME Section III Class 1 and Class 2 nuclear power piping. Participated in field surveys at nuclear plants. Supervised piping analysis in California for two years.

TELEDYNE
ENGINEERING SERVICES

WILLIAM J. McBRINE
Project Engineer

Professional Resume

Education

Northeastern University, B.S. Civil Engineering, 1979

Experience

Teledyne Engineering Services, June 1979 to present: static and seismic analysis of nuclear power piping systems and related components utilizing finite-element techniques and large-scale digital computer solutions. Structural analysis and design of piping restraints and related framed structures performed in accordance with applicable ASME codes; preparation of technical reports.

Congdon Gurney & Towle Inc., Engineering Assistant, 1977 to 1979: highway and bridge layout design.

Town of Weymouth Engineering Dept., Engineering Assistant, 1975 to 1977: land surveying and construction supervision.

Membership

American Society of Civil Engineers
Engineering-in-Training, Massachusetts

TELEDYNE
ENGINEERING SERVICES

Leo E. Barron
Engineer

Professional Resume

Education

University of Lowell, B.S., Mechanical Engineering, 1981

Experience

Teledyne Engineering Services, June 1981 to present: static and seismic analysis of nuclear power piping systems per NC-3650 Piping codes of the ASME - BPVC.

Membership

Engineer-in-Training, State of Massachusetts

TELEDYNE
ENGINEERING SERVICES

HERKEA JEA
Engineer

Professional Resume

Education

Feng Chia University, B.S. in Civil Engineering, 1976
University of Iowa, M.S. in Civil and Environmental Engineering, 1981

Experience

Teledyne Engineering Services, July 1981 to Present: Theoretical stress analysis, analysis of nuclear power piping per ASME Code Section III with computer aid.

Uni-Tech Engineering Consulting Company, July 1978 - August 1979: Structural analysis, bridge and building design for structural steel, reinforced concrete and prestressed concrete.

Republic of China Air Force, 1976 - 1978: Engineering Officer, responsible for design, inspection, construction, maintenance and estimation of permanent equipment.

Membership

American Concrete Institute, since 1979
Prestressed Concrete Institute, since 1979
Engineer-in-Training, State of Iowa

TELEDYNE
ENGINEERING SERVICES

JAMES J. ONDZES
Engineer

Professional Resume

Education

Boston College, B.S. in Finance, 1965 evenings
Northeastern University, 1980 to present, academic courses toward an Engineering degree

Experience

Teledyne Engineering Services and Teledyne Materials Research, since 1967: In charge of all computer room operations up until 1976. 1976 to present: Stress fatigue and thermal analyses of nuclear power piping systems and components, including use of appropriate computer programs, familiarity with applicable drawings, specifications and codes. Preparation of stress reports to ASME Code, Section III, field assignments at nuclear power plants, duties included piping systems audits and field verification in response to NRC IE Bulletins 79-02 and 79-14.

TELEDYNE
ENGINEERING SERVICES

ERIC K. WOODS, JR.
Engineering Assistant

Professional Resume

Education

Wentworth Institute of Technology, Electronic Engineering, Evening Division, 1979 - 1980

Northeastern University, Engineering Curriculum, 1981 - 1982

Teledyne Engineering Services, Ultrasonic Measure, Utilization of Strain Gauges Class 1 Weld Inspection, Quality Assurance Training

Experience

Teledyne Engineering Services March 1982 to present: responsibilities include project coordinator for field surveys and independent design reviews.

June 1981 to September 1981: Piping analyst; responsibilities include checking and revising models for Class 1 piping, calculating static and dynamic forces, utilization of computer programs for finite element analysis.

January 1981 to June 1981: contracting to Northern States Power Company, Redwing, Minnesota, assemble and record information pertaining to Class 1 electrical equipment for seismic analysis, weekly reports to project engineer.

April 1980 to January 1981: Laboratory technician responsible for design and fabrication of test fixtures. Running test specimen for nuclear and aeronautical application at elevated and cryogenic temperatures.

August 1979 to April 1980: contracting to Boston Edison Company, responsibilities included weld inspection in field and in shop. Drawing verification, daily log, weekly reports.

March 1979 to August 1979: contracting to Northern States Power Company, Response to NRC letter to the utilities. System walkdowns, ultrasonic inspection, drawing verification.