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PROPOSAL FOR
THIRD PARTY CONSTRUCTION
IMPLEMENTATION OVERVIEW
MIDLAND NUCLEAR COGENERATION
PLANT
CONSUMERS' POWER COMPANY

April 1, 1983

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Prepared by
STONE & WEBSTER

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STONE & WEBSTER MICHIGAN, INC.

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Mr. J. W. Cook
Vice President
Midland Project, Engineering and Construction
Consumers Power Company
1945 West Parnell Road
Jackson, MI 49201

April 1, 1983

Dear Mr. Cook:

THIRD PARTY CONSTRUCTION IMPLEMENTATION OVERVIEW MIDLAND NUCLEAR COGENERATION PLANT

Stone & Webster Michigan, Inc. (Stone & Webster) is pleased to provide this qualification document which describes Stone & Webster's capabilities for reviewing the Construction Completion Program at the Midland Nuclear Cogeneration Plant. The document consists of the following three sections:

- Section 1 - Qualifications
- Section 2 - Approach, Schedule, Organization, and Resumes
- Section 3 - Demonstration of Independence, Signed Affidavits

Qualifications

Stone & Webster has been a leader in the development of nuclear power since participating in the effort that produced the first self-sustained nuclear chain reaction at the University of Chicago in 1942. Since that time, Stone & Webster has completed the engineering, design, and construction of over 20 nuclear units. Stone & Webster has also performed backfits, modifications, and support activities for many nuclear plants, including those designed and built by other Engineer-Constructors. In addition, Stone & Webster has served as a third party reviewer of the engineering, design, and construction work, of others. These reviews have been conducted for Babcock & Wilcox Company, Georgia Power Company, Houston Lighting & Power Company, New Brunswick Electric Power Commission, Pacific Gas & Electric Company, Power Authority of the State of New York, and Washington Public Power Supply System. Details of Stone & Webster's experience and capabilities for serving as a third party overviewer of nuclear power plant work, including resources available to support that effort, are contained in Section 1.

Approach, Schedule, Organization and Resumes

A site assessment team and senior overview committee will be used to identify and report findings regarding performance of the Construction

April 1, 1983

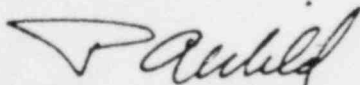
Completion Program. The site team will include an experienced Program Manager assisted by two functional leaders. One functional leader will be responsible for assessing the adequacy and completeness of procedures and inspection plans including quality assurance, quality control and installation work packages, and the other functional leader will be responsible for reviewing certain aspects of construction activities which relate to the performance of the Quality Control Inspection Program and installation activities. Each functional leader will be supported by qualified and experienced engineers and inspectors. Findings of the team will be submitted through the overview committee. Details of the approach and organization are contained in Section 2, along with a summary schedule and resumes of key individuals.

Demonstration of Independence

Stone & Webster will conduct the assessment of the Construction Completion Program in an independent manner. Stone & Webster has conducted an internal review of its records from January 1, 1978 to February 28, 1983, a period of five years, to demonstrate compliance with the specific independence of this program. Stone & Webster and its affiliated companies have performed an amount of work for Consumers Power Company (CPCo) since 1978 that represents only a very small portion of its business. Tasks that Stone & Webster has performed on the Midland Plant include assistance with spare parts and materials management, evaluation of the emergency plan, enhancement of the operations integration plan, and third party review of soils remedial work. This role has not involved any direct engineering or construction work. Neither Stone & Webster, Inc. nor any of its subsidiaries own a beneficial interest in CPCo. Stone & Webster's Employee Savings Plan and Retirement Plan are administered by banks as trustees and the Retirement Plan holds no CPCo securities. Also, all key technical personnel who will be assigned to the project will be required to sign a disclosure statement as to any beneficial interest by them or their immediate family in CPCo, as to any involvement they may have had in the design and construction of the Midland plant, and as to any members of their immediate family working for CPCo. The signing of this disclosure statement will be a precondition to assignment to the project. Stone & Webster believes that the above demonstrates the independence of Stone & Webster's participation in the assessment of the Construction Completion Program. Demonstration of independence is more fully discussed in Section 3.

Stone & Webster's qualifications amply support the requirements for this task. If you have any questions or need additional information, please call me at (617) 589-5569 or Mr. C. F. Sundstrom at (617) 589-2780.

Very truly yours,



P. A. Wild
Vice President

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DBMiller-CPC



SECTION 1
QUALIFICATIONS

1.1 ASSESSMENT OF WORK OF OTHERS

Stone & Webster has been involved in the review of work being performed by other engineer-constructors on power plants in the engineering, design, and construction stage. The scope of these services includes design, schedule, and estimate reviews. The following are major examples of these projects.

Indian Point Unit No. 3

In 1974 at the request of the Power Authority of the State of New York (PASNY), Stone & Webster investigated the engineering, design, construction, permits, operations, quality assurance, scheduling, and environmental considerations in support of PASNY's purchase of the unit from Consolidated Edison Company of New York.

Using criteria set forth in the Final Safety Analysis Report (FSAR), AEC Safety Evaluation Reports, Technical Specifications, and the Environmental Report, Stone & Webster assessed the following:

1. The physical plant including Stone & Webster's opinions as to percent completion, operability, anticipated reliability, aspects of public safety, redundant features, and overall quality of work.
2. The ultimate successful operability of the facility, giving particular consideration to such areas as: permits and licenses required by government agencies; separation criteria; possible future retrofitted hardware; equipment support criteria for piping and cable trays; outstanding "apparent deficiency" items set forth in AEC/NRC records; operator training, availability and qualifications; interdependence with existing units at the Indian Point site; compliance with applicable codes; preoperational testing program status and adequacy; and external sources of power.
3. Estimated dates for fuel loading and operation supported by Stone & Webster's observations of construction completion, the status of procedures, and a preliminary operations progress network.
4. Comments and observations regarding existing nuclear fuel contracts. (A complete evaluation of the nuclear fuel contracts was the responsibility of PASNY.)
5. Quality assurance program adequacy and compliance thereto.
6. Facilities shared between units and an opinion on the degree of desirable separation.

7. An estimate of the cost to complete the total facility, to be verified upon receipt of supporting data from Arthur Young & Company and from PASNY.

Babcock & Wilcox

In April 1975, The Babcock & Wilcox Company (B&W), Lynchburg, Virginia, requested Stone & Webster to provide technical assistance for a design audit of its German subsidiary's (Babcock-Brown Boveri Reaktor GMBH - BBR) Muelheim-Kaerlich (M-K) project. The M-K plant uses a B&W 205 reactor plant and is owned by the German utility Reinisch-Westfaelisches Elektrizitaetswerk AG (RWE). The project was approximately two years into design with the first concrete pour scheduled for June 1975. Stone & Webster assembled a project team, prepared a schedule, and defined audit tasks.

The Stone & Webster project team was instructed to review designs exclusive of the nuclear steam supply system (NSSS) and the turbine plant. Priority was placed on items which could adversely affect the forthcoming concrete pours or the plant's constructibility, maintainability, or operability. Audits were conducted to identify problems. Areas which were determined to be over designed and excessive in construction costs were also identified.

Point Lepreau Generating Station

Stone & Webster has been operating in support of the New Brunswick Electric Power Commission at the Point Lepreau Generating Station. A team has reviewed the Commission's compliance to applicable Canadian Standards, evaluated completed and open work items and assisted in upgrading of systems and procedures and completion of work necessary to bring the station to commercial operation. Stone & Webster provided engineering support to the Commission for the preparation of operating license documents for submittal to the AECB. Stone & Webster provided Quality Assurance support in developing and implementing a Quality Assurance Program during pre-operational testing and startup. Implementation of this program involved field inspections, validation of test proceedings and audits of test and startup activities.

Washington Public Power Supply System (WPPSS)

Stone & Webster was engaged by WPPSS to assess the accuracy of the 1980 revised estimates for five nuclear power plants under construction. This assessment, including the review of schedules, cost estimates, progress to date, and remaining work to complete the review, culminated in both oral and written reports to the WPPSS Board of Directors.

Vogtle Nuclear Generating Station

Stone & Webster was engaged by Georgia Power Company to conduct an independent review of the Vogtle Plant construction schedule. This review included an assessment of the construction sequence, scheduling and duration of the schedule based on Stone & Webster's experience in



nuclear plant construction. Stone & Webster also recommended innovative construction methods which might shorten the overall schedule.

Astoria Generating Station - Unit No. 6.

An investigation similar to that described above for Indian Point 3 was also conducted at Astoria 6 (825 MW, oil fired), then about 50 percent complete, in support of PASNY's purchase of that unit from Consolidated Edison. Subsequent to the investigation, Stone & Webster was retained for construction management responsibility and completed the unit.

South Texas Project

Stone & Webster has completed an estimate evaluation of the South Texas Project for the Houston Lighting and Power Company. The work included a slippage analysis of cost and scheduling in response to questions raised by the Texas Public Service Commission.

Diablo Canyon - Unit No. 1

Stone & Webster is assisting TELEDYNE in the design verification of the Diablo Canyon Nuclear Power Station for Pacific Gas and Electric Company. Stone & Webster Quality Assurance personnel performed extensive evaluation of selected physical installations and contractor quality programs to support this activity. Stone & Webster in performing this function was acting as independent reviewer/verifier of previously conducted work.

1.2 NUCLEAR PLANT DESIGN AND CONSTRUCTION EXPERIENCE

Stone & Webster has been a leader in the development of nuclear power since its participation in the effort which resulted in initiating the first self-sustaining nuclear chain reaction at the University of Chicago in 1942. The Corporation's experience covers projects ranging from nuclear research facilities to heavy and light water-moderated and gas-cooled nuclear power plants.

Stone & Webster assisted in the design of the first commercial-scale nuclear power plant in the United States at Shippingport, Pennsylvania, and later completed such pioneering projects as the Army Package Power Reactor, the Yankee Nuclear Power Station at Rowe, Massachusetts, and the Carolinas Virginia Prototype Nuclear Power Plant at Parr Shoals, South Carolina.

For the Carolinas Virginia Plant, Stone & Webster performed engineering and construction inspection for the only commercial heavy water-moderated pressure tube reactor to be constructed in the United States. This demonstration plant had a net electrical output of 17,000 kW and generated over 200 million kilowatt hours before plant retirement in 1967. For this plant, Stone & Webster conceived and designed a reinforced concrete containment now in common use on nuclear plants.

Since 1968, nine large nuclear generating units have been designed, constructed, and placed in operation by Stone & Webster.



S&W is currently engaged in activities in support of approximately 50 nuclear units. S&W designed, engineered and/or constructed 10 of these units, which have reactors furnished by four U.S. reactor manufacturers - pressurized water by Babcock & Wilcox Company, Combustion Engineering, Inc., and Westinghouse Electric Corporation, and boiling water by General Electric Company, for a total capacity in excess of 8,000 MW. In addition, S&W is conducting work on five nuclear units in varying stages of engineering, design and construction totaling over 4,000 MW of capacity. These include: Millstone 3, Beaver Valley 2, Shoreham, Nine Mile 2, and River Bend 1 as listed in Table 1-1.

In May 1976, Stone & Webster was the first engineer-constructor to have its standard (reference) nuclear power plant design approved by the NRC. This reference plant uses the Westinghouse 1,300 MWe RESAR-41 reactor. Since then, the NRC has issued preliminary design approvals for a Stone & Webster reference plant that uses the 1,300 MWe CESSAR-80 reactor of Combustion Engineering, Inc. Application for a reference plant using 1,300 MWe BSAR-205 reactor of Babcock & Wilcox has been submitted to the NRC.

NUCLEAR POWER PROJECTS

Power Authority of the State of New York - James A. FitzPatrick Nuclear Power Plant

The Power Authority of the State of New York selected Stone & Webster to provide design and supervision of construction of its 821 MW James A. FitzPatrick Nuclear Power Plant, located at Nine Mile Point, near Oswego, New York. The plant employs a boiling water reactor and commenced operation in 1975.

Niagara Mohawk Power Corporation - Nine Mile Unit 1 and 2

Stone & Webster was constructor for the 610 MW Unit 1 General Electric boiling water reactor plant. Construction began in 1965 and the station began commercial operation in 1969. Stone & Webster was selected to perform engineering, design, and construction management of Unit 2, also a General Electric boiling water reactor plant. Construction of the 1,100 MW station began in 1975 and commercial operation is scheduled for 1986.

Northeast Utilities Service Company - Millstone Point - Unit 3

Stone & Webster was selected as Engineer and Constructor of this 1,100 MW nuclear unit at the Millstone Point site on Long Island Sound. The unit utilizes a four-loop Westinghouse pressurized water reactor with a General Electric turbine. The once-through cooling system uses water from Long Island Sound. A construction permit was received in 1974 and commercial operation is scheduled for 1986.

Duquesne Light Company - Beaver Valley Units 1 and 2

Stone & Webster was retained by Duquesne Light Company as Engineer-Constructor for the 883 MW Unit 1 of its nuclear power plant at



Shippingport, Pennsylvania. Stone & Webster is also providing engineering and construction for the 883 MW Unit 2. Unit 1 was placed in operation in 1976. Both units have natural-draft cooling towers for their circulating water systems.

Long Island Lighting Company - Shoreham Power Station - Unit 1

Long Island Lighting Company selected Stone & Webster as Engineers and Construction Managers for Shoreham Power Station - Unit 1. During preliminary engineering, the unit size was increased from 540 MW to 820 MW. Intervenor's objections delayed receipt of the construction permit for this unit until April 1973. An underwater diffuser has been designed for the circulating water discharge to minimize thermal impact on Long Island Sound.

Virginia Electric and Power Company - Surry Units 1 and 2

Stone & Webster was the Engineer-Constructor for two 819 MW pressurized water nuclear units located in Surry, Virginia. The first unit was placed in operation in 1972 and the second in 1973.

Virginia Electric and Power Company - North Anna Units 1, and 2

VEPCO retained Stone & Webster as Engineer-Constructor for two 938 MW pressurized water nuclear units to be located on Lake Anna in Louisa County, Virginia. The reactors for Units 1 and 2 are provided by Westinghouse. Construction permits for these units were issued in 1971. Unit 1 was placed in operation in 1978 and Unit 2 in 1980.

Two additional PWR Units 3 and 4 by Babcock & Wilcox received construction permits in 1974. Work on these units was halted and the units were canceled.

Lake Anna was created by damming the North Anna River to form a large cooling reservoir. This man-made lake over 17 miles long with over 200 miles of shoreline is now a major recreational attraction. Provisions were made for flood control and flow control of the North Anna River.

Gulf States Utilities Company - River Bend Units 1 and 2

Stone & Webster is Engineer-Constructor for two 900 MW BWR nuclear units to be located North of Baton Rouge, Louisiana. A construction permit was received in 1975.

Maine Yankee Atomic Power Station

Stone & Webster was the Engineer-Constructor for the 825 MW Maine Yankee Atomic Power Station located at Wiscasset, Maine, the largest operating nuclear power plant in New England. The plant uses a Combustion Engineering pressurized water reactor and was placed in operation in 1972.



New York State Electric & Gas Corporation - Units 1 and 2

Stone & Webster was engaged by New York State Electric & Gas Corporation (NYSE&G) to engineer, design, and construct a two-unit reference nuclear power station. This utility was the first in the nation to choose a plant with all of its principal design features preapproved by the Nuclear Regulatory Commission. The twin 1,250 MW units were to be jointly owned by NYSE&G and Long Island Lighting Company. Commercial operation was scheduled for 1991 for Unit 1 and 1993 for Unit 2. The PSAR, ER and State PSC applications had been submitted in 1979 when work was stopped due to problems with state permits.

Nuclear Italiana Reattori Avanzati (NIRA) - CIRENE-Latina Prototype Plant

NIRA selected Stone & Webster to provide engineering services and consulting in design and construction of the CIRENE prototype plant. The plant, which is fueled with natural uranium moderated with heavy water and cooled with light water, has an electric power output of 40 MW. Stone & Webster assistance includes design review, stress analysis and pipe support design of the piping systems within the containment, design of radioactive waste system, conceptual design of the radioactive waste building, and review of specifications and procedures.

Project Management Corporation - Demonstration Liquid Metal Fast Breeder Reactor Plant

Late in 1975, Stone & Webster was selected by Project Management Corporation (PMC) to act as general construction contractor for the nation's first large-scale Demonstration Liquid Metal Fast Breeder Reactor Plant. Project Management Corporation was organized by the utility industry in 1972 to build and operate the LMFBR plant. In May 1976, management control of the Clinch River Breeder Reactor Plant (CRBRP) Project was transferred from PMC to the U.S. Department of Energy (formerly ERDA) in recognition of the Government's larger financial commitment.

The plant will be located on the Clinch River at Oak Ridge, Tennessee. The selection of Stone & Webster from a field of eleven competitors was significant since construction of the plant will be complex and the quality control requirements demanding.

San Diego Gas & Electric Company - Sundesert Nuclear Station

San Diego Gas & Electric Company selected Stone & Webster early in 1975 to design and construct two nuclear units of 975 MW capacity each at its Sundesert Nuclear Station. Each unit was designed for high seismic conditions using an innovative containment mat design to reduce requirements for excessive pipe/equipment seismic restraints. Additionally, due to lack of adequate water supply at the desert site, unique station makeup water treatment systems using agricultural waste water were designed and proven through pilot plant operation. Correspondingly, the station was also designed for zero liquid discharge from the site.



In 1978, San Diego Gas & Electric Company canceled further effort on the project pending satisfactory resolution of several bills passed by the California legislature which inhibited further nuclear power plant construction in the state.

General Public Utilities Service Corporation - Forked River Nuclear Generating Station

Stone & Webster was selected to provide construction management services for the two-loop, 1,120 MWe Combustion Engineering pressurized water nuclear power plant. This unit was subsequently canceled.

Long Island Lighting Company - Jamesport Units 1 and 2

Stone & Webster was selected by Long Island Lighting Company to provide engineering, design, and quality assurance services and to assist LILCO in the construction management of Jamesport Nuclear Power Station - Units 1 and 2. The unit was subsequently canceled.

General Atomic Company/Gas Cooled Reactor Associates

In the late 1960s, Stone & Webster was chosen to prepare several HTGR nuclear plant designs and cost evaluations for General Atomic. In 1968, a Balance-of-Plant design for a 1,000 MWe HTGR was completed. In the latter half of 1969, a Balance-of-Plant design for a 1,100 MWe HTGR unit, updating the original design, was completed and the competitive cost position of the HTGR versus those of other types of reactors was determined. Stone & Webster personnel are providing engineering support services on future HTGR development on a continuing basis for General Atomic Company and Gas Cooled Reactor Associates.

Water Reactor Design Studies

In addition to the work for utilities, reports and proposals for the Atomic Energy Commission (now the NRC) have been prepared by Stone & Webster. These included a 250 MW Advanced Pressurized Water Reactor Study, completed jointly with Combustion Engineering in 1959; a 400 MW Spectral Shift Control Reactor Study, completed jointly with Babcock & Wilcox in 1961; and a 1,000 MW Pressurized Water Reactor Study, completed jointly with Westinghouse in 1963. Conceptual designs were prepared for Allis-Chalmers for several boiling water reactors.

SPECIAL TECHNICAL CAPABILITIES

Licensing Experience with NRC

Stone & Webster has prepared Safety Analysis Reports, as well as Environmental Reports, for submission to the Atomic Energy Commission (now the NRC) as part of license applications. This work has included coordinating the preparation of the entire project with the owner and manufacturer, the preparation of technical sections, and final editing and reproduction.



In addition, Stone & Webster has prepared technical specifications for operating license applications. These specifications cover, in detail, plant system descriptions, equipment descriptions, operating parameters, general maintenance and operating instructions, and other special safety and engineering features.

During hearings on both construction permit and operating license applications, Stone & Webster personnel have assisted clients by providing information and expert testimony on siting, containment, foundation and structural design (especially related to earthquake analysis and design), engineered safeguards, auxiliary systems, and radioactive waste disposal.

Continual contacts with regulatory agencies are maintained to explore the acceptability of new nuclear concepts of safety and reliability and alleviate licensing concerns.

Radiological Emergency Response Planning

Stone & Webster's Radiological Emergency Response Planning Group has extensive experience in the field of radiological emergency response planning (RERP). To address the current regulatory requirements concerning emergency planning, Stone & Webster maintains a multi-disciplined staff of management, engineering, scientific, and planning personnel with demonstrated expertise in emergency plan development and implementation, radiation monitoring, meteorological assessment, communications, accident assessment, evacuability determination, personnel accountability, plan exercise and evaluation, personnel training, public prompt notification systems, and federal regulatory liaison. Stone & Webster staff activities include the review of emergency planning activities (state, county, local, and utility) with the Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA). This provides the necessary background to ensure that plans are responsive to NRC/FEMA requirements. Stone & Webster has also analyzed the potential radiological consequences of postulated accidents for Environmental Report (ER) and Safety Analysis Report (SAR) submittals. In addition, Stone & Webster has developed corresponding detailed emergency plan implementing procedures for state and local government agencies.

Stone & Webster maintains a complete library of work aids (e.g., generic plans for addressing the requirements of NUREG-0654, generic Emergency Plan Implementation Procedures, incident report messages, responsibility matrices, questionnaires, prepared public announcements, and detailed response procedures/checklists) that have proven to be an invaluable time saver in the developmental phase of a RERP. Through modification of these work aids, site-specific information is obtained by Stone & Webster's staff, organized in the desired format, and presented along with detailed implementing procedures as a comprehensive RERP.



Containment Design

Evolution

Stone & Webster designed a spherical steel shell for the Yankee Nuclear Power Station containment at Rowe, Massachusetts. The use of a steel-lined concrete structure which would serve as shielding as well as containment was used on the Carolinas Virginia Test Reactor (CVTR). Success of the CVTR containment was the basis for the choice of containment in Stone & Webster's design for the Connecticut Yankee plant at Haddam, Connecticut. This 135 ft diameter cylindrical structure with a hemispherical dome serves the three-fold purpose of housing, containing, and shielding the reactor. A further advance at Connecticut Yankee was the use of engineered safeguards required to meet AEC siting criteria. These facilities include a containment spray system and an internal air recirculation and filter system.

Subatmospheric Containment

In designing the Surry Power Station for Virginia Electric and Power Company, SWEC refined the Connecticut Yankee design developing a system called Subatmospheric Containment. During normal operation, the containment atmosphere is kept at about 9.5 psi absolute pressure. This arrangement lowers the peak accident pressure for a given containment volume, lowers containment cost, and allows the subsequent return to subatmospheric pressure within a short period of time.

Containment for Boiling Water Reactor Plants

A concrete pressure suppression containment (Mark II) was developed for the boiling water reactors at Shoreham Nuclear Power Plant of Long Island Lighting Company and at Nine Mile Point Unit 2 of Niagara Mohawk Power Corporation. In this containment design, the conically shaped vapor barrier and strength member are constructed and function as a unit for a boiling water reactor plant.

For subsequent projects, Stone & Webster participated with General Electric Company in the design of the Mark III concept which includes a secondary containment structure and cylindrical concrete dry well and suppression pool. These are surrounded by a concrete missile shield wall and roof.

Containment Computer Program

Stone & Webster has developed digital computer programs to determine containment structure design parameters (design temperature, pressure, and size) and to evaluate the performance of engineered safeguards, following a loss-of-coolant accident. In these programs, the containment and safeguard systems are optimized by studying combinations of variables, such as coolant blowdown, heat sources and sinks, metal-water reactions, and static and dynamic engineered safeguards (particle filters, fans, sprays, and safety relief). These programs provide an



analytical tool for nuclear safety analysis. Other programs are available for earthquake analyses, finite difference analyses for shell structures, tornado wind analyses, and high energy impact studies.

Nuclear Engineering

Stone & Webster Nuclear Technology Division provides technical services required for analysis, design, and other tasks usually referred to as Nuclear Engineering. These involve nuclear safety systems, radiological engineering, radiological safety, nuclear fuels, nuclear wastes, and emergency response planning.

Radiation Protection

Stone & Webster Radiation Protection Group is responsible for the radiation shielding, protection against radioactive effluent release, and accident dose calculations. This group designs shielding against fission products, activated crud, and N-16 activity in process streams. In 1974, the Nuclear Regulatory Commission, in Regulatory Standard Review Plan 12.3, cited the Stone & Webster topical report RP-8, "Radiation Shielding Design and Analysis Approach for Light Water Reactor Power Plants," as a guide in determining acceptability of shielding designs being reviewed. In its evaluation, the NRC concluded that "the topical report RP-8 is an important contribution in the field of radiation shielding design."

The Radiation Protection Group also calculates the dosage required to demonstrate the acceptability of the site/engineered safety features combination under postulated accident conditions and calculates doses from normal effluent releases to individuals at the site and to the surrounding population.

In addition, the group develops the requirements and provides the procurement specifications for equipment to monitor area, airborne activity, process, and effluent radiation.

An extensive set of computer programs has been developed for this work. These programs can calculate: the activity of a mixture of radioisotopes after various periods of buildup and decay in the reactor core, reactor coolant, and auxiliary system components; the radiation shielding for any array of point line and volume sources; and the radiation levels in the primary and secondary containments, in the control room at the site boundary, and at the low population zone boundary after postulated accidents for both water and gas-cooled reactors.

Radioactive Waste Disposal

SEWC is experienced in the areas of liquid, gaseous, and solid radioactive waste systems, boron recovery systems, and reactor cavity and fuel pool purification systems.

Stone & Webster has continuously refined its designs to provide systems that reclaim coolant and soluble poisons, facilitate the safe disposal of radioactive waste materials, and minimize operating expenses in these



areas. Typical of this development effort are low pressure cascade-type waste gas handling and disposal systems, waste gas recombiner systems, and a two-stage liquid-treating evaporator complex to reclaim or dispose of soluble poisons or coolant.

Nuclear Auxiliary Systems

The nuclear plant has many systems which support the reactor and the primary heat transfer system. Stone & Webster has developed detailed designs for the following systems through three generations of nuclear plants:

- Spent Fuel Pool Cooling and Purification
- Waste Treatment and Disposal
- Charging and Volume Control
- Residual Heat Removal
- Chemical Treating
- Auxiliary Cooling
- Coolant Makeup
- Containment
- Purification
- Sampling
- Leakage Rate Testing
- Ventilation
- Purging

Basic Services for Nuclear Auxiliary Systems

- Instrument and Service Air
- Vents and Drains
- Service Water

Engineered Safeguards

- Containment Air Recirculation and Filtration
- Containment Spray Cooling
- Core Deluge or Spray
- Safety Injection

The design effort required for the above systems includes basic process work, preparation of engineering flow diagrams, system process calculations, equipment sizing, preparation of system descriptions, equipment and piping layout, physical arrangement of equipment within buildings, and the preparation of detailed purchase specifications for all equipment, piping, valves, instrumentation, and controls in accordance with the applicable ASME codes.

Engineering Mechanics

In all nuclear power plants, special mechanical devices are needed which are not readily available on the open market. Among these are fuel handling devices and special equipment supports.



The reactor containment presents challenges in connection with the design of liners, penetrations, and hatches. Stone & Webster has a division of engineers with extensive experience in this specialized area of mechanical analysis and design. They are responsible for the detailed design and stress analysis of piping and supports, steam generator supports, steel containment vessels, steel liners for reinforced concrete containers and vessels, large equipment and personnel hatches, and other related reactor plant equipment. Their work encompasses the preparation of specifications, the selection of fabricators, assistance to suppliers in the solution of fabrication problems, and assistance in supervising field erection.

The Pipe Stress Analysis and Support Section within the Engineering Mechanics Division provides a broad spectrum of services in the area of pipe stress analysis and pipe support design, in accordance with applicable Codes, Regulatory Guides and Client Specifications. In addition to basic design and analysis, these services consist of staffing with qualified personnel, development of technical criteria, providing analytical tools, such as in-house computer facilities and codes, and preparation of calculations which demonstrate system/component acceptability to specified requirements. The Section also provides services related to fabrication, procurement, installation and as-built inspection of piping systems, components and supports.

Seismic Engineering

An extensive background in the field of seismic engineering has been developed by Stone & Webster engineers. This experience was generated through the design and construction of nuclear power plants, fossil-fueled power stations, hydroelectric facilities, and industrial plants. Earthquake engineers have also made a substantial contribution to the industry through membership on technical committees and publication of many technical papers on seismic engineering.

Engineering Models

Scale models have been prepared for many of Stone & Webster's major nuclear projects. The models have been very useful in the engineering, design, and construction of plants. They also serve as additional checks against piping and equipment interferences and, in the field, aid construction planning and coordination.

The models are also useful in operator training and in describing how maintenance and movement of heavy equipment can be accomplished.

Construction sequence models have been utilized to verify the benefits of modularized structural and mechanical subsystems.

Quality Assurance and Control

The Stone & Webster Nuclear Quality Assurance effort is guided by a comprehensive and flexible procedural system based upon the Stone & Webster Standard Nuclear Quality Assurance Program (SWSQAP 1-74A). This standard program reflects years of field experience, and was the first



A/E standard quality assurance program approved by the Nuclear Regulatory Commission. The program is derived from the management principles outlined in 10CFR50, Appendix B, and is responsive to basic regulatory requirements. It covers quality assurance activities connected with all phases of engineering, construction and testing of nuclear facilities including conceptual and final design, procurement, construction, inspection and testing.

Stone & Webster maintains programs meeting the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Divisions 1 and 2. Stone & Webster currently holds ASME Corporate Certificates as a Constructor (N), Installer (NA), and Fabricator (NPT). Stone & Webster also holds a Nuclear Repair (NR) Certificate granted by the National Board of Boiler and Pressure Vessel Inspectors.

Field Quality Control

Field Quality Control support includes full site inspection services covering all aspects of the field quality program. Support to all field operations is provided by Division Headquarters located in Boston with each site assigned a Senior Site Representative for Field Quality Control and staffed with qualified Engineers and Inspectors. Areas of inspection expertise include all major engineering disciplines plus non-destructive examination techniques, calibration and control of measuring and test equipment, welder qualification and the establishment and operation of various test laboratories such as soils or civil/structural.

Procurement Quality Assurance

Procurement quality assurance services includes seven District Offices located across the United States, three Operations Centers, and three international locations, to effectively monitor the quality of materials, components, and equipment supplied by manufacturers. Procurement QA inspectors are supported by the Boston Headquarters staff which administers and performs the functions of procurement inspection planning, seller qualification and evaluation, and seller documentation review. Further, the staff coordinates the overall efforts of all Procurement Quality Assurance (PQA) locations to ensure consistent compliance with all licensing requirements and applicable regulations.

Quality Engineering

The Stone & Webster quality effort is based upon an established system of administrative and technical programs and procedures. Quality Engineering provides the needed technical assistance and systems support for further development and implementation of this system. Quality Engineering specialists are assigned to all locations within the Quality Assurance organization and to specific projects, as necessary.

Specific functions performed within the Quality Engineering discipline are: developing controlled QA/QC administrative and operational procedures; review and approval of technical documents such as master and project specifications; analyzing quality data and reporting trends to management; developing inspection plans; maintaining expertise in the



quality assurance requirements of codes and standards such as ASME, ANSI, etc., and providing QA Department positions and guidance upon request; providing training for the qualification and certification of auditors, examiners and inspectors.

Inspections conducted on a sampling basis are performed to valid statistical plans, when appropriate, prepared by experienced specialist engineers.

In addition to these activities, Stone & Webster Quality Engineering also provides technical expertise and assistance in the specialized field of Nondestructive Examination and Testing (NDE and NDT). Specifically, this effort may include pre-award evaluation of NDT facilities, evaluation of seller/subcontractor NDT capabilities, audit support, technical interpretation and training for certification of inspectors. NDE engineering, laboratory services and training support is provided to procurement and field operations.

Quality Evaluations

Audits and evaluations are conducted to monitor the performance and effectiveness of the quality program and report results to management. Auditors are qualified to ANSI standards and capable of auditing the quality aspects of industrial, fossil, and nuclear projects. Audits are performed in accordance with the detailed audit plans. A thorough review of applicable codes and standards and project commitments prior to the development of such plans ensures evaluation of program effectiveness and implementation.

Qualification and Training

Quality Assurance Engineers and Inspectors are trained and qualified in accordance with standards endorsed by the American National Standards Institute (ANSI). Inspectors are certified in accordance with the requirements of ANSI N45.2.6 "Qualification of Nuclear Power Plant Inspection Examination and Testing Personnel." Personnel performing or evaluating NDT are trained and certified by the Nondestructive Test Division to SNT-TC-1A in the techniques of Ultrasonic, Liquid Penetrant, Magnetic Particle, Eddy Current, Radiographic Testing and Leak Testing. QA Engineers conducting pre-award surveys and post-award audits are trained and qualified in accordance with ANSI N45.2.23.

In addition to the specialized training involved in certification, the Quality Assurance Department provides indoctrination and continuing education of all Stone & Webster personnel performing activities affecting quality. Typical training topics include procedural system requirements, auditing, general inspection techniques, codes and standards, and administrative practices. Engineering Assurance also provides corporate training Engineering Department policies and procedures and related engineering management systems to ensure a proper understanding of intent and application.



1.3 SUPPORT OF OPERATING PLANTS

Stone & Webster has been engaged in performing backfits, modifications, and support activities to many operating nuclear plants, both those designed by Stone & Webster and those designed by other Engineer-Constructors. Table 1-2 is a partial listing of operating nuclear plants for which Stone & Webster has provided such services. The following are operating nuclear plants designed by other Engineer-Constructors firms for which Stone & Webster has provided these services:

- Pilgrim 1
- Point Beach 1 and 2
- Fort St. Vrain
- Cooper
- Salem 1
- Indian Point 3
- Oyster Creek
- Vermont Yankee
- Zion
- Ft. Calhoun
- Millstone 1 and 2
- Prairie Island
- Monticello.

Table 1-3 lists some of the backfits, modifications, and support activities that have been performed by Stone & Webster.

1.4 CORPORATE RESOURCES

Staffing and Personnel Resources

Support personnel will be assigned from appropriate divisions within Stone & Webster to assist those individuals assigned to the review effort for the Construction Completion Program. The resource pool available to complete the required staffing includes over 5,500 engineers and designers out of a total technical staff of approximately 10,000.

WASHINGTON OFFICE

The Stone & Webster organization includes a Washington, D.C. office. Its primary function is to provide support services across the full spectrum of corporate programs as they relate to federal government activities. The professional staff in the office has expertise in the executive, legislative, and regulatory activities of the federal government. This experience and expertise is used on a continuous basis to establish and maintain liaison with pertinent federal agencies and staff, and to develop current, accurate information for all corporate offices.

FACILITIES

Stone & Webster's Headquarters and principal operations facility is located near the center of Boston's business district. This location allows ready access to all rail, subway, and ground transportation, and is within a 10-minute cab ride to Boston's Logan Airport.



Stone & Webster also maintains fully staffed and functioning engineering centers in New York City; Cherry Hill, New Jersey; Denver, Colorado; and Houston, Texas. These centers have facilities for total project handling. Computer, telecopier, and other ties between Headquarters and these centers provide the rapid communication necessary to Stone & Webster's operations.

COMPUTER FACILITIES

The computer center has an IBM 3033 MP system with 16 million bytes of storage and an IBM 3033 UP. In order to provide the most economical services possible to clients, this computer system is tied to an established electronic communication network in Boston, New York, Denver, Cherry Hill, Houston, London, Toronto, and Paris and Stone & Webster's various construction sites. These capabilities provide rapid, world-wide information transfer.

MATERIALS AND MATERIALS PROCESSING LABORATORY

Stone & Webster's Materials Engineering Division maintains a laboratory to provide services for projects, clients, and/or other Stone & Webster organizations.

The following services are available in this laboratory:

- Metallographic
- Material Processing
- Corrosion and Chemistry
- Nondestructive Testing
- Protective Coatings

ACOUSTICS AND VIBRATION LABORATORY

Stone & Webster maintains an advanced Acoustics and Vibration Laboratory containing field portable instrumentation which offers multiple channel signal recording and dual channel real time narrow band frequency analysis capabilities. A full complement of transducers are available including: accelerometers, seismic velocity pickups, noncontact proximeter probes, load cell, optical shaft position and speed pickup, condenser microphones, and dynamic pressure. A complete data acquisition and analysis system can be quickly and efficiently set up so that data are analyzed at the time of the measurements to identify the problem quickly and minimize any disruption of normal operations. Computer modeling using advanced finite element programs developed by Stone & Webster is available to evaluate structural, foundation, or equipment changes to reduce vibration.

GEOTECHNICAL LABORATORY

An integral part of Stone & Webster's Geotechnical Division is a physical testing laboratory located in the basement of the Headquarters building. The Geotechnical Laboratory is a 3,000-square ft. area subdivided into compartments devoted to temperature, humidity, and dust control. This complete testing capability within the Geotechnical Division permits



samples to be selected, test programs formulated, and test results reported with a minimum loss of time and a maximum understanding of the objectives and the results of the testing.

TECHNICAL INFORMATION CENTER

Stone & Webster provides its employees with appropriate resources for keeping abreast of relevant technological and management techniques. This Center is an active participant in the Special Libraries Association.

Stone & Webster is also a member of the MIT Industrial Liaison Program. Reports and papers published by MIT may be acquired at no charge through the Center.

The Center can also perform computer searches in any subject area through the Department of Energy RECON, the Defense Documentation Center, System Development Corporation ORBIT, and Lockheed DIALOG. Foreign data bases can also be tapped as a resource. All searches are performed by trained Center personnel. Access is quick and accurate with documentation always presented in bibliographic format.

CONTINUING EDUCATION DEPARTMENT

The Continuing Education Department (CED) of Stone & Webster provides professional educational services that are designed to serve the businesses in which Stone & Webster and its clients are engaged. They include managerial, technical, and business programs designed for career development and personal growth for professionals. Approximately 400 Stone & Webster educational courses are currently available. Ninety-five (95) of these courses address Quality Assurance activities and 173 provide instruction in construction skills. CED also designs a tailor-made, technical skills development program, such as a program for instrumentation specialists.

COMPUTER GRAPHICS

Stone & Webster has developed, over the past five years, an interactive graphics computer system which is one of the most advanced systems available today. Using specialized software, the system integrates the development of a drawing from the first design idea to the finished product.



TABLE 1-1

STONE & WEBSTER ENGINEERING CORPORATION
REPRESENTATIVE NUCLEAR POWER PROJECTS

<u>Completion</u>	<u>Client & Location</u>	<u>Project/Station</u>	<u>MW</u>	<u>Type and Mfr.</u>	<u>Services Provided</u>
1957	Alco Products Incorporated (AEC/U.S. Army)	Army Package Power Reactor	2.5		Engineering and Construction
1957	Westinghouse Electric Corporation/Duquesne Light Company	Shippingport	90	PWR-W	Architect-Engineer for Nuclear Plant
1960	Yankee Atomic Electric Company	Yankee-Nuclear Power Station	185	PWR-W	Engineering and Construction
1963	Carolinas Virginia Nuclear Power Associates, Inc.	Prototype Nuclear	17	PWR-W	Engineering, Design, and Construction Liaison
1968	Connecticut Yankee Atomic Power Company	Connecticut Yankee Atomic Power Plant	600	PWR-W	Engineering, Construction and Quality Assurance
1969	Niagara Mohawk Power Corporation	Nine Mile Point Unit No. 1	590	BWR-GE	Management of Construction and Quality Assurance
1972	Virginia Electric and Power Company	Surry Power Station No. 1	819	PWR-W	Engineering, Construction and Quality Assurance
1972	Maine Yankee Atomic Power Company	Maine Yankee Atomic Power Station	825	PWR-CE	Engineering, Construction and Quality Assurance
1973	Virginia Electric and Power Company	Surry Power Station No. 2	819	PWR-W	Engineering and Construction
1975	Power Authority of the State of N.Y.	James A. FitzPatrick	821	BWR-GE	Engineering, Construction Management and Quality Assurance



TABLE 1-1 (CONT'D)

STONE & WEBSTER ENGINEERING CORPORATION
REPRESENTATIVE NUCLEAR POWER PROJECTS

<u>Completion</u>	<u>Client & Location</u>	<u>Project/Station</u>	<u>MW</u>	<u>Type and Mfr.</u>	<u>Services Provided</u>
1976	Duquesne Light Company	Beaver Valley 1	883	PWR-W	Engineering, Construction and Quality Assurance
1978	Virginia Electric and Power Company	North Anna 1	938	PWR-W	Engineering, Construction and Quality Assurance
1980	Virginia Electric and Power Company	North Anna 2	938	PWR-W	Engineering, Construction and Quality Assurance
*	Duquesne Light Company	Beaver Valley 2	883	PWR-W	Engineering, Construction Management and Quality Assurance
Δ	GPU Service Corporation	Cancelled	1120	PWR-CE	Construction Management
*	Gulf States Utilities Company	River Bend 1	940	BWR-GE	Engineering, Construction and Quality Assurance
Δ	Gulf States Utilities Company	River Bend 2	940	BWR-GE	Engineering, Construction and Quality Assurance
*	Long Island Lighting Company	Shoreham 1	820	BWR-GE	Engineering, Construction Management and Quality Assurance
*	Niagara Mohawk Power Corporation	Nine Mile Point 2	1100	BWR-GE	Engineering, Construction and Quality Assurance
*	Northeast Utilities Service Company	Millstone 3	1100	PWR-W	Engineering, Construction and Quality Assurance



TABLE 1-1 (CONT'D)

STONE & WEBSTER ENGINEERING CORPORATION
REPRESENTATIVE NUCLEAR POWER PROJECTS

<u>Completion</u>	<u>Client & Location</u>	<u>Project/Station</u>	<u>MW</u>	<u>Type and Mfr.</u>	<u>Services Provided</u>
*	U.S. Department of Energy (formerly ERDA)	Clinch River Liquid Metal Fast Breeder Reactor	350	-	Construction Management Quality Assurance
Δ	Virginia Electric and Power Company		975	PWR-B&W	Engineering

NOTE: Asterisk denotes on-going project.
ΔProject Cancelled



TABLE 1-2

STONE & WEBSTER ENGINEERING CORPORATION
PARTIAL LISTING OF MODIFICATION AND/OR RETROFIT SERVICES
TO OPERATING NUCLEAR POWER PLANTS

<u>Client & Location</u>	<u>Project/Station</u>	<u>Type and Mfr.</u>	<u>Services Provided</u>
Boston Edison Company	Pilgrim 1	BWR-GE	Continuing Service
Virginia Electric and Power Company	Surry 1	PWR-W	Continuing Service
Virginia Electric and Power Company	Surry 2	PWR-W	Continuing Service
Virginia Electric and Power Company	North Anna 1	PWR-W	Continuing Service
Virginia Electric and Power Company	North Anna 2	PWR-W	Continuing Service
Power Authority of the State of New York	James A. FitzPatrick	BWR-GE	Continuing Service
Northeast Utilities Company	Connecticut Yankee	PWR-W	Continuing Service
Northeast Utilities Company	Millstone 1	BWR-GE	Specific Tasks
Northeast Utilities Company	Millstone 2	PWR-CE	Specific Tasks
Maine Yankee Atomic Power Company	Maine Yankee	PWR-CE	Specific Tasks
Niagara Mohawk Power Corporation	Nine Mile Point Unit 1	BWR-GE	Specific Tasks



TABLE 1-2 (CONT'D)

<u>Client & Location</u>	<u>Project/Station</u>	<u>Type and Mfr.</u>	<u>Services Provided</u>
Nebraska Public Power District	Cooper	BWR-GE	Continuing Service
Omaha Public Power District	Fort Calhoun	PWR-CE	Continuing Service
Commonwealth Edison Company	Zion	BWR-CE	Miscellaneous Tasks
Wisconsin Electric Power Company	Point Beach 1 & 2	PWR-W	Specific Tasks
Duquesne Light Company	Beaver Valley 1	PWR-W	Continuing Service
Northern States Power Company	Prairie Island	PWR-W	Continuing Service
Northern States Power Company	Monticello	BWR-GE	Continuing Service
Public Service of Colorado	Fort St. Vrain	HTGR-CA	Continuing Service
Public Service Electric & Gas Company	Salem 1	PWR-W	Miscellaneous Task
Power Authority of the State of New York	Indian Point 3	PWR-W	Miscellaneous Tasks
Vermont Yankee Nuclear Power Corp.	Vermont Yankee	PWR-GE	Miscellaneous Tasks
Jersey Central Power & Light Co.	Oyster Creek	BWR-GE	Miscellaneous Tasks



TABLE 1-3

PARTIAL LISTING OF BACKFITS, MODIFICATIONS AND SUPPORT
ACTIVITIES FOR OPERATING NUCLEAR POWER PLANTS
ENGINEERED AND DESIGNED BY OTHER A/E's

<u>Client and Station</u>	<u>Scope of Work</u>
NORTHEAST UTILITIES SERVICE COMPANY BERLIN, CONNECTICUT	
Millstone 2	Addition of condensate polishing system.
Millstone 1 and 2	10CFR50 Appendix I Study.
	State emergency plan for Millstone site area and LOCA dose calcula- tions.
BOSTON EDISON COMPANY BOSTON, MASSACHUSETTS	
Pilgrim 1	Performing engineering and design and/or providing studies and support in the following areas:
	Scram discharge volume
	Dry well temperture reduction
	Condenser tube sheet cathodic protection
	Torus inspection protective coating
	Prompt notification and alerting system
	Appendix J leak rate test
	Implementation of Appendix R fire protection
	FSAR updating



Auto restart

R.G. 1.97 assessment

CO dump test in cable
spreading room

Reactor building crane
analysis

I&E Bulletin 79-01B

Snubber evaluation
program

recirculation nozzle
shields

Assisted in the evaluation
of plant's health physics
facilities

Assisted preparations for
erection of health physics
prefab structure

Prepared 17 procedures as
preparation for removing the
main condenser tubes and the
installation of new titanium
tubes

Prepared the valve testing
section of the Inservice
Inspection Program in accordance
with the requirements of ASME XI
Summer Subsection IWV

Engineering, design, planning
and field assistance for rad-
waste system modifications

Engineering, design, planning,
and field assistance for fuel
pool filtration system
modifications

Developed procedures for spent
fuel rack replacement

Evaluation and recommendations
for radwaste tank modifications



Scheduled maintenance activities
for a planned outage

Quality Assurance and Control
support provided and tasks
performed:

Operational QA Audits

Tread Analysis of
Corrective Action Docu-
ments and audit
deficiencies regarding
fire protection

Corporate Corrective Action
Program evaluation and
improvement

Enhancement of Internal
Audit Program

Procurement Quality Assurance

Training and qualification of
NDE and QC personnel

Civil/Structural engi-
neering inspection for the
Block Wall 80-11 project

Developed QC Inspection
Manual

Developed QC Training and
Certification Manual

NORTHERN STATES POWER COMPANY

Prairie Island

Prepared an engineering study
evaluating problems associated
with the containment and
auxiliary building ventilation
systems. Upon completion of the
study, prepared engineering
modifications of the ventilation
system.

OMAHA PUBLIC POWER DISTRICT

Fort Calhoun

Provided engineering services
for the design of a plant security
system.



Provided engineering services for modifications to the solid radwaste system.

Provided engineering modifications for upgrading the plant fire protection system.

Performed an engineering analysis of the pressurizer relief system.

Performed an engineering analysis of the irradiation sample cask.

Performed a study evaluating the plant ventilation system and prepared modification recommendations.

WISCONSIN ELECTRIC POWER COMPANY
WISCONSIN MICHIGAN POWER COMPANY

Point Beach 1 & 2

Engineering, design, and planning to increase the cooling capacity of the spent fuel pool.

10CFR50 Appendix I Study.

Conceptual recommendations regarding blowdown evaporator reboiler control system.

Quality Control inspection of modified or installed backfitted systems.

WISCONSIN PUBLIC SERVICE CORPORATION

Kewaunee

On-site evaluation of the existing spare parts program, and presentation of a report documenting findings and recommendations. A draft plan for implementing suggested improvements will be provided.

Emergency planning assistance.



NEBRASKA PUBLIC POWER DISTRICT

Cooper

Completed a study to determine the feasibility of adding reheat capability.

Prepared a study to determine the feasibility of adding a steam reboiler to provide plant auxiliary steam.

Prepared and recommended modifications for the service water system.

Prepared and recommended modifications to the plant fire protection system.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS

M.I.T. Research Reactor

Review of documentation for modification to reactor to ensure it met QA program.

CONSOLIDATED EDISON COMPANY OF
NEW YORK, INC.

Indian Point 2

Study of condenser tube failures.

TOLEDO EDISON COMPANY
TOLEDO, OHIO

Davis Besse 1

Development of Corporate Outage Management Program for Nuclear and Fossil Units. Assisted in the development and implementation of a detailed outage management system at Davis Besse 1.

PHILADELPHIA ELECTRIC COMPANY

Peach Bottom Units 2 & 3

Performed a maintenance procedures audit.

YANKEE ATOMIC ELECTRIC COMPANY

Vermont Yankee

Prepared 75 maintenance procedures and 9 administrative procedures. Also prepared the Station Maintenance Department training procedure.



Conducted a Spare Parts
Management Study.

SOUTHERN CALIFORNIA EDISON CO.

San Onofre

Performed a spare parts
management system study to
determine whether or not a
computer-based material manage-
ment system was justified for
the San Onofre Nuclear
Generating Station.



SECTION 2

APPROACH, SCHEDULE, ORGANIZATION, AND RESUMES

2.1 OBJECTIVE

Stone & Webster will independently monitor the performance of the Construction Completion Program, which is to be implemented by Consumers Power Company (CPCo), will assist CPCo in evaluating the effectiveness of the program and will provide NRC and CPCo with progress reports.

2.2 APPROACH

The assessment of the Construction Completion Program will be conducted by Stone & Webster in accordance with CPCo's Quality Assurance and Construction Completion programs. The effort will consist of the following three tasks:

- Development of an Assessment Plan

- Site Monitoring

- Overview Evaluation

2.2.1 Development of an Overview Plan

A Quality Assurance Plan will be developed for the scope of this program. To support the plan, special Stone & Webster procedures and checklists will be developed for use by a team to be established at the site to monitor the effectiveness of the Construction Completion Program. The Construction Completion Program, CPCo Quality Assurance Program, pertinent CPCo procedures, organizational charts, status of safety-related systems, construction problem areas, drawings and specifications, and pertinent reports will be reviewed to develop checklists that cover the specific scope, responsibilities, methodology, and schedule for the overview. These procedures and checklists will include appropriate elements of the Stone & Webster Quality Assurance Program.

2.2.2 Site Monitoring

A site team will be established to monitor the effectiveness of the Construction Completion Program. The team will consist of a Program Manager and two functional groups. One group will assess the adequacy and the completeness of procedures and inspection plans, including quality assurance, quality control and installation work packages being used to complete the work. The other group will review certain aspects of construction activities which relate to the performance of the Quality Control Inspection Program and the installation activities. Qualified engineers, inspectors, and auditors will be assigned to the site team as required. Qualifications of personnel and demonstration of independence will be a precondition to such assignments. The Program Manager will maintain communications with CPCo Site Manager and NRC. These two groups



will use special procedures, checklists, and sampling techniques to evaluate the following:

- Adequacy of controls and practices in the Quality Assurance Program to determine that design information is incorporated in installed hardware.
- Conformance of installed hardware to design information in specifications, drawings, etc.
- Completeness of CPCo procedures regarding construction activities, personnel qualifications, training programs, and organizational practices.
- Compliance of Construction Completion Program teams with prescribed procedures.
- Compliance of Quality Control personnel with applicable procedures.
- Compliance of construction activities with applicable procedures.

Weekly progress meetings will be held with CPCo, its contractors and NRC.

2.2.3 Overview Evaluation

Observations of the Site Monitoring Team will be submitted for evaluation to a Senior Overview Committee on a monthly basis. Programmatic observations of a serious nature will be submitted immediately to the Committee. The Committee will consist of senior representatives from Stone & Webster Quality Assurance, Construction, and Engineering Departments. The Committee will classify, assign a significance of concern, and report observations to CPCo and NRC. A final report will be submitted 30 days after completion of the program.

2.2.4 Organization

See Figure 2.1

2.2.5 Schedule

See Figure 2.2

2.2.6 Resumes

See pages following figures



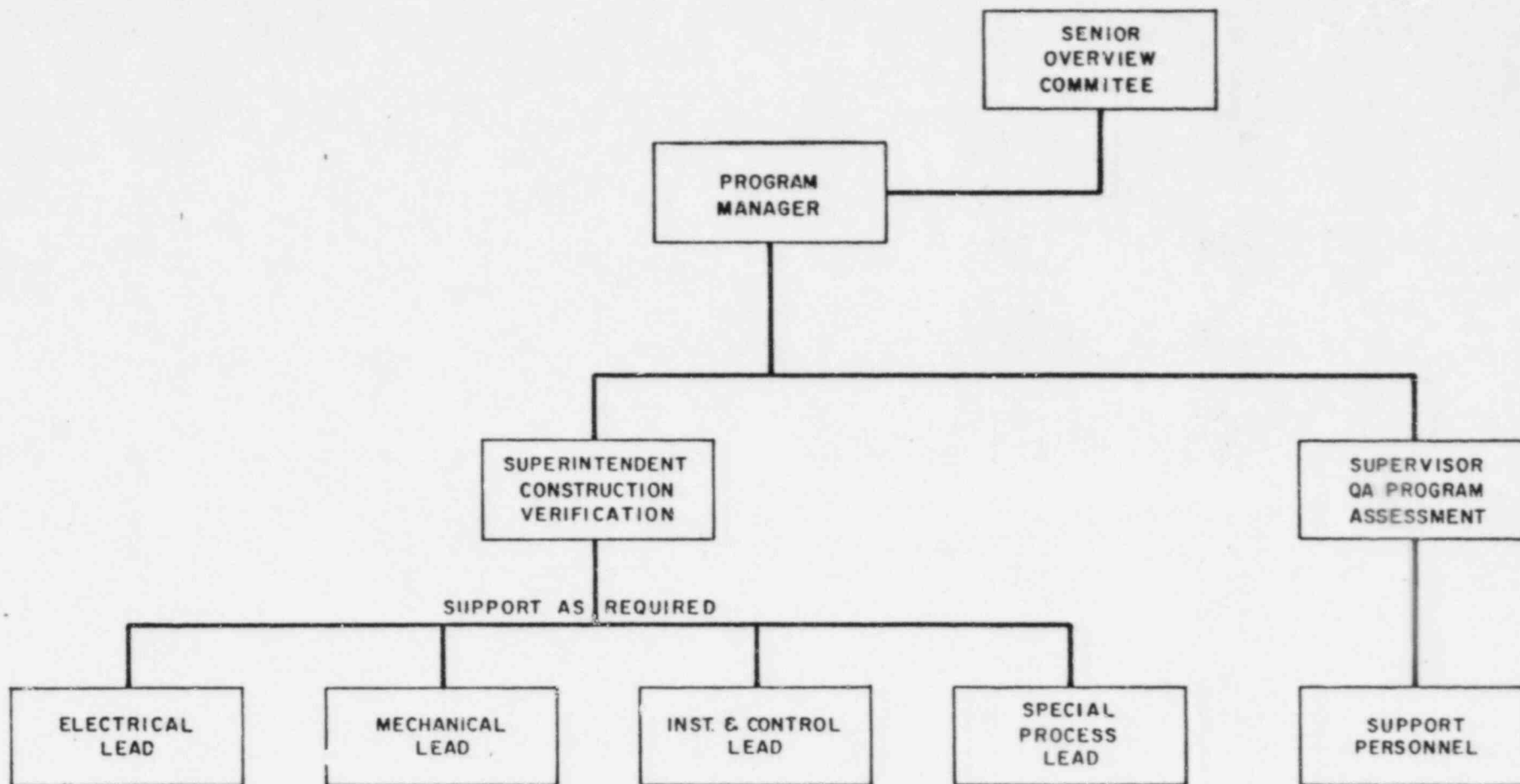


FIGURE 2-1
PROJECT ORGANIZATION
THIRD PARTY CONSTRUCTION
IMPLEMENTATION OVERVIEW
MIDLAND NUCLEAR CONGENERATION PLANT
CONSUMERS POWER COMPANY
STONE & WEBSTER ENGINEERING CORPORATION

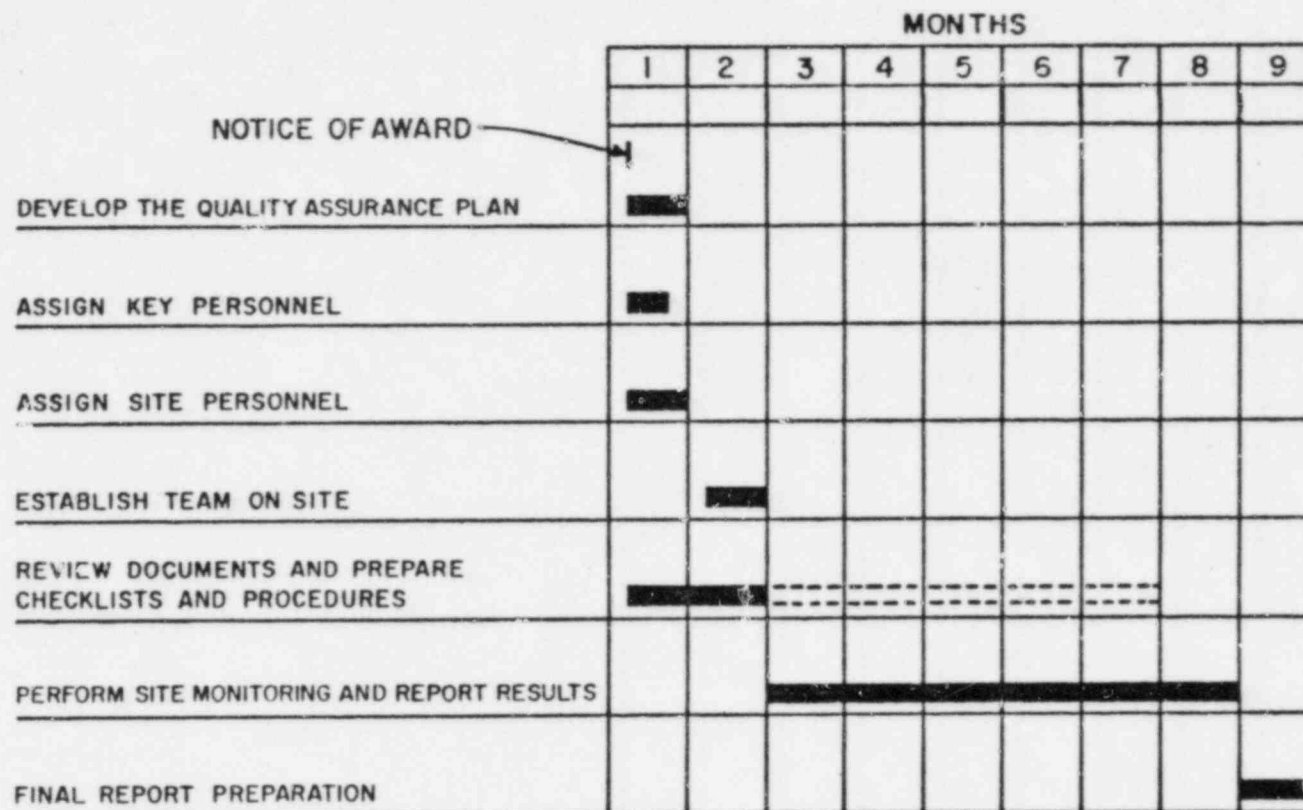


FIGURE 2-2
 PROJECT SCHEDULE
 THIRD PARTY CONSTRUCTION
 IMPLEMENTATION OVERVIEW
 MIDLAND NUCLEAR COGENERATION PLANT
 CONSUMERS POWER COMPANY
 STONE & WEBSTER ENGINEERING CORPORATION

Resumes are attached for the following personnel:

Program Manager	W. MacKay
Senior Overview Committee	C. O. Richardson
	N. B. Cleveland
	G. M. Schierberg
	M. Giannattasio
	E. A. Long

<u>TITLE</u>	<u>NAME</u>
Superintendent of Construction Verification	J. C. Thompson*
Inspectors	W. D. Miller
	R. S. Scallen
	J. R. Langston
Inspection Support Engineers	A. A. Smith
	J. Hannwacker
Supervisor of Program Assessment	F. B. Bearham*
Auditor	W. H. Sienkiewicz

* These individuals have U.K. equivalent to B.S. degree.



SECTION 3

DEMONSTRATION OF INDEPENDENCE, SIGNED AFFIDAVITS

Stone & Webster will conduct the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant in an independent manner. Stone & Webster has a long standing and valued reputation which is based upon the professional integrity and independent judgment of its personnel. The Corporation's commitment to the continuation of such high ethical standards is reflected in its Code of Business Conduct which, of course, applies to the services provided for this program, as well as to any other assignment. In order to further demonstrate that the program will be performed in an independent manner, Stone & Webster has conducted the internal review described below to meet the specific requirements for this program.

3.1 LOCATION OF OFFICES

Overall assessment of the Construction Completion Program will be managed by Stone & Webster Headquarters office in Boston, Massachusetts and will be manned by personnel from the Boston office and, as required, from other offices which are located in Denver, Colorado; New York, New York; Cherry Hill, New Jersey; and Houston, Texas. Stone & Webster does not have an engineering and design office in Michigan.

Stone & Webster believes that the independence of the performance of its services will be enhanced by the remoteness of its offices from those of Consumers Power Company. The distance between offices should diminish the likelihood of outside relationships among employees of both organizations and of individuals having been employed in both organizations.

3.2 INDEPENDENCE OF PERSONNEL

To demonstrate that the professional and technical personnel who will be assigned to the assessment of the Construction Completion Program do not have potential or apparent conflicts of interest, such personnel will be required to sign the statement shown in Figure 3-1. Thus, the personnel assigned to the assessment of the Construction Completion Program will indicate the following:

1. That such personnel have not engaged in any work or business involved with or related to the engineering or design of the Midland Nuclear Cogeneration Plant;
2. That neither such personnel nor any members of their immediate families own any beneficial interest in the Consumers Power Company; and
3. That none of the members of their immediate family are employed by Consumers Power Company.

Immediate family is defined as spouse, children, parents and siblings.



3.3 BUSINESS DEALINGS BETWEEN STONE & WEBSTER AND CONSUMERS POWER COMPANY

Stone & Webster has reviewed its records to determine what work has been performed for Consumers Power Company from January 1, 1978 to February 28, 1983. A list of these jobs is contained in Table 3-1. This work for Consumers Power Company represents a very small portion of Stone & Webster's total business.

In addition to Stone & Webster's business dealings with Consumers Power Company, Stone & Webster records have also been searched to determine if Stone & Webster's affiliated companies, Stone & Webster Management Consultants (SWMCI) and Stone & Webster Appraisal Corporation, have performed any services for Consumers Power Company since January 1, 1978. No such tasks were found.

3.4 HOLDINGS OF CONSUMERS POWER COMPANY SECURITIES

Stone & Webster, Inc., the parent company of Stone & Webster, and its subsidiaries (including Stone & Webster), have no holdings of Consumers Power Company securities. The Employee Savings Plan of Stone & Webster, Incorporated and participating subsidiaries, is administered by The Chase Manhattan Bank, N.A. as trustee. Funds may be invested in the Employee Benefit Investment Funds, Equity Fund of the Chase Manhattan Bank which is a commingled fund. Stone & Webster exercises no direct control over the investment of such funds. The Chemical Bank of New York is trustee for the Employee Retirement Plan of Stone & Webster, Incorporated and participating subsidiaries. There are no Consumers Power Company securities held in the plan.

3.5 SUMMARY

Stone & Webster and its affiliated companies have performed an amount of work for Consumers Power Company over the past five years which represents only a very small portion of Stone & Webster's business. Neither Stone & Webster, Inc. nor any of its subsidiaries own an interest in Consumers Power Company. Stone & Webster's Employee Savings Plan and Retirement Plan are administered by banks as trustees and neither Plan holds Consumers Power Company securities. Also, all key technical personnel who will be assigned to the project will be required to sign the attached disclosure statement (Figure 3-1). We believe that these disclosures and representations should be more than adequate to demonstrate the independence of Stone & Webster's participation in the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant.



TABLE 3-1

WORK PERFORMED BY STONE & WEBSTER MICHIGAN, INC., ENGINEERING CORPORATION
FOR CONSUMERS POWER COMPANY FROM JANUARY 1, 1978 TO
DECEMBER 31, 1982

<u>CPCo Purchase Order No.</u>	<u>Date of Task</u>	<u>Description</u>
12513Q	March 1978- December 1981	Review List of Equipment and Recommend Spare Parts for Midland Station
Contract DTD August 1, 1978	June 1978- June 1980	Prepare Critique Report of Second Outage at Palisades Station and Provide Planning Support
10319	November 1978- June 1980	Procure a Mobile Security Access Module for Outage Work Forces at Palisades
CP10-8408	1979-	Provide Consulting Services for CPCo Plants as Assigned by Production Planning Department
CP10-8509-Q	March 1982- July 1982	Evaluate Midland Site Emergency Plan
CP11-0232-Q	September 1982-	Perform Independent Assessment of Construction Activities Related to Auxiliary Building and Feedwater Isolation Valve Pit Remedial Work at Midland
CP11-0170	October 1982-	Provide Emergency Planning Consulting Services for Big Rock
CP11-0265 CP11-0324 CP11-0353	October 1982-	Perform Vibration Analysis on Boiler Feed Pump at J. H. Campbell Unit 3 and Recommend Corrective Action
CP10-9945	October 1982-	Provide Services and Materials to coordinate 1983-1984 Palisades Refueling Outage



<u>CPCo Purchase Order No.</u>	<u>Date of Task</u>	<u>Description</u>
CP11-0529	January 1983-	Provide Services and Materials to Assist in Planning 1983-1984 Palisades Refueling Outage
CP12-1450	January 1983-	Provide Services to Enhance Midland Operations Integration Plan
CP11-0684	March 1983-	Material Management Support to Midland (Follow-up to previous spare parts work, 12513Q)



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

Whereas, Employee understands that it is necessary that proposed participants be screened for any potential or apparent conflicts of interest with respect to this assignment;

Therefore, for the above stated purposes Employee makes the following representations to Stone & Webster Engineering Corporation:

1. Employee has not engaged in any work or business involved with or related to the engineering or design of the Midland Nuclear Cogeneration Plant;
2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred stock, bonds or other securities issued on behalf of the Consumers Power Company; and
3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated March 25, 1983

Signature Joseph Hannwacker

JOSEPH HANNWACKER
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

Whereas, Employee understands that it is necessary that proposed participants be screened for any potential or apparent conflicts of interest with respect to this assignment;

Therefore, for the above stated purposes Employee makes the following representations to Stone & Webster Engineering Corporation:

1. Employee has not engaged in any work or business involved with or related to the engineering or design of the Midland Nuclear Cogeneration Plant;
2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred stock, bonds or other securities issued on behalf of the Consumers Power Company; and
3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated 3/25/83

Signature Albert A. Smith

ALBERT A. SMITH
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

Whereas, Employee understands that it is necessary that proposed participants be screened for any potential or apparent conflicts of interest with respect to this assignment;

Therefore, for the above stated purposes Employee makes the following representations to Stone & Webster Engineering Corporation:

1. Employee has not engaged in any work or business involved with or related to the engineering or design of the Midland Nuclear Cogeneration Plant;
2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred



stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated 3-28-83

Signature Richard S. Scallan

Richard S. Scallan
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

Whereas, Employee understands that it is necessary that proposed participants be screened for any potential or apparent conflicts of interest with respect to this assignment;

Therefore, for the above stated purposes Employee makes the following representations to Stone & Webster Engineering Corporation:

1. Employee has not engaged in any work or business involved with or related to the engineering or design of the Midland Nuclear Cogeneration Plant;
2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred



stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated 3/25/83

Signature W. Mackay

WILLIAM MACKAY
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

Whereas, Employee understands that it is necessary that proposed participants be screened for any potential or apparent conflicts of interest with respect to this assignment;

Therefore, for the above stated purposes Employee makes the following representations to Stone & Webster Engineering Corporation:

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2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred



stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated

3/25/83

Signature

NB Cleveland

Print Name

N. B. Cleveland



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

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2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred



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3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated 3-24-83

Signature W. D. Miller

W. D. MILLER
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

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2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred



stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated Mar. 25, 1993

Signature G. M. Schierberg

G. M. SCHIERBERG
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

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stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated 3/28/83

Signature J C Thompson

JAMES C THOMPSON
Print Name



FIGURE 3-1

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To: Stone & Webster Engineering Corporation

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2. Neither Employee, nor any members of his or her immediate family, own any beneficial interest in the Consumers Power Company, including but not limited to common or preferred



stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated March 30 1983

Signature F. Bearman

FRED. BEARMAN
Print Name



FIGURE 3-1

STATEMENT REGARDING POTENTIAL OR APPARENT CONFLICTS OF INTEREST

To: Stone & Webster Engineering Corporation

Whereas, the undersigned employee ("Employee") understands that he or she is being considered as a participant to provide services to Consumers Power Company with respect to the overview of the Construction Completion Program at the Midland Nuclear Cogeneration Plant and

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stock, bonds or other securities issued on behalf of the Consumers Power Company; and

3. None of the members of Employee's immediate family are employed by Consumers Power Company.

This statement is based upon the Employee's best information and belief and any exceptions to the representations contained herein have been described on the reverse side of this document.

Dated

April 1, 1983

Signature

M. Giannattasio

Print Name

M. GIANNATTASIO



GOVERNMENT ACCOUNTABILITY PROJECT

Institute for Policy Studies

1901 Que Street, N.W., Washington, D.C. 20009

(202) 234-9382

August 5, 1983

FREEDOM OF INFORMATION
ACT REQUEST

FOIA-83-449

Rec'd 8-9-83

Director
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

To Whom It May Concern:

Pursuant to the Freedom of Information Act (FOIA), 5 U.S.C. §552, the Government Accountability Project (GAP) of the Institute for Policy Studies requests copies of any and all agency records and information, including but not limited to notes, letters, memoranda, drafts, minutes, diaries, logs, calendars, tapes, transcripts, summaries, interview reports, procedures, instructions, engineering analyses, drawings, files, graphs, charts, maps, photographs, agreements, handwritten notes, studies, data sheets, notebooks, books, telephone messages, computations, voice recordings, and other data compilations, interim and/or final reports, status reports, and any and all documents or submittals by Consumer Power Company to the NRC for NRC consideration of candidate companies or methodologies to perform the Construction Implementation Overview (CIO) of the Construction Completion Plan (CCP).

Specifically, we request the materials reviewed by the Office of Nuclear Reactor Regulations that led to an April 22, 1983 letter from Thomas Novack to CPCo rejecting TERA for the CIO.

If any records have been destroyed and/or removed, please provide all surrounding records, including but not limited to a list of all records which have been or are destroyed and/or removed, a description of the action(s) taken, relevant date(s), individual, office and/or agency-wide policies and/or justification(s) for the action(s), identification of all personnel involved with the action(s), and any and all records relevant to, generated in connection with, and/or issued in order to implement the action(s).

Dupe of

2310120618

Director of Administration
U.S. Nuclear Regulatory Commission

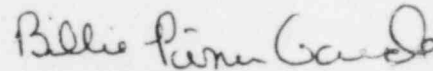
August 5, 1983

GAP requests that fees be waived, because "finding the information can be considered as primarily benefitting the general public." 5 U.S.C. §552(a) (4) (A). The Government Accountability Project is a non-profit, non-partisan public interest organization concerned with honest and open government. Through legal representation, advice, national conferences, films, publications and public outreach, the Project promotes whistleblowers as agents of government accountability. GAP requests the above information as part of an ongoing monitoring project on the adequacy of the NRC's efforts to protect public safety and health at nuclear power plants.

For any documents or portions that you deny due to a specific FOIA exemption, please provide an index itemizing and describing the documents or portions of documents withheld. The index should provide a detailed justification of your grounds for claiming each exemption, explaining why each exemption is relevant to the document or portion of the document withheld. This index is required under Vaughn v. Rosen (I), 484 F.2d 820 (D.C.Cir. 1983), cert. denied, 415 U.S. 977 (1974).

We look forward to your response to this request within ten days.

Yours truly,



BILLIE PIRNER GARDE
Director, Citizens Clinic for
Accountable Government

BPG/ww