

APPLICATION FOR CONSTRUCTION PERMIT
AND OPERATING LICENSE

Southwest Atomic Energy Associates, a non-profit mutual benefit association organized under the laws of Arkansas, and General Electric Company, a corporation organized under the laws of New York, respectfully request a construction permit and an operating license for the Southwest Experimental Fast Oxide Reactor (hereinafter "SEFOR"). General information in support of the joint application follows:

1. Addresses of Applicants

- (a) The principal address of Southwest Atomic Energy Associates ("SAEA") is 306 Pyramid Building, Little Rock, Arkansas.
- (b) The *Advanced Products Operation* of General Electric Company ("General Electric") is located at *310 DeGuigne Drive, Sunnyvale, * California.

2. Description of Organization and Business

- (a) SAEA. The membership of SAEA consists of the seventeen investor-owned utility companies listed in Exhibit A. The names and addresses of SAEA's trustees and principal officers, all of whom are citizens of the United States, are also listed in Exhibit A.

SAEA has been formed, among other objects, to promote the development of low-cost nuclear fuels for the generation of electricity, to design or promote the design of prototype

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reactors capable of utilizing such fuels and to foster education concerning the use of nuclear materials as power sources. SAEA will accept title to SEFOR at the time of initial fuel loading, but has no present intention of operating the facility. All operation, including the conduct of a research and development program in SEFOR will be the responsibility of General Electric.

Neither SAEA nor any of its Member Companies is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. SAEA is associated, in the proposed construction of SEFOR with Gesellschaft für Kernforschung m.b.H., a non-profit corporation of the Federal Republic of Germany (hereinafter "Gesellschaft"). While Gesellschaft will make technical and financial contributions to the project, for itself and for the European Atomic Energy Community, Gesellschaft is aware of the limitations of the Atomic Energy Act of 1954, as amended, with respect to foreign corporations and individuals. Contractual arrangements between the applicants and between SAEA and Gesellschaft specify that Gesellschaft will have no right to exercise any measure of control over the construction or operation of SEFOR or over the research and development program to be conducted therein.

(b) General Electric is a publicly-held corporation engaged, among

other activities, in the manufacture and sale of nuclear power plants, experimental reactors, and in other nuclear activities. General Electric's principal officers and directors, all of whom are citizens of the United States, are listed in Exhibit B hereto.

General Electric is not controlled by any alien, foreign corporation, or foreign government. General Electric has no knowledge or information indicating any appreciable ownership of General Electric stock by any alien, foreign corporation, or foreign government. No person owns of record, or is known by General Electric to own beneficially, one percent or more of the outstanding shares of its capital stock.

3. Description of Facility

SEFOR will be a facility designed to demonstrate that large plutonium-uranium fueled test reactors can be built with reliable operating characteristics and inherent safety features. Applicants propose to construct SEFOR on a 620-acre site located approximately 20 miles southwest of Fayetteville in Washington County, State of Arkansas. Both the facility and its site are fully described in the *Facilities Description and Safety Analysis* Report for SEFOR which has been transmitted to the Commission under separate cover and which is by this reference made a part hereof. SAEA and General Electric believe that the design information and safety analyses set forth in the *Facilities Description and Safety Analysis* Report provides reasonable assurance that SEFOR *has been* constructed and *can be* operated without undue hazard to public health and safety.

The *Facilities Description and Safety Analysis* Report will be amended in the future to provide any additional technical information which may be necessary to enable the Commission to exercise its licensing judgment.

4. Class of License Applied for and Term of License

Applicants request the issuance of a Section 104(b) construction permit and operating license. Applicants request that the operating license be issued for an initial term of ten years.

5. Other Licenses

Applicants further request such source, special nuclear, and byproduct material licenses as may be necessary to the construction and operation of SEFOR.

6. Estimated Construction Cost and Financial Qualifications

Applicants estimate the cost of constructing SEFOR at *\$15,000,000.* Of the estimated sum, SAEA will provide a maximum of \$5,900,000, Gesellschaft, acting for itself and Euratom, will contribute a maximum of \$5,000,000, and General Electric will provide all additional funds required for completion of construction.

General Electric's financial qualifications and the Commission's findings thereon are of record in Commission Docket No. 50-183. A copy of General Electric's latest Annual Report was submitted to the Commission on *April 12, 1967*.

The financial qualifications of SAEA are evidenced by the agreement among the member utilities of SAEA dated July 22, 1963 and the financial statements of the member utilities, copies of which are attached hereto as Exhibit "C".

The financial qualifications of Gesellschaft are evidenced by the attached Declaration of the Federal Republic of Germany.

7. Technical Qualifications

(a) A general description of technical qualifications of General Electric, which will construct and operate SEFOR, is set forth in the license application in Docket 50-183. General Electric further submits that it has engaged in a number of projects commencing in 1947 which are related to the design, construction, and operation of sodium-cooled reactors. There are approximately 250 engineers and scientists in the employ of General Electric's *Nuclear Energy Division* who have direct experience in sodium-cooled reactors and related equipment. The qualifications of *four* such employees who will have primary responsibilities concerning the design or construction of SEFOR are as follows:

Dr. Karl Paley Cohen, General Manager, Advanced Products Operation

Dr. Cohen received his B.A. degree in 1933, his M.A. degree in 1934, and his PhD in Physical Chemistry in 1936. All degrees were received from Columbia University. Dr. Cohen, who was born in New York City, New York, is now residing in Palo Alto, California.

Dr. Cohen is a 25-year veteran in the atomic field. He was assistant to Professor H.C. Urey of Columbia University from 1938 to 1940, and was one of the pioneers in the early

scientific work that eventually led to the Manhattan Project. From 1940 to 1944, Dr. Cohen was Director of the Theoretical Division of the Manhattan Project at Columbia University. In this capacity, he made major contributions to the development of the Gaseous Diffusion Plant. Summing up this work, he wrote a book, "Isotope Separation" (one of the National Nuclear Engineering Series), which is the standard reference work in the field.

Dr. Cohen was a physicist and adviser on atomic energy matters for the Standard Oil Development Company (now ESSO Research and Engineering Company) for four years. Subsequently, he became Technical Director for the H.K. Ferguson Company, which constructed the Brookhaven reactor and radioactive laboratory, from 1948 to 1952. In 1952, Dr. Cohen founded the Walter Kidde Nuclear Laboratories, and served as Vice President for three and one-half years. During this period he was a prime advocate of the slightly enriched uranium, water-moderated reactor concept for power generation, and was instrumental in securing acceptance of the concept.

Dr. Cohen joined the General Electric Company in 1955 as a Consulting Engineer, and was appointed in 1956 to the position of Manager, Advance Engineering, in the Atomic Power Equipment Department of General Electric. Advance Engineering was reorganized in 1964, into the (*) Advanced Products Section,*and in 1965 to the present department-level operation.* Among other functions, as Manager of that *component*, Dr. Cohen is in charge of General

Electric's development of fast breeder reactors for central station power application.

Dr. Cohen also holds several patents in nuclear reactor technology and isotope separation. He is past Treasurer and a Fellow of the American Nuclear Society, and on many occasions has served as a Consultant to the Atomic Energy Commission and other government agencies in reactor physics, separations chemistry, and isotope separation.

Dr. Bertram Wolfe, Manager, *Plant Engineering & Projects Section*

Dr. Wolfe received his B.A. in Physics from Princeton University in 1950. He received a PhD in Physics from Cornell University in 1954.

At Cornell University, Dr. Wolfe was a National Science Foundation predoctorate fellow, taught undergraduate physics courses, and participated in high energy nuclear physics research, using the 300 MW Cornell Synchrotron. Upon receiving his PhD in nuclear physics from Cornell in 1954, Dr. Wolfe joined the Eastman Kodak Company, Naval Ordnance Division, where he worked in research on guided missiles.

In July of 1955, he came to the Atomic Power Equipment Department and was placed in charge of the physics work on the 175 Megawatt Engineering Test Reactor now operating at the AEC Reactor Testing Station in Idaho. As Manager of Special Reactor Physics, he supervised physics work on a number of reactors,

including the General Electric 3 Megawatt Swimming Pool Reactor, the 10 Megawatt Radiation Effects Reactor now operated by the Lockheed Aircraft Corporation, the 30 Megawatt General Electric Test Reactor, and the Vallecitos Boiling Water Reactor.

In 1959, Dr. Wolfe was appointed to the position of Manager, Conceptual Design & Analysis, where he was responsible for design and analysis of advanced nuclear systems having the potential for improving either the economics or performance of nuclear power plants. This involved work on diverse systems such as sodium graphite, gas-cooled, and organic-cooled reactors. In this capacity, he made major contributions to the design and development work on the Fast Ceramic Reactor and the Mixed Spectrum Superheater. He also played an important role in formulating the research program and the initial conceptual design for the SEFOR reactor, which is intended to demonstrate that fast ceramic fueled power reactors can be designed with desirable operating and safety characteristics.

At the start of the SEFOR project in 1964, Dr. Wolfe was appointed Manager, SEFOR Engineering & Development, *later changed to Plant Engineering & Projects Section,* with responsibility for both the engineering of the reactor and the SEFOR research and development program.

Dr. Wolfe has published over 25 papers and articles in such journals as PHYSICAL REVIEW, JOURNAL OF NUCLEAR ENGINEERING, NUCLEONICS, and NUCLEAR SCIENCE AND ENGINEERING. Among these are "Fundamental Factors of

Test Reactor Design, " "On Superheat and the Mixed Spectrum Superheater, " "A Generalized Equivalence Theorem for Resonance Escape in Heterogeneous Systems, " "Shielding Aspects of Nuclear Power Plants for Marine Propulsion, " and "Development of the Fast Ceramic Reactor." Recently he has been working on Meltdown Accident Analyses in fast reactors and has published several papers on this subject.

*Jesse O. Arterburn, Manager, SEFOR Facility

Mr. Arterburn was awarded his B.S. in Physics from Georgia Institute of Technology in 1952 Magna Cum Laude and accomplished graduate study in mathematics at the University of Cincinnati (1953-1955) and at San Jose State (1956-1957).

He joined the Aircraft Nuclear Propulsion Department (ANPD) of General Electric at Oak Ridge, Tennessee, in January 1952 as an experimental physicist. Subsequent to the move of ANPD to Cincinnati and until the Fall of 1955, Mr. Arterburn was responsible for the physics measurements for the ANPD critical experiment programs. In September of 1955 he transferred to the Atomic Power Equipment Department and assumed responsibility for the critical experiments and nuclear measurements for a number of reactor projects including the Engineering Test Reactor, Lockheed Radiation Effects Reactor, Spanish Pool Reactor and the Dresden Critical.

In January 1958 he was assigned responsibility for the Operations Physics of the Vallecitos Boiling Water Reactor, the General Electric

Test Reactor and the associated experiments. As Manager-Operations Physics he pioneered in the adaptation of reactor design analyses and techniques to the prediction of the variable characteristics and behavior of operating reactors and experiments. In this capacity he was responsible for the physics and thermal-hydraulics of the operating plants, for the design of numerous experiments and fuel assemblies, the upgrading of performance of the VBWR and GETR, and in 1963 and 1964 the startup and operation of the ESADA-Vallecitos Experimental Superheat Reactor.

In his present position Mr. Arterburn is responsible for all activities at the SEFOR site including the operation of the facility and the conduct of the SEFOR Experimental Program.*

Katsumi Hikido, *Manager, Safeguards & Analysis Unit*

Mr. Hikido graduated from Stanford University in 1950 with a B.S. in Physics. In 1951, Mr. Hikido received an M.S. in Engineering Mechanics from Stanford.

Following his graduation from Stanford University, Mr. Hikido was employed as a physicist by the National Bureau of Standards in the summer of 1950. He completed his requirements for his Master's Degree in 1951 and was employed as an Aeronautical Research Scientist by the National Advisory Committee for Aeronautics from 1951 to 1956. His work involved the conducting and evaluating of both theoretical and experimental studies of compressib

fluid flow and dynamic stability problems associated with the development of supersonic missiles and airplanes.

Since coming to the Atomic Power Equipment Department of General Electric in 1956, he has performed design analysis work on a number of reactor projects, including the Lockheed Radiation Effects Reactor, General Electric Test Reactor, and the General Atomic Irradiation Loop for the GETR. He has also participated in various reactor feasibility studies, including studies resulting in the conceptual design of a 75 MWe Mixed Spectrum Superheating Reactor (MSSR) prototype and a proposal for an experimental fast oxide reactor.

The former study led to a contract to design and construct the Mixed Spectrum Critical Assembly for which Mr. Hikido was assigned technical leadership responsibilities. This critical assembly, now in operation at the Vallecitos Atomic Laboratory, is providing physics data to confirm the feasibility of the Mixed Spectrum Superheater concept and to provide design information for the 75 MWe MSSR prototype.

In his present position, Mr. Hikido has responsibility for safeguards and design analysis for SEFOR.

- (b) While the member utilities companies of SAEA have had many years of experience in the operation of fossil-fueled electric generation stations, SAEA has no present intention of participating in the operation or direction of the operation of SEFOR. Since General Electric will be responsible for construction and operation of SEFOR, SAEA considers that licensing administrative responsibilities should be exercised by General

Electric. Accordingly, SAEA hereby authorizes General Electric, to act for SAEA as well as itself, and General Electric assumes responsibility for acting for SAEA as well as itself, in submitting future amendments to this application and correspondence relating to the application or to the licenses which have been requested herein other than such information which the Commission may wish to obtain directly through SAEA alone.

8. Completion Date

The earliest completion date for SEFOR is estimated to be May 1, 1967, and the latest completion date is estimated to be November 1, 1967.

9. Security Agreement

SAEA and General Electric agree that they will not permit any individual to have access to restricted data until the Civil Service Commission shall have made an investigation and report to the Atomic Energy Commission on the character, associations, and loyalty of such individual and the Atomic Energy Commission shall have determined that permitting such person to have access to restricted data will not endanger the common defense and security.

10. Future Amendment Procedure

This application has been prepared in a manner designed to permit future application amendments to be consolidated into a single integrated document for more efficient use and ready reference. Subsequent application amendments will identify the amendment by

Electric. Accordingly, SAE. hereby authorizes General Electric, to act for SAEA as well as itself, and General Electric assumes responsibility for acting for SAEA as well as itself, in submitting future amendments to this application and correspondence relating to the application or to the licenses which have been requested herein other than such information which the Commission may wish to obtain directly through SAEA alone.

8. Completion Date

The earliest completion date for SEFOR is estimated to be *April 1, 1968*, and the latest completion date is estimated to be *December 1, 1968.*

9. Security Agreement

SAEA and General Electric agree that they will not permit any individual to have access to restricted data until the Civil Service Commission shall have made an investigation and report to the Atomic Energy Commission on the character, associations, and loyalty of such individual and the Atomic Energy Commission shall have determined that permitting such person to have access to restricted data will not endanger the common defense and security.

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Electric. Accordingly, SAEA hereby authorizes General Electric to act for SAEA as well as itself, and General Electric assumes responsibility for acting for SAEA as well as itself in submitting future amendments to this application and correspondence relating to the application or to the licenses which have been requested herein other than such information which the Commission may wish to obtain directly through SAEA alone.

8. Completion Date

The earliest completion date for SEFOR is estimated to be *September 1, 1967,* and the latest completion date is estimated to be *March 1, 1968.*

9. Security Agreement

SAEA and General Electric agree that they will not permit any individual to have access to restricted data until the Civil Service Commission shall have made an investigation and report to the Atomic Energy Commission on the character, associations, and loyalty of such individual and the Atomic Energy Commission shall have determined that permitting such person to have access to restricted data will not endanger the common defense and security.

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Subsequent application amendments will identify the amendment by

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Electric. Accordingly, subject to the Commission's approval, SAEA will by amendment to this application authorize General Electric to act for itself and for SAEA in submitting (a) any future amendments to this application and (b) any other correspondence relating to the application and to the licenses which have been requested herein other than such information which the Commission may wish to obtain directly through SAEA alone.

8. Completion Date

The earliest completion date for SEFOR is estimated to be May 1, 1967, and the latest completion date is estimated to be November 1, 1967.

9. Security Agreement

SAEA and General Electric agree that they will not permit any individual to have access to restricted data until the Civil Service Commission shall have made an investigation and report to the Atomic Energy Commission on the character, associations, and loyalty of such individual and the Atomic Energy Commission shall have determined that permitting such person to have access to restricted data will not endanger the common defense and security.

10. Future Amendment Procedure

This application has been prepared in a manner designed to permit future application amendments to be consolidated into a single integrated document for more efficient use and ready reference. Sub-

sequent application amendments will identify the amendment by

license and/or docket number, describe the objectives of the amendment, and identify new or revised pages. Revised or additional information will be enclosed by asterisks.

To the best of our knowledge and belief the information contained herein is accurate.

Respectfully submitted,

Attest: *[Signature]*

SOUTHWEST ATOMIC ENERGY ASSOCIATES

By *[Signature]*

Subscribed and sworn to before

me this 14th day of October, 1964

Derrel R. Williams
Derrel R. Williams
Notary Public In And For Caddo Parish, La.

GENERAL ELECTRIC COMPANY

Attest: *James T. Hughes*

By *Geobwhite*

Subscribed and sworn to before

me this 16th day of October, 1964

[Signature]
F. E. LORD
My Commission Expires Sept. 5, 1968
State of California
County of Santa Clara

EXHIBIT A

SOUTHWEST ATOMIC ENERGY ASSOCIATES

MEMBERS

Arkansas-Missouri Power Company
Arkansas Power & Light Company
Central Louisiana Electric Company, Inc.
The Central Kansas Power Company
The Empire District Electric Company
Gulf States Utilities Company
Kansas Gas and Electric Company
Louisiana Power & Light Company
Mississippi Power & Light Company
Missouri Public Service Company
Missouri Utilities Company
New Orleans Public Service Inc.
Oklahoma Gas and Electric Company
Public Service Company of Oklahoma
Southwestern Electric Power Company
D. E. Ackers
(The Kansas Power and Light Company)
E. P. Hennek
(Western Light & Telephone Company, Inc.)

TRUSTEES

Mr. C. C. Czeschin, President
Arkansas-Missouri Power Company
104 South Fifth Street
Blytheville, Arkansas

TRUSTEES (Cont'd.)

Mr. Reeves Ritchie, President
Arkansas Power & Light Company
Ninth and Louisiana Streets
Little Rock, Arkansas

Mr. F. H. Coughlin, President
Central Louisiana Electric Company, Inc.
415 Main Street
Pineville, Louisiana

Mr. John Stewart, President
The Central Kansas Power Company
111 East 11th Street
Hays, Kansas

Mr. J. T. Jones, President
The Empire District Electric Company
602 Joplin Street
Joplin, Missouri

Mr. Harold E. Mortimer
Director of Rates & Depreciation
Gulf States Utilities Company
P. O. Box 2951
Beaumont, Texas

Mr. G. W. Evans, President
Kansas Gas and Electric Company
201 North Market Street
Wichita, Kansas

Mr. D. E. Ackers, Chairman of Board
The Kansas Power and Light Company
808 Kansas Avenue
Topeka, Kansas

Mr. W. O. Turner, Chairman of Board
Louisiana Power & Light Company
142 Delaronde Street
New Orleans, Louisiana

Mr. R. B. Wilson, President
Mississippi Power & Light Company
Electric Building
Jackson, Mississippi

TRUSTEES (Cont'd.)

Mr. R. C. Green, President
Missouri Public Service Company
10700 East 50 Highway
Kansas City, Missouri

Mr. Ray W. Call, President
Missouri Utilities Company
400 Broadway
Cape Girardeau, Missouri

Mr. L. J. Cucullu, Vice President
New Orleans Public Service Inc.
317 Baronne Street
New Orleans, Louisiana

Mr. D. S. Kennedy, President
Oklahoma Gas and Electric Company
321 North Harvey Street
Oklahoma City, Oklahoma

Mr. D. J. Tuepker, President
Public Service Company of Oklahoma
600 South Main Street
Tulsa, Oklahoma

Mr. J. Robert Welsh, President
Southwestern Electric Power Company
P. O. Box 1106
Shreveport, Louisiana

Mr. E. P. Hemek, President
Western Light & Telephone Company, Inc.
P. O. Box 763
Great Bend, Kansas

OFFICERS

President

J. Robert Welsh, President
Southwestern Electric Power Company
P. O. Box 1106
Shreveport, Louisiana

Vice-President

W. O. Turner, Chairman of the Board
Louisiana Power & Light Company
142 Delaronde Street
New Orleans, Louisiana

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OFFICERS (Cont'd.)

Vice-President

G. W. Evans, President
Kansas Gas and Electric Company
201 North Market Street
Wichita, Kansas

Treasurer

A. B. Coen, Treasurer
Arkansas Power & Light Company
P. O. Box 57
Pine Bluff, Arkansas

Secretary

R. E. Kerns, Secretary
Oklahoma Gas and Electric Company
321 North Harvey Street
Oklahoma City, Oklahoma

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EXHIBIT B
GENERAL ELECTRIC COMPANY
DIRECTORS AND OFFICERS

DIRECTORS

J. Paul Austin	Atlanta, Ga.
Fred J. Borch	New York, N.Y.
Charles D. Dickey	New York, N.Y.
Edwin D. Harrison	Atlanta, Ga.
Frederick L. Hovde	Lafayette, Ind.
Gilbert W. Humphrey	Cleveland, Ohio
John E. Lawrence	Boston, Mass.
Ralph Lazarus	Cincinnati, Ohio
Edmund W. Littlefield	San Francisco, Calif.
George H. Love	Pittsburgh, Pa.
Thomas B. McCabe	Philadelphia, Pa.
Neil H. McElroy	Cincinnati, Ohio
Dean A. McGee	Oklahoma City, Okla.
George G. Montgomery	San Francisco, Calif.
Henry S. Morgan	New York, N.Y.
Gerald L. Phillippe	New York, N.Y.
Gilbert H. Scribner, Jr.	Chicago, Ill.
Robert T. Stevens	New York, N.Y.
Walter B. Wriston	New York, N.Y.

OFFICERS

Chairman of the Board	Gerald L. Phillippe	New York, N.Y.
President	Fred J. Borch	New York, N.Y.

OFFICERS (Cont'd.)
Vice Presidents

Hershner Cross	New York, N.Y.
James H. Goss	New York, N.Y.
Jack S. Parker	New York, N.Y.
Charles K. Rieger	New York, N.Y.
Herman L. Weiss	New York, N.Y.
S. Wellford Corbin	Schenectady, N.Y.
Donald E. Craig	Schenectady, N.Y.
Walter D. Dance	Chicago, Ill.
L. Berkley Davis	Owensboro, Ky.
Virgil B. Day	New York, N.Y.
William H. Dennler	Louisville, Ky.
Oscar L. Dunn	Erie, Pa.
Robert M. Estes	New York, N.Y.
Robert L. Gibson	Pittsfield, Mass.
Hubert W. Gouldthorpe	Philadelphia, Pa.
George L. Haller	Schenectady, N.Y.
Reginald H. Jones	Bridgeport, Conn.
Milton F. Kent	Schenectady, N.Y.
Harold A. MacKinnon	Fort Wayne, Ind.
Francis K. McCune	New York, N.Y.
Halbert B. Miller	New York, N.Y.
Gerhard Neumann	Lynn, Mass.
Hilliard W. Paige	Philadelphia, Pa.
Louis T. Rader	New York, N.Y.

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OFFICERS (Cont'd.)

Vice Presidents

Charles E. Reed	Bridgeport, Conn.
Willard H. Sahloff	Bridgeport, Conn.
J. Stanford Smith	New York, N.Y.
Hoyt P. Steele	New York, N.Y.
C. Guy Suits	Schenectady, N.Y.
William C. Wichman	New York, N.Y.
Laurence I. Wood	Washington, D.C.

Comptroller

Robert E. Pfenning	New York, N.Y.
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Treasurer

John D. Lockton	New York, N.Y.
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Secretary

Robert M. Estes	New York, N.Y.
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Regional

Vice Presidents

Thomas K. Edenfield	Atlanta, Ga.
Harry P. Gough	San Francisco, Calif.
Edwin H. Howell	Dallas, Texas
George L. Irvine	Chicago, Ill.
William A. Mann	St. Louis, Mo.
Charles J. Miller	Cleveland, Ohio
F. Charles Ruling	Philadelphia, Pa.
John A. Spencer	New York, N.Y.

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